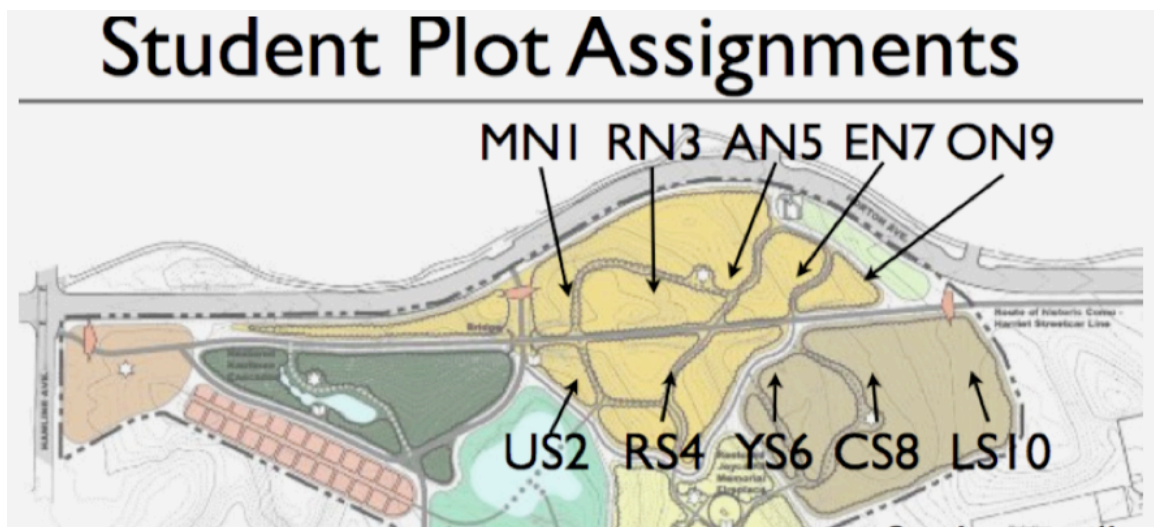


# Integrating EE into Saint Paul Public Schools Science Instruction

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Final Report September 2013



# Integrating EE into Saint Paul Public Schools Science Instruction

## *Introduction*

The EPA Environmental Grant was awarded for implementation in Saint Paul Public Schools (SPPS) for the 2012-13 school year. Also, in 2012-13, SPPS district policy on the amount of science education and site-level professional development time increased for all elementary teachers. Specifically, students received 100 minutes of science instruction each week and teachers time to meet in PLC's doubled for a total of 100 minutes weekly as well. Therefore, the time for teaching and learning increased, furthering the opportunities of participants' time to plan and deliver outdoor lessons.

The EPA grant focused on supporting teachers through a gradual release of responsibility model, with the PI of the grant, Joshua Leonard, modeling outdoor lessons and supporting teachers while they transitioned from the learner to the facilitator of outdoor lessons. At the outset, teachers were given the opportunity to be the learner experiencing what their students would experience and allowing them to observe best practices in outdoor teaching. The program support of a mentor, equipment and transportation to outdoor sites gave teachers the support they needed to effectively increase and improve outdoor instructional practices with more in-depth support initially and slowly releasing that responsibility completely to the participating classroom teachers and science specialists.

This report summarizes the data collected to evaluate the SPPS EPA Environmental Education Grant, "Integrating Environmental Education into Saint Paul Public Schools Science Instruction" – herein referred to as the "EPA grant project". It is organized by the four outcomes identified in the Project Evaluation section of the Work Plan.

## *Program Highlights*



**2,700 Student Experiences Outdoors**

We liked learning about, "How the environment works, what lives outside and how their adaptations work and where their habitats are."

Darynaisha, SPMA 5<sup>th</sup> grade

For the 2012-13 school year, all 14 participating teachers conducted a minimum of 3 outdoor lessons, with several conducting up to 20 totaling more than **2,700 student experiences outdoors.**

“The experiences never would have happened [without the grant]”  
– Todd Marder, Science Specialist, Saint Paul Music Academy.

Student experiences included lessons on comparing Minnesota’s three biomes, measuring the surface area and volume of a pond, climate analysis of an urban woodland, and the Comparative cultural and environmental history of two Native American holy sites. Other outdoor lessons were as simple as stepping outside to make observations using the five senses to write a poem.

*“I hear, I hear a bird, a bird  
I hear, I hear the wind, the wind  
I see, I see an ant, an ant  
I feel, I feel a tree, a tree  
I smell, I smell the rain the rain”*

Hailey, 1<sup>st</sup> grade student, Mrs. Cheryl Dinger’s class

Teaching outside was effective for student learning. The most striking feedback from students was how memorable their outdoor lessons were. Students were asked, “How many times did your teacher take you outside this year?” Regardless if students were in 1<sup>st</sup> grade or 8<sup>th</sup> grade they gave instant and accurate responses. When asked if they could remember what they did outside, students gave detailed descriptions of each lesson and what they learned from each experience. Considering these interviews took place in late May, and the outdoor lessons started in early September, that is quite an accomplishment. Furthermore, the same students could not describe what they had done inside the classroom the week prior or the week after going outside, *unless it had something to do with their outdoor learning.*

Participating teachers will continue to teach outside. When asked, teachers indicated their strong interest, and greater likelihood, of teaching outdoors after the EPA grant project was completed.

“The EPA grant gave me practice teaching outside... and pushed me to do it. I am looking for more [academic] standards to connect with the outdoors.”

– Amber Osterkamp, teacher, grades 4-6, J. J. Hill Montessori.

As outlined in the EPA grant application, following are the activities and corresponding teachers who completed each program component.

Grant Activities Completed	N	%
Summer training	14	93.3
Belwin Outdoor Science field trip	14	100*
Outdoor field trip lesson(in collaboration with BOS Education Director)	14	100*
Independently planned and completed outdoor lesson plan	14	100*

**\*Note:** The grant project intended to include 15 teachers. In June, 2012 registration was capped at 17 teachers to allow for two alternates in the case of cancellation. All 17 slots were filled in June, 2012. On July 31, 2012 all 15 participating teachers re-confirmed their registration. One teacher canceled at 10:00 a.m. on August 7, an hour and a half after training started. The late timing of her cancellation made it impossible for alternate teachers to participate. The project continued with 14 teachers throughout the 2012-2013 school year.

One hundred percent of participants participated in the field trip to Belwin Outdoor Science facilities. Additionally, 85% of the teachers used the school grounds for outside lessons and 46% used local parks, reserves and refuges or other outdoor locations beyond the school property.

The goal of the project was to train teachers to independently lead outdoor field trips for their students in order to promote care and respect of the natural world. Proficiency was measured by conducting at least one independent outdoor lesson. 100% of participating teachers completed this requirement, and many of the participants went above and beyond this requirement indicating a successful project.

Overall, teachers strongly indicated the opportunities and positive impact of the EPA grant. Teachers mentioned the time the grant gave them to learn and access to the expertise they needed to understand and become comfortable with outdoor teaching. All the teachers participating in the EPA grant program identified positive values this project brought to their instructional practice. They most often cited time and opportunity to develop their instructional skills in a way not otherwise viable/feasible/unlikely. Even with their own strong interest in outdoor teaching many teachers acknowledged they would have been unlikely to pursue if it were not for this grant.

“Best day in a long time. Took my kids on a nature photography scavenger hunt at the Minnesota Wildlife Refuge. So fun! I heard students say "Best day EVER!" My heart remembered today why I became a teacher in the first place.”

– Maureen Mahoney, Gifted and Talented grades 4-6, American Indian Magnet School

Survey results indicate teachers felt more confident in classroom management and more knowledgeable in environmental education content after the year-long professional learning opportunity.

Teachers identified the overarching ideas of general encouragement & logistical support and science content knowledge & skills as the specific supports they believe the grant provided.

Teachers most frequently cited the lack of exposure and way to observe outdoor lessons leading to their apprehension to more outdoor teaching. They were interested in the idea of using the outdoors and without someone to support the learning experience process, it did not seem feasible. Teachers also said they are had more to do than the school day and without the training and ongoing support, taking on a new endeavor was even less likely to happen.

Students have an overwhelming interest spending more time learning outdoors. Students recognize the value in learning from the “real world” with hands-on opportunities. Students said they had not known about the environment around them and saw the importance of that learning. And, 26 of the 27 students (96%) were able to identify learning that occurred outdoors. The majority of students interviewed, 24 out of 27 (89%) would prefer to spend more time learning outside rather than less.

### ***Project Evaluation Outputs & Outcomes***

The following outputs and outcomes were outlined in the SPPS EPA grant work plan in section c: project evaluation.

1. Teacher Recruitment
2. Summer Training at Belwin Outdoor Science
  - a. Teachers learn outdoor classroom management and environmental education content and curricula
  - b. Teachers conduct lessons in an outdoor green space
  - c. Environmental education is integrated with SPPS science instruction
3. Field Trip to Belwin Outdoor Science.
  - a. Students demonstrate their learning through outdoor instruction (sample of students will be interviewed).
  - b. Students share their beliefs about learning outdoors (sample of students will be interviewed).
4. Field Trips to Neighborhood Green Spaces
  - a. Teachers plan and implement an outdoor field trip/lesson.
  - b. Teachers observe and reflect on students’ attitudes, behaviors and learning.
  - c. Teachers reflect and offer feedback on the comprehensiveness of the EPA trainings and support.
  - d. 5<sup>th</sup> grade science MCA results will improve (available in August 2013)

### ***Data Collection***

To ascertain the extent to which the outcomes identified in the grant were met, the following evaluation activities were completed:

#### ***Summer professional development pre-and post-survey***

A pre- and post-training survey was administered with the 2012 summer training with the purpose of determining the extent to which the professional development met its intended objectives. The survey also provided baseline information on teachers’ use of outdoor spaces for lessons.

### Teacher Interviews

The goals of the teacher interviews were to gather information about participants experience with outdoor lesson(s), capture their reflections on teaching outdoors and this grant program, and to ascertain their future plans for using the outdoors as a classroom. All 14 teachers and specialists were interviewed.

### Student Interviews

The goals of the student interviews were to gauge their learning and interests in outdoors lessons (compared to indoors) and capture impressions of their outdoor experiences this year. A sample of students (n=27) of participating teachers were interviewed.

### Lesson plan review

Within the role of coach Josh Leonard worked individually with teachers to review, support and improve lesson delivery in an outdoor environment. Teachers shared their lessons with other teachers in their EPA cohort including posting some of their lesson online ([http://belwin.spps.org/epa\\_grant\\_teachers.html](http://belwin.spps.org/epa_grant_teachers.html)).

### MCA III Science Test Scores:

Of the students participating in the EPA grant project, only those in grade 5 and 8 are tested on the MCA III Science exam. 53% of the students in five of the eight schools involved in the grant tested in the MCA III Science exams in 2013. Three schools involved in the EPA grant project did not have students that both participated in the grant *and* tested in the MCA III Science exam, and therefore do not have MCA III Science scores applicable to this project.

Grade	Number of Students Involved in EPA Grant Project 2012-2013
1 <sup>st</sup>	49
2 <sup>nd</sup>	22
3 <sup>rd</sup>	51
4 <sup>th</sup>	41
5 <sup>th</sup>	182
6 <sup>th</sup>	15
8 <sup>th</sup>	25
Total	385

### *Teacher Recruitment and Participation*

The grant project intended to include 15 teachers that needed to participate in the initial training August 7-9, 2012. In June, 2012 registration for the training was capped at 17 teachers to allow for two alternates in the case of cancellation. All 17 slots were filled in June, 2012. One week prior to training on July 31, 2012 all 15 participating teachers re-confirmed their registration. On August 7 one teacher canceled at 9:52 a.m., an hour and a half after training began. At that point alternate teachers were unable to participate. The project continued with 14 teachers throughout the 2012-2013 school year. All 14 teachers completed the program.

Recruitment efforts attempted to match an elementary science specialist with a 3<sup>rd</sup> or 5<sup>th</sup> grade teacher from the same school. SPPS science coaches advised that teachers are more successful at retaining and implementing new skills when there is at least one other

person that has received similar training in his/her building to act as a small cohort. The program's goal was to connect students to nature through outdoor science experiences. These experiences could be short, 30-60 minute lessons outdoors, but also encouraged deeper exploration through half or full-day long field excursions.

Given the scientific lens of the grant, science specialists were recruited to the program. However, elementary science specialists have significant scheduling obstacles to leave the building for more than 45 minutes. Elementary classroom teachers are able to take their students on half-day to full-day field trips. Classroom teachers are not responsible for teaching science content, and therefore had different curricular goals including English Language Arts and Math.

Teachers participating in the EPA grant program held the following teaching roles:

Classroom teacher: 8  
 Science specialist: 5  
 Gifted & Talented (G&T) specialist: 1

Table 1 displays the participating EPA participating teachers by school as well as the students interviewed for the evaluation.

**Table 1.**

School	Number Teachers	Number Students Interviewed
American Indian Magnet	2	6
Farnsworth Aerospace	2	6
Hamline	2	3
JJ Hill	1	3
French Immersion	1	2
Murray Junior	1	2
St. Paul Music Academy	2	2
The Heights	3	3
Total	14	27

The students' interviewed for the evaluation ranged in grade level from 1<sup>st</sup> grade through 8<sup>th</sup> grade. Table 2 shows the number of students at each grade level interviewed for the grant.

**Table 2.**

Grade	Number of Students Interviewed
1 <sup>st</sup> Grade	5
2 <sup>nd</sup> Grade	6
3 <sup>rd</sup> Grade	3
4 <sup>th</sup> Grade	5
5 <sup>th</sup> Grade	4
6 <sup>th</sup> Grade	2
8 <sup>th</sup> Grade	2
Total	27

**Table 3.**

Race	Number of Students Interviewed	% of Students Interviewed	% District Students
American Indian	5	21%	2%
Asian American	3	13%	31%
Hispanic/Latino	2	8%	14%
African American	7	29%	30%
Caucasian	7	29%	24%
Total	24	101%*	101%*
Students of Color and American Indian			
Total	17	71%	75%

\*Total does not equal 100 due to rounding

For the 2012-13 school year, teachers participating in the EPA grant program each students in the following grade levels: (Participating science and G&T specialists teach more than one grade level.)

Table 4 displays the grade levels taught by teachers and specialists participating in the EPA grant for the 2012-13 school year.

**Table 4.**

Grade Level	Number Teaching Grade Level*
1 <sup>st</sup> Grade	1
2 <sup>nd</sup> Grade	2
3 <sup>rd</sup> Grade	3
4 <sup>th</sup> Grade	4
5 <sup>th</sup> Grade	6
6 <sup>th</sup> Grade	3
8 <sup>th</sup> Grade	3

\* Total is greater than the 14 participants due to Science and G&T specialists teaching more than one grade level.

### ***Summer training at Belwin Outdoor Science***

A total of 14 participants completed the pre-training survey and 12 participants completed the post-training survey. Pre- and post-training survey demonstrated an increase in teacher's perceived efficacy in teaching outdoor lessons (including classroom management). Pre- and post-training surveys were used to determine the extent to which teachers learn outdoor classroom management and environmental education content and curricula. Survey results indicate teachers felt more confident in classroom management and more knowledgeable in environmental education content. Survey results include:



- Using a scale of 1 to 9 (1=Nothing to 9=A Great Deal), the average score for the question, “How much can you do to motivate students who show low interest in school work?” increased from 5.9 on pre-training surveys to 7.4 on their post-training surveys.
- Using the same scale, the average score for the question, “How well can you establish routines to keep activities running smoothly *in an outdoor setting?*” increased from 6.7 on the pre-training survey to 7.2 on their post-training survey.
- Using the same scale, the average score for the question, “How well can you respond to defiant students *in an outdoor setting?*” increased from 5.9 to 7.0 from their pre- to post-training survey.
- When asked on their post-training survey what types of lessons they plan to teach outside this year, responses ranged from art, history, and math to specific science topics including observation activities, land forms, plants, and site restoration.

Using a nine-point Likert scale (1=nothing to 9=a great deal), Table 5 shows the average pre- and post-test scores.

**Table 5: Summer Training Pre and Post Survey Results**

	Avg Pre-test Score	Pre-test N	Avg Post-test Score	Post-test N
<b>Instructional Strategies and Student Engagement</b>				
How much can you gauge student comprehension of what you have taught in the classroom?	7	14	7	11
How much can you do to adjust your lesson to the proper level for individual students?	6.7	14	7.4	11
How much can you do to motivate students who show low interest in school work?	5.9	14	7.4	11
How much can you do to help your students value learning?	6.6	14	7.4	11
<b>Classroom Management</b>				
How much can you do to control disruptive behavior in the classroom?	7.6	14	--	--
How much can you do to control disruptive behavior <i>in an outdoor setting?</i>	6.9	14	7.2	9
How well can you establish routines to keep activities running smoothly in the classroom?	7.7	14	--	--
How well can you establish routines to keep activities running smoothly <i>in an outdoor setting?</i>	6.7	14	7.2	9
How well can you keep a few problem students from ruining an entire lesson in the classroom?	6.8	14	--	--
How well can you keep a few problem students from ruining an entire lesson <i>in an outdoor setting?</i>	6.1	14	6.8	9
How well can you respond to defiant students in the classroom?	6.7	14	--	--
How well can you respond to defiant students <i>in an outdoor setting?</i>	5.9	14	7	9

Feedback from the pre- and post-training surveys was incorporated into an outdoor education content and management checklist for teachers to utilize in planning and reflecting on their outdoor lessons. The checklist was provided to teachers for their first outdoor lesson implemented at Belwin. The first outdoor lesson had full support of Belwin staff and facilities enabling teachers to step back and observe how classroom

management and content could be delivered with their students in an outdoor environment. See Appendix B

**MCA III Science Data Analysis:**

Data Source: Minnesota Department of Education, “Data for Parents and Educators”

<http://w20.education.state.mn.us/MDEAnalytics/Reports.jsp>

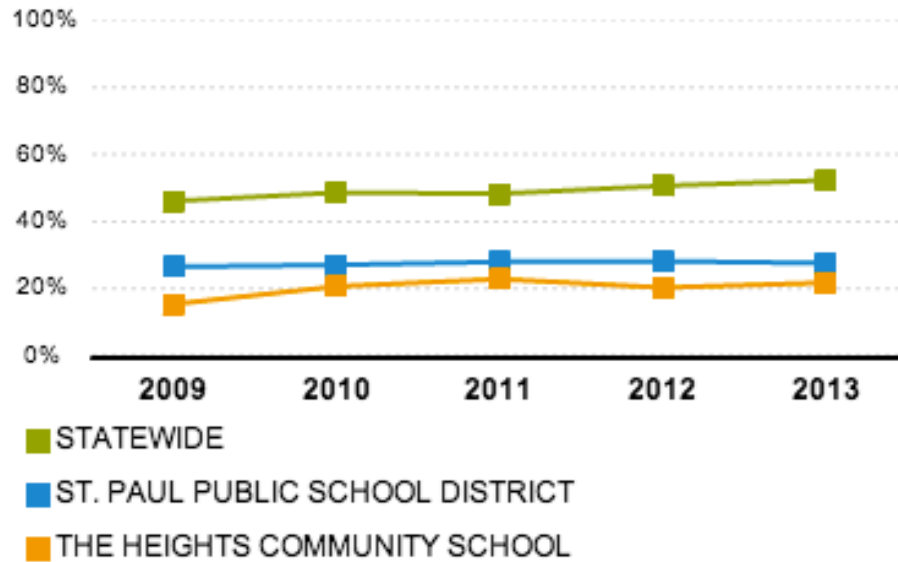
Name of School	% Proficient	N Tested	N Grant Participants	% Tested Involved in Grant
MCA 2012	20.3%	64	NA	0%
MCA 2013	21.8%	55	29	52.7%
Change	+1.5%	NA	NA	NA

**Relevance of School-Level Data:**

One goal of the grant project was to increase the percent of students proficient in science as measured by the MCA III Science assessment. Student science test score data are available at the school level.

The **change in percent proficient** is the most important number in the school data below. The relevancy of the percent change to the grant project is dependent on the percent students tested involved in the grant. In one school 100% of students tested on the MCA III Science exam participated in the project (L’Etoile du Nord French Immersion). In this case the EPA grant project has a stronger correlation to the percent change in science scores. In another school only 25 of 367 students, or 6.8% tested had participated in the EPA grant project (Murray Jr. High School), and therefore the grant project would have had very little impact on overall science scores for Murray Jr. High School students.

**Trend Proficiency**  
**Science All Grades**  
**All Students**



**THE HEIGHTS COMMUNITY SCHOOL**

1863 CLEAR AVE E SAINT PAUL MN 55119-4501

tel: 651 293 8815

preK-6

web: [www.spps.org](http://www.spps.org)

The Heights School	% Proficient	N Tested	N Grant Participants	% Tested Involved in Grant
MCA 2012	20.3%	64	NA	0%
MCA 2013	21.8%	55	29	52.7%
Change	+1.5%	NA	NA	NA

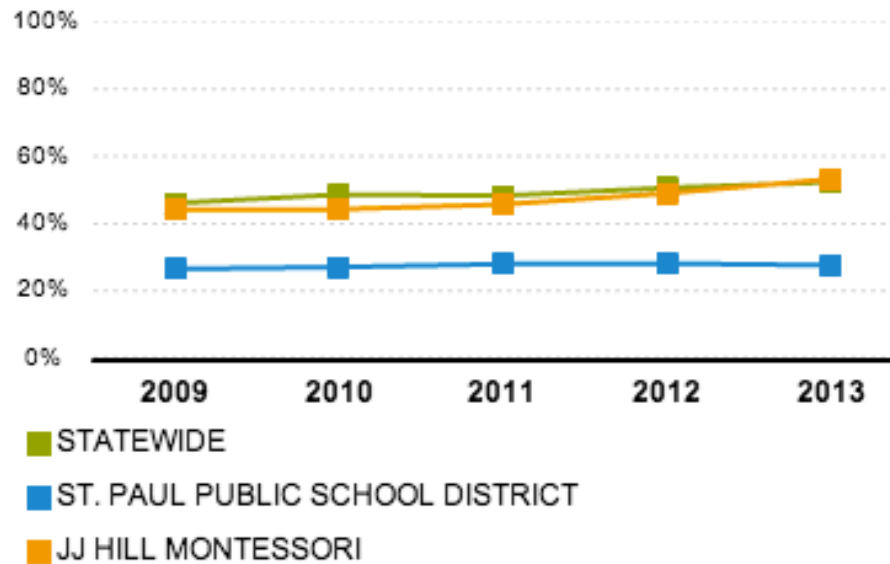
**School Level Analysis: The Heights Community School**

Although an increase of 1.5% is probably statistically insignificant, the 2013 score offsets a downward trend from 2011-2012. Also, the minor increase in scores at The Heights Community School is in contrast to slightly lower scores district-wide (N=7,338)

### Trend Proficiency

#### Science All Grades

#### All Students



### JJ HILL MONTESSORI

998 SELBY AVE SAINT PAUL MN 55104-6532

tel: 651 293 8720

preK-6

web: [www.spps.org](http://www.spps.org)

J.J. Hill Montessori	% Proficient	N Tested	N Grant Participants	% Tested Involved in Grant
MCA 2012	49.1%	53	NA	0%
MCA 2013	53.3%	45	30	66.7%
Change	+4.2%	NA	NA	NA

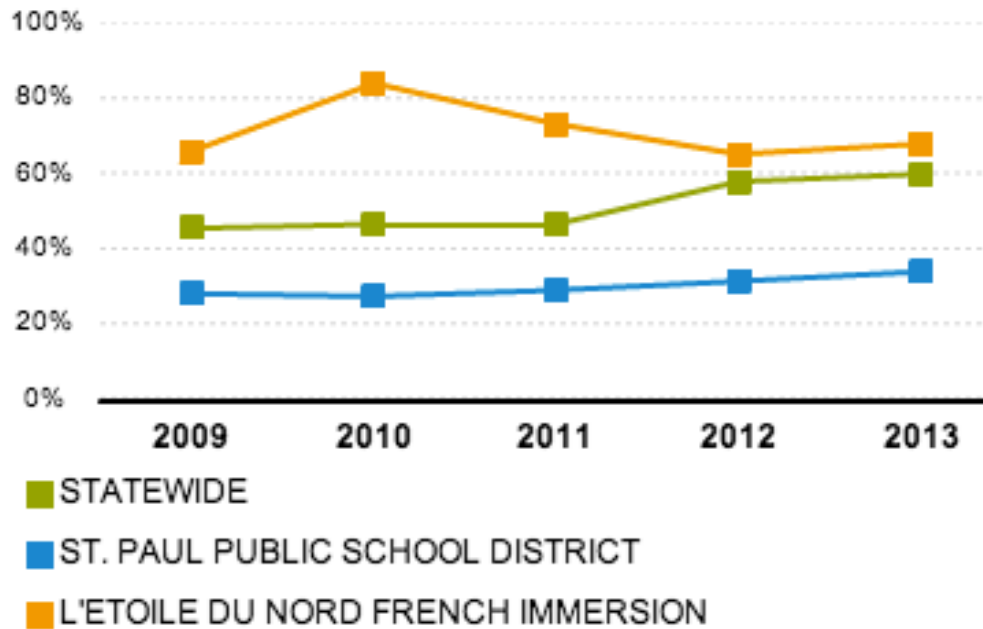
### School Level Analysis: J.J. Hill Montessori

An increase of 4.2% is probably statistically significant. Two thirds of the students tested at J.J. Hill Montessori participated in the grant project.

## Trend Proficiency

### Science 05

#### All Students



### L'ETOILE DU NORD FRENCH IMMERSION

1363 BUSH AVE E SAINT PAUL MN 55106-4199

tel: 651 221 1480

K-6

web:

L'Etoile du Nord French Immersion	% Proficient	N Tested	N Grant Participants	% Tested Involved in Grant
MCA 2012	65.2%	343	0	0%
MCA 2013	67.9%	56	56	100%
Change	+2.7%	NA	NA	NA

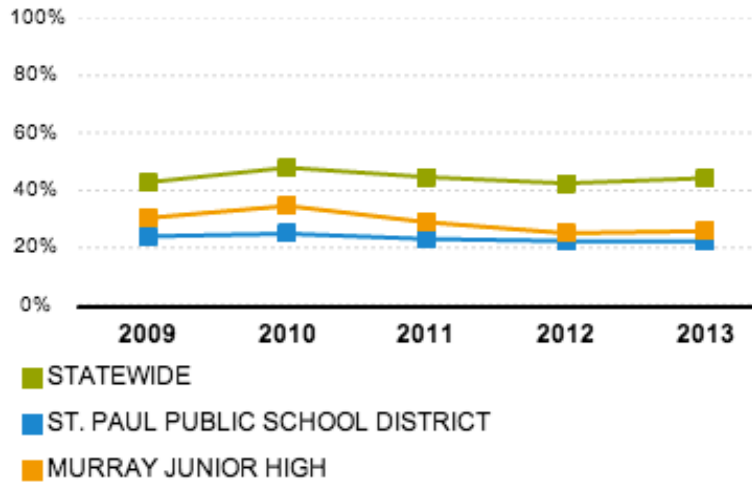
### School Level Analysis: L'Etoile du Nord French Immersion School

Although an increase of 2.7% could be statistically insignificant, the 2013 score offsets a three-year downward trend from 2010-2012. Also, the minor increase in scores at The L'Etoile du Nord is in contrast to slightly lower scores district-wide (N=7,338)

### Trend Proficiency

#### Science 08

#### All Students



#### MURRAY JUNIOR HIGH

2200 BUFORD AVE SAINT PAUL MN 55108-1400

tel: 651 293 8740

7-8

web: [www.spps.org](http://www.spps.org)

Murray Junior High School	% Proficient	N Tested	N Grant Participants	% Tested Involved in Grant
MCA 2012	25.1%	343	0	0%
MCA 2013	25.9%	367	25	6.8%
Change	+0.8%	NA	NA	NA

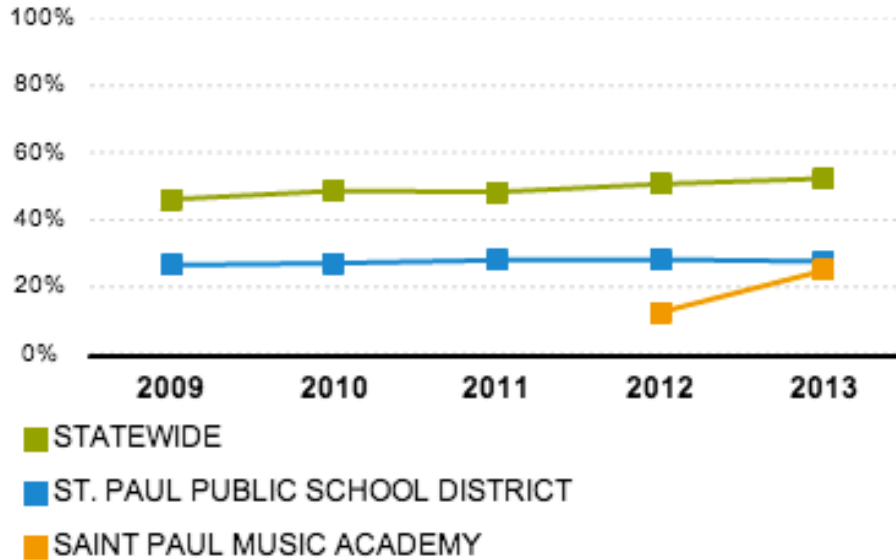
### School Level Analysis: Murray Junior High School

Although an increase of 0.8% could be statistically insignificant, the minor increase in 2013 MCA III Science scores offsets a three-year downward trend from 2010-2012. Also, the minor increase in scores at Murray Junior High School is in contrast to slightly lower scores district-wide (N=7,338). It should be noted that only 6.8% of students tested at Murray Junior High School participated in the grant project, and therefore MCA III Science scores are not an accurate measure of the grant's impact on participant's science learning. The Murray Junior High School outdoor education curriculum is a better measure of science and environmental education learning in this case.

## Trend Proficiency

### Science All Grades

#### All Students



### SAINT PAUL MUSIC ACADEMY

27 GERANIUM AVE E SAINT PAUL MN 55117-5067

tel: 651 293 8620

K-6

web: [www.spps.org](http://www.spps.org)

St. Paul Music Academy	% Proficient	N Tested	N Grant Participants	% Tested Involved in Grant
MCA 2012	12.5%	72	NA	0%
MCA 2013	25%	84	28	33.3%
Change	+12.5%	NA	NA	NA

### School Level Analysis: Saint Paul Music Academy (SPMA)

An increase of 12.5% in students' MCA III Science test scores is significant. One third of those tested at SPMA participated in the grant.

## Analysis of MCA III Science 2013 Scores

### Factors affecting MCA III Science scores

1. MCA III Science exams 6 to 8 weeks earlier than the previous year.
  - a. 2012 MCA III Science exams were taken in mid-April to early May
  - b. 2013 MCA III Science exams were taken in mid-March
2. Science proficiency for the SPPS school district overall fell 0.5% (N=7,388)
  - a. The lost instruction time from 2012 to 2013 is one explanation for the district wide lower science scores.
3. Weekly science instruction time increased at the elementary level in SPPS for 2012-2013

### Conclusions based on MCA III Science Data:

1. All participating schools maintained or increased MCA III Science proficiency while the average score for the school district dropped.
  - a. In several schools the MCA III Science scores increased for the first time after two or three years of decreasing test scores (L'Etoile du Nord, Murray Jr. High,
2. Although science teaching time increased per week in Saint Paul Public Schools' elementary grades, the earlier testing dates reduced the number of weeks science teachers had to prepare students for the exams.
3. Science is only tested in grades 5, 8 and once in high school (usually 10<sup>th</sup> grade). Only five of the eight participating schools included students' MCA testing scores.

MCA Testing scores are one tool to measure student science understanding. Although the results reflect well on the EPA grant project there are many complex factors influencing students test scores. For example, 5<sup>th</sup> grade students are tested on material from third, fourth and fifth grades.

Interview results provide much more detailed descriptions on the EPA grant project impact for teacher and student participants.

### *Interview Results*

Interviews were conducted in late May, 2013 to hear from teachers and students what they had experienced throughout the implementation of the 2012-2013 EPA grant project.

#### *How will you utilize the outdoors as a teaching space in the future?*

One of the desired outcomes from the training and subsequent coaching and support was for participating teachers to create and use outdoor lessons. For the 2012-13 school year, all 14 participants conducted a minimum of 3 outdoor lessons, with many conducting up to 20 totaling more than **2,700 student experiences outdoors**. Interview results indicate teachers found the support of the EPA invaluable. Responses to the question, "How will you utilize the outdoors as a teaching space in the future? How is this different than in the past?" provide strong evidence of the positive and lasting impact the EPA grant will have on teaching outdoors. Specifically, teachers identified the following (in descending order of frequency):

- Teach outdoor with greater frequency
- Utilize more the space around the school (and more often)
- Go to the garden/plant a garden



- See out other grants and funding find funding to allow for more outdoor learning (different sites, proper use of woodlands)
- Identification of specific lessons (e.g. how humans have changed nature and the effects we've made, measurement in math)

*What was your greatest benefit of your participation with the EPA grant?*

When teachers were asked specifically, "What was the greatest benefit of your participation with the EPA grant?" teachers identified the following:

- Able to utilize Belwin Outdoor Science facilities
- Accelerated outdoor learning by providing ideas, tools, materials, techniques, methods to piece together a sequence of meaningful lessons for students
- General support to go outdoors/awareness of opportunities
- Learning with like-minded colleagues/connections
- Acknowledgement the learning experiences and subsequent outdoor lessons would not have happened without the support of the grant

"[I am] seeing kids in a whole new light. Kids that have hard time sitting listening usually rise to occasion outside. They are on task outside."

*Mrs. Swenson, 2<sup>nd</sup> grade teacher, American Indian Magnet School*

The same reasons for their participation were identified in large group discussion at the initial training in August 2012, thus validating their beliefs and the importance of this work.

*What do you believe are the benefits to teaching in an outdoor space?*

When asked to articulate the benefits of teaching in an outdoor space generally, EPA grant participants identified the following:

- Student motivation, enthusiasm, engagement & amazement with their outdoor experiences and abilities to analyze them
- Deeper & greater student engagement, particularly ELL students who grasp greater, more clear understanding.
- Teaching in the real world/natural connections, expanded world and teachable moments/real artifacts
- Seeing new sides to students, " I see qualities of students that aren't seen indoors. When you see these qualities outdoors you can bring them indoors to help students advance."
- "Can't trade for anything. Pictures not the same. Builds relationships with students. Students have fun and learn. Not forced learning. Just making observations super beneficial."
- Enthusiasm of students
- Everything

"Kids get hooked on learning. Teaching outdoors is easier because you only have to teach it once and they remember it."

*-Elementary classroom teacher*

*In what ways did the EPA grant help you feel more comfortable utilizing an outdoor space to teach?*

Participants identified the following instructional knowledge and skills for which they are more comfortable after the year-long professional support of the EPA grant:

- Using the outdoors to teach students about the outdoors rather than continue to utilize the fabricated methods to keep students indoors. (E.g. use natural light instead of flashlights indoors)/ Discovered key features of outdoor spaces/ Gave me practice to feel comfortable/Understanding what to expect with outdoor teaching (the unknown)

- Introduced to new techniques, locations, new technologies to use with outdoor teaching/ Access to equipment to use with outdoor lessons
- Collaboratively working with another teacher at their school
- Getting parental support

*What, if any, have you learned about teaching environmental issues? Do you think you will approach them differently, after your experience?*

Teachers identified the following issues as ones they would address in

- Fossils
- Climate change
- Water quality, erosion
- Earth science standards
- Keep area clean and safe for plants and animals
- Greater collaboration between classroom teachers and Belwin, their environmental learning center.

### ***Belwin Outdoor Science field trip***

In the summer of 2012, one of the survey questions asked teachers if they have taught lessons outdoors. 100% of the teachers indicated they had completed at least one outdoor lesson at some point in their career. However, responses ranged from “once” to “0-2 times per grade” to “two times per month.”

During the Spring 2013 teacher interviews, teachers were asked again how many outdoor lessons they completed with the fewest indicating 3 and the highest indicating 20. The average number of outdoor lessons participants completed in the 2012-13 school year was 7.4 lessons.

“More time. Better because it’s fresher and natural and easier for me to learn, not rushed by the work and have more time I need.”

*-Dobry, 4<sup>th</sup> grade student, J.J. Hill Montessori*

In addition to utilizing the Belwin Outdoor Science facilities, 93% of the teachers used the school grounds for outside lessons and 46% used local outdoor classrooms, parks and refuges beyond the school property.

100% (N=14) of teachers and science specialists indicated they have taught their classes outside in the past, 93% (N=13) agreed they had not taught outside as often as they had wanted.

*Prior to the outdoor lesson, what were your concerns about teaching outdoors?*

On the pre-training surveys, 93% (n=13) of teachers/specialists indicated they did not feel they had taught outside as often as they wanted. The question was posed again during the teacher interviews. Following is a collective list of challenges and concerns identified by participating teachers:

- Didn’t know what or how to teach outdoors/unfamiliar with how to plan outside lessons/how to engage students
- Time for planning/lack of structured, outdoor lessons
- Class time constraints
- Student Issues/student behavior management
- Support of administration/funding support/teacher buy-in or support
- Location
- Safety
- Resources (adequate clothing, supplies, additional adults to attend)

- Determining which of the new standards to teach/fitting within curriculum/aligning to common core

*How did your work with the EPA grant change that? Please be specific.*

Their responses indicate their strong interest, and therefore greater likelihood, of teaching outdoors. Teachers identified the overarching ideas of general encouragement and logistical support and science content knowledge and skills as the specific support they believe the grant has provided. Specifically,

*General encouragement and logistical support*

- “Permission” to go outside/ Frame of mind in how to use the outdoors when teaching science/ Support for transportation and a substitute to allow teacher to receive professional development in outdoor lessons/ Could not have done it without the support of the grant/ Opened opportunities/ Realized outdoor lessons do not require as many materials as thought/Knowledge of outdoor sites to use

*Science content knowledge and skills*

- Support for science content/ Gained ideas for outdoor lessons/Lesson support (e.g. receiving mini-lessons to use)/ collaboration/ Gave ideas of writing topics to use with students.

## ***Field Trips to Neighborhood Outdoor Spaces***

*What were the lessons you taught?*

Teachers identified a variety of ways the outdoors were used. Content and skills include:

- Constructing a rain garden
- Science focused content
- Math: Surface area and volume of a pond
- Outdoor Observations & Inferences
- Tree Inventory (“world is a measurable place”)(perimeter of pond, height of trees, circumference of tree trunk)
- Structure and functions of plants and animals
- Ecological relationships
- Cycle of life of living things
- Using senses in the outdoors
- Semester-long climate survey

“There is a lot of things I haven’t see out there.”

-2<sup>nd</sup> grade student,  
American Indian  
Magnet School

*What have you learned about managing classroom behavior in an outdoor setting?*

In the pre-training survey, teachers indicated a variety of reasons why they had not conducted more outside lessons. Teachers were asked again in the interview. In both cases, classroom behavior management was mentioned often. During the interview, teachers were asked what behavior management lessons they through the EPA grant.

Responses included:

- Set and maintain expectations and procedures outdoors as indoors.
- Convey expectations to student ahead of outdoor lessons
- Kids are more engaged outdoors. AND it engages some students who would otherwise not be engaged indoors
- Works best to break class into smaller groups
- Fewer behavior problems outdoors

*Can you tell me what your teacher did with you outside this year?*

Students were asked to share what their teacher did with them outside and 25 of the 27 students (93%) provided a description of what they did outdoors. Only one student could not remember and another did not answer the question. Examples of student responses include:

- “Put on rain suits at Bruce Vento Nature Sanctuary. Learned about Native Americans, the cave used to be bigger until the United States put dynamite so they could put railroad tracks. Learned about if the water keeps its temperature....” -5<sup>th</sup> grade student
- “Observed south and north side of building and observed church garden. Picked plants and observed it. Took hula-hoop and found percentage of green versus brown grass.” -4<sup>th</sup> grade student
- “Field trip, measured circumference and height of trees. Used a ruler to measure us and compare us to height of building. Garden adventure.” -6<sup>th</sup> grade student

*What did you learn when your teacher took you outside?*

While similar to the above question, when asked, students offered a range of responses. And, 26 of the 27 students (96%) were able to identify learning that occurred outdoors. The majority of students specifically shared learning about various plant and animal life. Many described the experiments they did and observations they made. Examples of student responses include:

- “What grass felt like. Maple syrup tastes like honey.” -1<sup>st</sup> grade student
- “Deep portage – learned about trees and how to navigate using trees.” -5<sup>th</sup> grade student
- “Learn how pansies...what to do if they grow too big, to trim and help them grow again. Learned how to prepare plants to be brought outside (if started inside).” -2<sup>nd</sup> grade student

*What do you like about learning outside? What don't you like about learning outside?*

Students were asked what they liked and did not like about learning outdoors. Student responses to the question regarding what they liked, student responses varied. Examples of student responses include:

- “More facts outside. Inside is more facts and opinions. Sometimes you don't really believe it until you see it.” -5<sup>th</sup> grade student
- “How the environment works, what lives outside and how their adaptations work and where their habitats are.” -5<sup>th</sup> grade student
- “Prepare me to expect the unexpected when I get older. How the world works and the weather so I won't be so confused when I get older.” -7<sup>th</sup> grade student
- “Exploring and see what I can learn. Easier then learning about them inside from a picture.” -5<sup>th</sup> grade student

“Nice to see it instead of just hearing about it, it made more sense. Nice to be out of the classroom.”  
-6<sup>th</sup> grade student

When asked the opposite, what they do not like, overall, students indicated they enjoyed learning outside. 12 of the 27 (42%) students said they like it all; there is nothing they don't like about learning outside.

The other students most often disliked some of the weather (too cold and too hot), while other students commented on the bugs and ticks while other students mentioned it being messy, when people are blocking their way, and some noise distractions as reasons they did not like learning outdoors.

*If you could pick, would you like to spend more time outside learning or less time outside learning?*

The majority of students, 24 out of 27 (89%) would prefer to spend more time learning outside rather than less.

Two students said less with one saying they caught a cold while outdoors and the other student said less because she liked learning to do math. One student did not directly answer the question. Students had the following to say about more learning outdoors:

- “More time, better for our body, and observe more plants and learn more facts about them.” *-5<sup>th</sup> grade student*
- “More. There is a lot of things I haven’t see out there.” *-2<sup>nd</sup> grade student*
- “More time. Better because it’s fresher and natural and easier for me to learn, not rushed by the work and have more time I need.” *-4<sup>th</sup> grade student*

*What is one thing you would tell a teacher they need to do when they teach outside?*

Students were asked for advice to give to teachers. While some of the younger students didn’t quite understand the question, examples of responses of the older students include:

- “Try to make it not so straight on. If you were to measure this pond, how many fish does it hold? Not just this square how would you measure it?” *-4<sup>th</sup> grade student*
- “Instead of ready-made equipment, use equipment you made. When seeing how tall use a stick instead of a ruler. Even if not exact, it’s fun to estimate.” *-6<sup>th</sup> grade student*
- “We should spend more time outside. 50 minutes is not long enough to learn about nature.” *-5<sup>th</sup> grade student*

# APPENDIX A

## Pre- and Post surveys

### Belwin Outdoor Science

*Summary of Pre- and Post- Survey Results: August 7-9 Teacher Training*

#### Survey Responses

Number of completed the pre-training surveys: 14

Number of completed post-training surveys: 12

#### Pre-Training Assessment

- |                                                           |          |      |
|-----------------------------------------------------------|----------|------|
| 1. Have you taught your class outside before?             | Yes=100% | N=14 |
| 2. How often do you teach outside during the school year? | Varies   | N=14 |

The amount of time each teacher or science specialist teaches outside varies. A sample of responses include:

- Once
- Every now and then
- 0-2 lessons per grade
- 20 days
- Two times per month
- As often as possible
- 3-4 times in the fall, 2 times in the spring

- |                                                                                                    |        |      |
|----------------------------------------------------------------------------------------------------|--------|------|
| 3. At the end of the school year, did you feel that you had taught outside as often as you wanted? | Yes=7% | N=1  |
|                                                                                                    | No=93% | N=11 |

*If no, please list or describe why you did NOT teach outside as often as you wanted.*

- Trying to figure out exactly what to teach of newer standards.
- Sadly, time for planning and actual possible class time were factors.
- Time constraints; student issues.
- I didn't feel outside teaching was supported by the administration.
- Didn't really know what or how to teach.
- Schedule, location, resources, fear of administration.
- Cold, unfamiliar with how to plan for outside lessons.
- Lack of structured, outdoor lessons.

*If yes, what facilitated teaching outside at your school.*

- I have a lot of support and area around the school is set up/developed well for outdoor classroom.
- Partnership with watershed district – students involvement/learning abilities for ELS

#### Instructional strategies, student engagement and classroom management

*Pre – and Post- training survey scores*

# APPENDIX A

Continued

Scale  
1=Nothing    3=Very Little    5=Some Influence Deal    7=Quite a Bit    9=A Great

Used:

	Avg Pre-test Score	Pre-test N	Avg Post-test Score	Post-test N
<b>Instructional Strategies and Student Engagement</b>				
• How much can you gauge student comprehension of what you have taught in the classroom?	7	14	7	11
• How much can you do to adjust your lesson to the proper level for individual students?	6.7	14	7.4	11
• How much can you do to motivate students who show low interest in school work?	5.9	14	7.4	11
• How much can you do to help your students value learning?	6.6	14	7.4	11
<b>Classroom Management</b>				
• How much can you do to control disruptive behavior in the classroom?	7.6	14	--	--
• How much can you do to control disruptive behavior <i>in an outdoor setting</i> ?	6.9	14	7.2	9
• How well can you establish routines to keep activities running smoothly in the classroom?	7.7	14	--	--
• How well can you establish routines to keep activities running smoothly <i>in an outdoor setting</i> ?	6.7	14	7.2	9
• How well can you keep a few problem students from ruining an entire lesson in the classroom?	6.8	14	--	--
• How well can you keep a few problem students from ruining an entire lesson <i>in an outdoor setting</i> ?	6.1	14	6.8	9
• How well can you respond to defiant students in the classroom?	6.7	14	--	--
• How well can you respond to defiant students <i>in an outdoor setting</i> ?	5.9	14	7	9

# APPENDIX A

Continued

## Post-Training Survey Results

- |                                                                                                                                                                                                                                                                                                                                            |          |      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|
| 1. Do you plan to teach outside this school year (2012-2013)?                                                                                                                                                                                                                                                                              | Yes=100% | N=12 |
| 2. How often do you plan to teach outside during the school year?                                                                                                                                                                                                                                                                          | Varies   | N=12 |
| The amount of time each teacher or science specialist teaches outside varies. A sample of responses include:                                                                                                                                                                                                                               |          |      |
| <ul style="list-style-type: none"><li>• &gt; 30 hours</li><li>• At least five days</li><li>• Fall – weekly experiences, winter – monthly, spring - weekly</li><li>• As often as possible</li><li>• At least once a week</li><li>• Hopefully 1 lesson per week</li><li>• More than the required 3 lessons</li></ul>                         |          |      |
| 3. What types of lessons do you plan to teach outside this year?                                                                                                                                                                                                                                                                           | Varies   | N=12 |
| <ul style="list-style-type: none"><li>• Observations, claims, evidence, reasoning</li><li>• Science, math, art, history</li><li>• Science, photography, nature journaling, writing</li><li>• Observation activities, phrenology and earth process – land forms, plants</li><li>• Site restoration, forest, soil and peace garden</li></ul> |          |      |



# APPENDIX B

## Outdoor Education Checklist



### Outdoor Education Observation Checklist

#### General Information

Lesson: _____	Date: _____	Total Students: _____
Standards addressed: _____	Weather: _____	Total Staff/Volunteers: _____

#### Equipment

- Student medications
  - Inhalers
  - Epi-pens
  - Other
- First Aid Kit
- Map of area
- Clipboards
- Writing utensils
- Paper/data sheets
- Teaching tools
- List student tools used here
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

#### Classroom Management

##### Large Group expectations

- Set the tone
- Acceptable student behaviors
- Unacceptable student behaviors

##### Transition into small groups

- Which students will work together?
- Is an adult that is assigned to that group?
- How do students find that adult?
- If no adult, how do students know which activities/tasks they are supposed to do?

##### Transition from inside to outside

- Schedule – how long will students be outside?
- Weather and terrain appropriate clothes?
- Bathroom break needed?
- Water break needed?
- Rules for being outside – reinforce the tone
- Set physical boundaries (where are students allowed and not allowed to go?)

##### Transition from outside to inside

- Expectations of heading inside
- Storing gear
- Cleaning up



Content: How is content delivered in the following steps?

Priming the pump – What do students know/expect ahead of time about their outdoor lesson?

Large group information/Expectations

Approx. time allotted \_\_\_\_\_ minutes

Small group information – inside

Approx. time allotted \_\_\_\_\_ minutes

Small group information – outside

Approx. time allotted \_\_\_\_\_ minutes

Small group information – wrap-up

Approx. time allotted \_\_\_\_\_ minutes

Large group information – wrap-up

Approx. time allotted \_\_\_\_\_ minutes

# APPENDIX C

## Teacher Exit Interview Questions

### **Belwin EPA Grant**

#### Teacher Interview Questions Spring 2013

*The goal of this interview is to gather information about your outdoor lesson(s), your reflections on the grant program and teaching outdoors and to ascertain your future plans for using the outdoors as a classroom.*

#### ***Outdoor Lessons Completed***

To date, how many lessons have you taught outside during the 2012-13 school year?

Which grade level(s) did you teach?

What was the lesson(s)?

Where did you teach the lesson(s)?

#### ***Reflections on your work with the EPA grant.....***

Prior to the outdoor lesson, what were your concerns about teaching outdoors?

→ How did your work with the EPA grant change that? Please be specific.

In what ways did the EPA grant help you feel you more comfortable utilizing an outdoor space to teach?

What have you learned about managing classroom behavior in an outdoor setting? (Please share any examples, if you have them.)

What do you believe are the benefits to teaching in an outdoor space? (What are the unique features that an indoor classroom doesn't have?)

## APPENDIX C

### Continued

What challenges do you continue to face teaching outdoors? Please be specific.

#### *Future Plans*

How will you utilize the outdoors as a teaching space in the future? How is this different than in the past?

What, if any, have you learned about teaching environmental issues? Do you think you will approach them differently, after your experience? (How?)

What was your greatest benefit of your participation with the EPA grant?

What advice do you have for other teachers hesitant to teach outdoors?

Do you have any additional feedback or insight you would like to share regarding your participation or this program?

**APPENDIX D**  
Student Exit Interview Questions

**Belwin EPA Grant**  
Student Interview Questions  
Spring 2013

Student First Name:

School:

Grade:

Ethnicity:

1. Can you tell me what your teacher did with you outside this year?

Do you remember how many times you went outside?

Where did you go?

What did you learn?

2. What do you like about learning outside? (Ask for explanation if needed)
3. What don't you like about learning outside (Ask for explanation if needed)
4. What have you learned in your classroom this year?
5. If you could pick, would you like to spend more time outside learning or less time outside learning?
6. What is one thing you would tell a teacher they need to do when they teach outside?