

# *Stages of Green:*

*A Summary Evaluation of  
The Boston Schools Environmental Initiative (BSEI)  
Program from 2005-2009*



*Presented to:*

*Mass Audubon's Boston Nature Center*

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# Stages of Green:

## *A Summary Evaluation of the Boston Schools Environmental Initiative, 2005-2009*

### EXECUTIVE SUMMARY

The Boston Schools Environmental Initiative (BSEI) program worked with several Boston Public schools to foster “hands-on, minds-on” science and environmental awareness.<sup>1</sup> The overall finding from this evaluation, conducted over four academic years, was that **the longer a school participated in the BSEI program, the more the culture and operations of the school changed in the direction of the intended BSEI outcomes.**



BSEI is a program of Mass Audubon’s Boston Nature Center (BNC), which places a teacher naturalist part time in each school, and provides ongoing professional development and project coordination for BSEI schools. The goal of the program is to move through a model-mentor-coach cycle over the course of a four-year period. The teacher naturalist and school educators move back and forth between these roles throughout this four-year period as the model becomes more fully integrated into educator practice and school culture. In the last year of BNC’s formal involvement with the school, the program emphasizes leadership and action from within the school.

The notion of change happening in stages and cycles was central to the design and implementation of this program and the evaluation. The fluidity of the change process represented in BSEI’s model-mentor-coach cycle is consistent with the Stages of Change model derived from psychological research on intentional behavior change (Prochaska, DiClemente, and Norcross, 1992; Doppelt, 2009). This psychological model describes how people change their patterns of behavior, and suggests strategies to help people change. In sum, change happens in increments, and reversion to prior stages and temporary stretching to subsequent stages is normal and to be expected. Thus, success might be more accurately and usefully measured in terms of progression along a continuum of stages.

In order to facilitate this progression, BNC adapted the BSEI program to be optimally useful and successful at each of the participant schools. The teacher naturalists engaged in a wide range of activities at each school, depending on the school’s needs, and this adaptability of the program was key to its success.

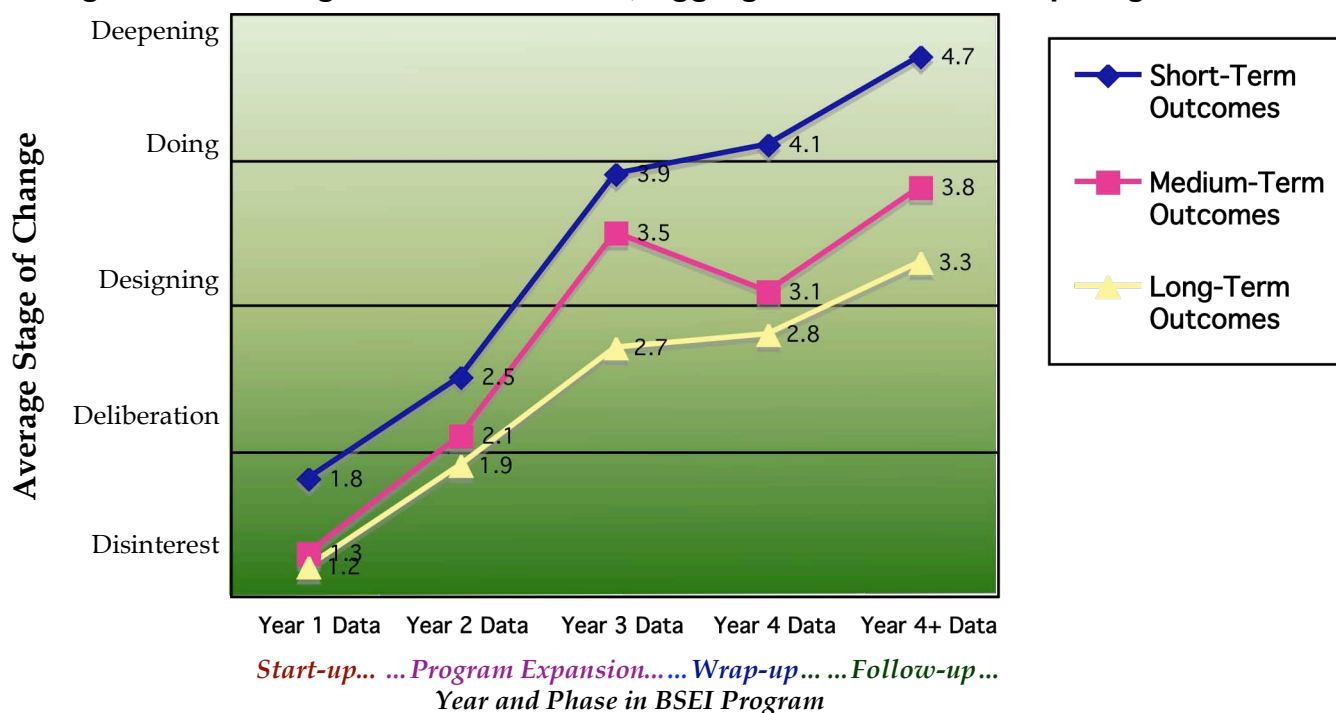
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<sup>1</sup> “Hands-on, minds-on” science refers to an experiential approach to learning that engages students in asking and answering their own questions and hypotheses. See the Appendix for a complete program logic model, which shows how this science approach fits into the broader BSEI program goals.

## Summary of Key Evaluation Findings

When examining data across several BSEI sites over a number of years, an overall pattern emerged: participating schools progressed through four sequential phases that were distinct but overlapping. This developmental maturation seemed clearly driven by the presence of the BSEI program and roughly aligns with the Stages of Change model described previously. These phases, “Start-up,” “Program Expansion,” “Wrap-up,” and “Follow-up” are described in more detail below, with report headings color-coded for easier recognition.

**Figure 1. BSEI Logic Model Outcomes, Aggregated Across Participating Schools**



### Start-up Phase

The beginning phase of BSEI implementation was mostly about laying the groundwork for future development. The success of this start-up phase was dependent upon a combination of the prior relationship with BNC and the following indicators:

- *Working on relationships between BSEI and school staff*
- *Modeling hands-on, minds-on science in the classroom*
- *Emerging science focus at the school*
- *Early stages of student scientific skills and conservation awareness*
- *Initiating plans to implement a school wide conservation project*

### Program Expansion Phase

As time went on, schools began to make progress with BSEI program operations and logic model outcomes. Schools in this phase tended to show evidence of exciting but somewhat isolated exemplar projects. Other indicators of this phase included:

- *Expanding the role and reach of the teacher naturalist*
- *Increasing focus on science at the school*
- *School wide conservation project galvanized support for BSEI*
- *Hands-on, minds-on science impacted student scientific thinking and conservation awareness*

## Wrap-up Phase

The central challenge and opportunity that played out during the final years of the BSEI program was the question of the role of science in the future identity of the school. Indicators of this phase included:

- *Integrated science focus, with educators teaching science in the classroom*
- *Student scientific thinking and conservation awareness/behavior deepened*
- *Expansion of school wide conservation and science projects/events*
- *Uncertainty and anxiety around the sustainability of BSEI goals without BNC support*

## Follow-up Phase

By the time the school completed the BSEI program, it was very far along the Stages of Change continuum. The level and type of ongoing commitment to science revealed the extent to which it had become part of the core fabric of the school.

Indicators included:

- *Highly collaborative school climate*
- *Drive toward coherent curriculum focused on thematic integration related to environment*
- *Thematic integration impact student outcomes*
- *Essential components of BNC support identified: naturalist support, planning time, and funding*
- *Continued concern about sustainability of program goals without BNC support*

*"It's been great having [the teacher naturalist's] expertise, because there's a lot of stuff that I never would have thought to do. She definitely helped me integrate all of it together."*

*- Holmes Educator*

## *Evaluation Methods*

External evaluators from PEER Associates, Inc. conducted evaluations with a select subset of BSEI schools each year from fall of 2005 to spring of 2009. The primary goals of the evaluations were to: 1) inform program improvement during the program; and 2) provide data from various sites in order to document the range of outcomes from baseline to longer term. Data was collected from five different schools over the course of four academic years, including interviews with over 100 educators, 13 family members, and seven students, and 78 educator surveys. In addition, BNC staff filled out project summaries. Finally, logic model outcomes were rated in terms of the Stage of Change categories by BNC staff and by evaluators for each school in every year that the school was evaluated (not every school was evaluated every year). Ratings were then reconciled and the results presented in chart form (see Figure 1).



## *Conclusions and Recommendations*

Looking across all sites and all years, there was definite evidence of progress along the Stages of Change continuum. This progress looked to be a developmental process, which could be likened to that of a growing plant. In the beginning, the main task of the BNC and the school was to sow the seeds for the BSEI program. In the middle years of the BSEI program, the seeds began to sprout and send off shoots. By the final year of the BSEI program, the seeds had grown into plants. Once the formal BSEI program was completed, there was still some tending of the plant to be done to ensure that it continued to grow strong and yield fruit. It is striking that this developmental pattern persisted despite considerable variations by school. Indeed, adaptability of the BSEI model to the unique context of each school seemed to be a fundamental key to achieving the greatest success.

### **Recommended actions for each phase:**

- Start-up:** *Introduce the program slowly, starting with early adopters or select grades*
- Program expansion:** *Sponsor a school wide event or conservation project to increase unification around science at the school*
- Wrap-up:** *Determine the optimal way to stay engaged with the school, while transitioning out gradually and empowering them to continue without BNC*
- Follow-up:** *Guide school in finding other sources of support and resources for this work*





## INTRODUCTION

The Boston Schools Environmental Initiative (BSEI) program of Mass Audubon's Boston Nature Center (BNC) works with selected schools in Boston to foster scientific thinking through using a hands-on, minds-on<sup>2</sup> approach to teaching and learning about environmental awareness. A distinguishing feature of this program is that it works in urban settings with a diverse group of schools and students. This diversity adds to the richness and challenges of the program. The BNC is set in the middle of an urban environment, and offers a beautiful open area to schools that have minimal access to open green space.

The overall long-term goal of BSEI is incremental, systematic development of the school culture. The BSEI program implements a model-mentor-coach cycle across a four-year period, by providing a designated 75%-100% time teacher naturalist in each school during the first and second school years of the program, as well as ongoing professional development and project coordination during the program. Over the course of the four years, the teacher naturalist works less and less with schools, with the ultimate goal of moving the school to a program sustainability plan after the fourth year, when classroom educators are able to incorporate inquiry-based methods for teaching science, as well as use the environment as an integrating context across disciplines. (See the BSEI Logic Model in Appendix B for more details about program goals).



It is important to note that this model-mentor-coach cycle is a cyclical and fluid, rather than linear or sequential, approach. It refers to the general approach that the BNC teacher naturalist uses as the program implementation progresses. During the modeling phase, the BNC teacher naturalist demonstrates a hands-on, minds-on approach to science in the classroom. In the mentor phase, the teacher naturalist and educator work together to plan and execute lessons. Ultimately, the classroom educator takes the lead role in program implementation during the later phase of the cycle, as the teacher naturalist becomes more of a supportive coach. This explanation is, of course, a simplification of the process. In actuality, the teacher naturalist and school educators move back and forth between these roles during this four-year period.

The notion of change happening in complex and fluidly overlapping stages and cycles was central to the design and implementation of this evaluation. The change cycle idea was applied to both individual teachers and to the school as a whole, and also helped both program staff and evaluators make sense of the various ways that the program adapted to the differing contexts and opportunities at each participating school. However, this report integrates two complementary conceptual models to describe the observed change process, and this could create some confusion about terminology. On the one hand is the model-

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<sup>2</sup> "Hands-on, minds-on" science refers to an experiential approach to learning that engages students in asking and answering their own questions and hypotheses. See the Appendix for a complete program logic model, which shows how this science approach fits into the broader BSEI program goals.

mentor-coach cycle that was internally generated by the BSEI program staff to guide their program design. On the other hand, the evaluation data was found to be strikingly consistent with an externally generated model called *Stages of Change* that has emerged from decades of psychological research on efforts to intentionally modify habits and behaviors (Prochaska, DiClemente, and Norcross, 1992; Doppelt, 2009). The model-mentor-coach cycle tends to fit well when looking at the level of individual teachers, and the Stages of Change model tends to more fully describe observed phenomena at the level of the school as a whole. In both conceptual models, the changing of behavior patterns does not happen all at once. Rather, change happens in increments, and reversion to prior stages and stretching to subsequent stages is normal and to be expected. Thus, success might be more accurately and usefully measured in terms of progression along a continuum of stages instead of solely in terms of having achieved the end goal in a linear, lock step, theoretically predictable progression. Table 1 attempts to clarify the ways these overlapping conceptual models relate to each other.

**Table 1. Summary of Stages of Change and BSEI Phase/Model**

<b>Stage<sup>3</sup></b>	<b>Description</b>	<b>Strategies for success</b>	<b>BSEI Phase &amp; Model</b>
<b>Disinterest</b>	<ul style="list-style-type: none"> <li>• <i>Not intending to make a change in the next six months</i></li> <li>• <i>Not necessarily opposed, just not ready to start</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Focus on basic information of who, what, when</i></li> <li>• <i>Build awareness and inspiration</i></li> </ul>	<p><b>Start-Up</b></p> <ul style="list-style-type: none"> <li>• <i>Primarily introducing the program</i></li> </ul>
<b>Deliberation</b>	<ul style="list-style-type: none"> <li>• <i>Thinking about making a change in next six months</i></li> <li>• <i>Ambivalent about costs v. benefits of the effort required</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Begin exploring why and how</i></li> <li>• <i>Present information, discussion in terms of "What's in this for me?"</i></li> </ul>	<p><b>Start-Up/Program Expansion</b></p> <ul style="list-style-type: none"> <li>• <i>Primarily modeling (with some mentoring or coaching with certain educators)</i></li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>• <i>Intending to make a change in the near future</i></li> <li>• <i>Convinced potential benefits outweigh the risks</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Provide coaching, supportive relationships, skill and capacity building</i></li> <li>• <i>Pushing too quickly can lead to demoralization</i></li> </ul>	<p><b>Program Expansion</b></p> <ul style="list-style-type: none"> <li>• <i>A combination of modeling and mentoring (with some possible coaching with certain educators)</i></li> </ul>
<b>Doing</b>	<ul style="list-style-type: none"> <li>• <i>Overt behavior changes have been made</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Celebrate, encourage, support</i></li> <li>• <i>Be alert for overwhelm and slipping into previous stages</i></li> </ul>	<p><b>Wrap-Up</b></p> <ul style="list-style-type: none"> <li>• <i>Primarily mentoring (with some possible coaching, and some modeling with new educators)</i></li> </ul>
<b>Deepening</b>	<ul style="list-style-type: none"> <li>• <i>Maintained behavior change for at least six months</i></li> <li>• <i>Behavior has become more automatic</i></li> <li>• <i>The "old days" seem distant</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Regularly highlight and reinforce progress made</i></li> <li>• <i>Continue some level of support</i></li> <li>• <i>Formalize self-support mechanisms</i></li> <li>• <i>Structural redesign</i></li> </ul>	<p><b>Follow-Up</b></p> <ul style="list-style-type: none"> <li>• <i>Primarily coaching (with some modeling and/or mentoring as new educators come in to the school)</i></li> </ul>

<sup>3</sup> These terms are based on those of Doppelt, B. (2009), whose work is built off of the foundational research of Prochaska.

The BSEI program operated in five schools during 2005-2009, as described in Table 2 below. Each school included in this evaluation had a pre-existing formal and informal history of working with the BNC. The depth and breadth of the pre-existing work is important to note in the context of this evaluation as that history influenced both the initial conditions and the current state of the BSEI program within the partner schools. The bullets in Table 2 show a sample of the range of activities that BNC teacher naturalists engaged in at each school, indicating how the BNC adapted the BSEI program to be optimally useful and successful at each of the participant schools. This adaptability of the program was key to its success.

**Table 2. Snapshot of schools participating in BSEI 2005-2009**

School (grade levels, location)	BSI <sup>4</sup> Involve- ment	BSEI Starting Date	Sample BSEI Program Components <sup>5</sup>	BSEI Sustainability Plan as of '09	Evaluation Data Collected
Dennis C. Haley Elementary (K2-5, Roslindale)	2000 - 2003	Sep, 2006 (CO-SEED <sup>6</sup> , 2003 - 2006)	<ul style="list-style-type: none"> <li>• TN* on site</li> <li>• Field investigations</li> <li>• Overnight activities</li> <li>• Curriculum plans</li> <li>• Advisor to school committee &amp; planning efforts</li> </ul>	Coaching	Year 4+
John D. Philbrick Elementary (K2-5, Roslindale)	2003 - 2004	Oct, 2004	<ul style="list-style-type: none"> <li>• TN* on site</li> <li>• Field investigations</li> <li>• Overnight activities</li> <li>• Science unit plans</li> <li>• Professional devel.</li> <li>• Vision-to-Action</li> </ul>	Coaching	Year 2 Year 3 Year 4
James M. Curley Elementary (K1-5, Jamaica Plain)	2000 - 2002	Nov, 2005	<ul style="list-style-type: none"> <li>• TN* on site</li> <li>• Field investigations</li> <li>• Science unit plans</li> <li>• Support science events</li> </ul>	Back to BSI	Year 1 Year 2
Oliver W. Holmes Elementary (K1-5, Dorchester)	1998- 2000; 2004 - 2005	Feb, 2006	<ul style="list-style-type: none"> <li>• TN* on site</li> <li>• Field investigations</li> <li>• 'Science Week'</li> <li>• Curriculum plans</li> <li>• Professional devel.</li> <li>• Assist with merger</li> <li>• Vision-to-Action</li> </ul>	Coaching	Year 1 Year 2 Year 4
Samuel W. Mason Elementary (K1-5, Roxbury)	1998- 2000; 2006 - 2007	Sep, 2007	<ul style="list-style-type: none"> <li>• TN* on site</li> <li>• Field investigations</li> <li>• Overnight activities</li> <li>• Curriculum plans</li> <li>• Professional devel.</li> <li>• Use of Outdoor Classroom</li> </ul>	BSEI, 2007-2009	Year 1

\* TN = teacher naturalist

<sup>4</sup> The BSI program was a grant initiative of BNC that placed a teacher naturalist in each school's 2<sup>nd</sup> and 3<sup>rd</sup> grade classes. The primary role of this teacher naturalist was to deliver science based environmental education programming to the classrooms in the "modeling" mode of BNC's approach.

<sup>5</sup> See individual school Executive summaries for more detailed description of components.

<sup>6</sup> CO-SEED program was a 3-year partnership between the BNC, the Haley Elementary School and Antioch University's CO-SEED program. This program operated in a similar capacity as the BSEI program, though with a slightly larger scope.

## Evaluation Methods

The overall purpose of this evaluation was to assess the effectiveness of BSEI in terms of process (program implementation) and outcomes (results). The primary foci of the evaluation for the latter years of the evaluation included: 1) providing information about program function in order to inform program improvement, with a special emphasis on formative qualitative data; and 2) providing baseline, check-in, wrap-up, and follow-up data from various sites in order to document the range of outcomes from baseline to longer term. The evaluation intended to provide useful information for BSEI staff to assist with program development, justification, and refinement. BSEI staff played a highly participatory role in the refinement of evaluation plans and activities throughout the years of the evaluation. All evaluation questions were variations on the themes of: “How can BSEI adapt to the local needs of the participating schools?” and “To what extent are participating schools currently implementing intended BSEI outcomes?” To answer these questions, interviews were conducted with educators, administrators, and family members, as described in Table 3.

**Table 3. Summary of Sources of Interview Data for BSEI 2005-2009**

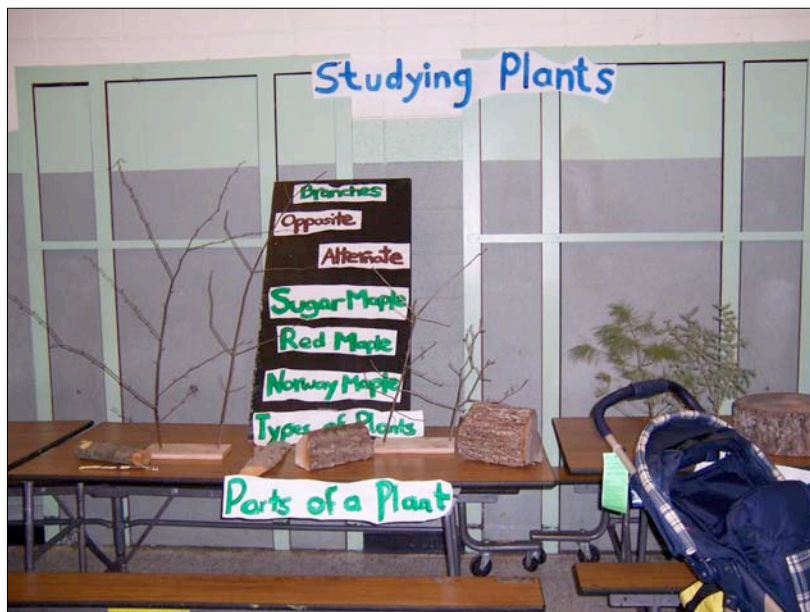
<b>Interviews</b>	<b>Respondent Role and Number</b>
<b>Haley School</b> <i>Total over 1 year (Fall 08)</i>	12 Educators 2 Administrators 2 Family Members
<b>Philbrick School</b> <i>Total over 3 years (05-06, 06-07, and 07-08)</i>	20 Educators 1 Administrator (per year) 1 BNC Teacher Naturalist (per year) 5 Family Members 7 Students
<b>Curley School</b> <i>Total over 2 years (05-06, and 06-07)</i>	21 Educators 1 Administrator (per year) 1 BNC Teacher Naturalist (per year) 6 Family Members
<b>Holmes School</b> <i>Total over 3 years (05-06, 06-07, and 08-09)</i>	45 Educators (+ 2 from Stone School) 1 Administrator (per year) 1 BNC Teacher Naturalist (per year) 0 Family Members
<b>Mason School</b> <i>Total over 1 year (Fall 07, Spring 08)</i>	16 Educators 1 Administrator (2 times) 1 BNC Teacher Naturalist (2 times)
<b>Overall BSEI Program</b>	2 BNC Administrators 1 BNC Consultant
<b>Total</b>	116 Educators 13 Family Members 7 Students

Other data collected included:

- ❖ Educator surveys (38 from Fall, 2007, and 40 from Spring, 2008)
- ❖ Project summaries for each school for every year they were evaluated
- ❖ Logic model tables filled out by Boston Nature Center staff for each school for every year they were evaluated.

### *External Evaluation Team*

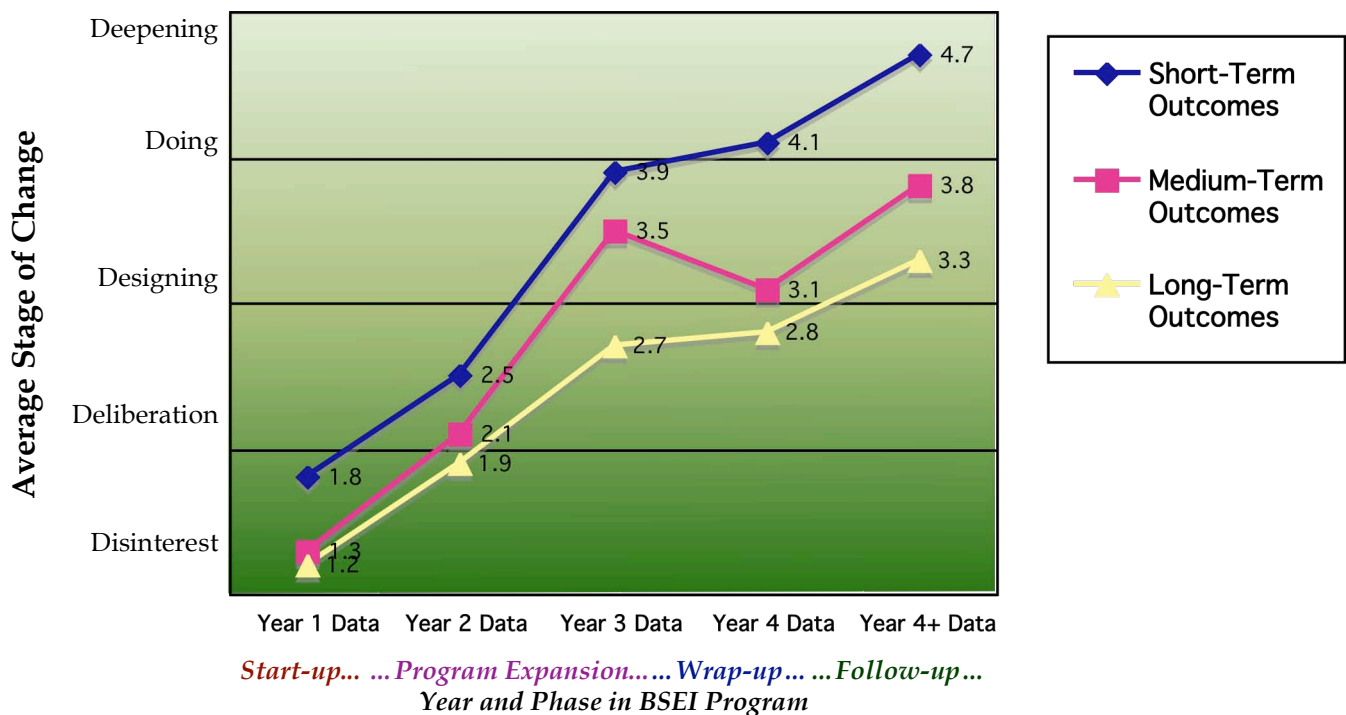
All aspects of the evaluation were facilitated by PEER Associates, Inc. PEER Associates is committed to using a multiple-methods, utilization-focused, participatory evaluation process. It is our intention to help organizations better understand their programs and to help them to improve their programs based on evidence of program functioning and outcomes. We also intend to help organizations build their own capacity to reflect on and internally evaluate programs and to help to improve the evaluability of programs.



## FINDINGS AND DISCUSSION

After examining data across several BSEI sites over several years, **the overall finding was that the longer a school participated in the BSEI program, the more the school culture and operations changed in the direction of the intended BSEI outcomes.** As the logic model would predict, schools appeared to progress to the Action stages (Doing and Deepening) for most short-term outcomes in three or four years. Reaching the Action stages for medium-term outcomes and long-term outcomes, by their very definition, occurred over a longer period of time. Yet, there was some evidence that schools made progress towards these outcomes as well.

**Figure 1. BSEI Logic Model Outcomes, Aggregated Across Participating Schools**



[See Appendix A for more detail of how we arrived at Figure 1, with a break down of each of the short, medium, and long term outcomes by year and by school.]

The pattern of change seemed to reflect developmental maturation and appeared to be clearly and strongly driven by the presence of the BSEI program. The Stages of Change theoretical model presented in Figure 1 fit the observed data very closely and provided a coherent conceptual framework for understanding the change at a global level. From a program operations perspective, however, the change is perhaps more usefully described in terms of four sequential phases that were distinct but overlapping. These phases, “Start-up,” “Program Expansion,” “Wrap-up,” and “Follow-up” are described in more detail below, with report headings color-coded for easier recognition. By presenting the common indicators for the phase in conjunction with examples from various schools, we hope to provide a kind of snap shot of the activities, challenges, and opportunities that characterize the main development steps over several years of BSEI implementation.

## *Start-up Phase*

The beginning phase of the BSEI program laid the groundwork for future work with schools by building awareness of the program and modeling the goals of the program with early adopter teachers. This program strategy was likely to be effective, because most of the teachers in the start-up phase were at Disinterest or Deliberation, where they were not yet ready to start thinking about implementing program goals, or were thinking about making some changes, but were still ambivalent about the costs versus the benefits of the program. Overall, schools in this start-up phase were not assessed to be in the Doing stage for the BSEI logic model outcomes, which was to be expected since the program was just gearing up.

All of the schools had some involvement with the BNC prior to beginning the BSEI program, but the quantity and quality of that involvement varied considerably by school. The success of this start-up phase was dependent upon some combination of effectively negotiating the indicators below and the prior relationship with BNC. Indicators of the start-up phase included:

- Working on relationships between BSEI and school staff
- Modeling hands-on, minds-on science in the classroom
- Emerging science focus at the school
- Early stages of student scientific skills and conservation awareness
- Initiating plans to implement a school wide conservation project



### **Working on relationships between BSEI and school staff**

During the start-up phase of the BSEI program, the BNC spent a sizeable amount of time working on developing a positive working relationship with the schools and teachers. Since schools were all different, the methods used varied considerably, ranging from focusing on working with one or two key players, to working with one teacher per grade. Although they employed different methods for each school as described in the following paragraphs, the BNC worked closely with each school's administration to select the strategy most likely to succeed in that school.

*"It looks like [the teacher naturalist] is well received by the teachers because he was here last year and I think people were eager to see him coming back and working with them."*

*- Mason Educator*



The Mason School managed a transition from the BSI program to the BSEI program well, with some growing pains along the way. The previous year's BSI initiative established the teacher naturalist as a science resource, and built relationships between the teacher naturalist and students and teachers. These relationships served as a helpful foundation for disseminating the BSEI program approach during the start-up year. The optimism and idealism expressed in the fall interviews turned to a more realistic vision for many in the spring. In the fall, there was recognition among educators that the BSEI program was exciting, and in the spring it also became clear to them that it would include a lot of hard work as well.

During the first year of BSEI at the Curley School, BNC staff worked to introduce the program to selected educators, starting with the teacher naturalist working with the kindergarten through third grade classrooms. This first year of the BSEI program at the Curley School focused on building working relationships with classroom teachers, and beginning to bring science education to the school on a consistent basis. The data indicated clearly that the Curley School and the BNC worked hard to blend the goals of the BSEI program with the opportunities and constraints at the Curley School. Systems were put in place to build on initial successes and also to address concerns that emerged during this start up phase of the program at this site. Compounding these issues was the matter that the school started a process of merging with the Curley Middle School. This potential restructuring was a point of some controversy and disruption in the community, and added to the challenge of developing a successful working relationship with the BNC.

*"I think it is important to have a strong personal connection. I've always thought that those personal connections are the way that you get stuff done."*

*- Curley Educator*

At the Holmes School, by the end of the first year of BSEI, the working relationship between the BNC and the school was characterized by openness and collaboration. Program staff intended to expand the BSEI program the following year, so that the teacher naturalist would be in all of the grades, and working with more educators per grade. The teacher naturalist at the Holmes School was able to make inroads with at least one educator in almost every grade at the school, modeling instruction for the educators. However, the school underwent a considerable transition in staff for the following school year (as well as subsequent years), so the teacher naturalist had to start over with many classroom educators, creating a less than ideal situation.

### **Modeling hands-on, minds-on science in the classroom**

Besides working on building relationships with teachers, a primary goal of the BNC teacher naturalist during the start-up phase was to model hands-on, minds-on science for school educators. In every school, there were some teachers who were already comfortable incorporating science into the classroom, and the teacher naturalist could work more collaboratively (in more of a mentoring or coaching role) with those teachers. However, the majority of teachers at this phase had little experience or comfort integrating science into their teaching.

At the Curley School, the BNC teacher naturalist began working in Kindergarten through third grade, with the hopes of expanding upwards the following year, and then again the year after that until all grades were working directly with the BSEI program. While the partnership worked very smoothly in some classrooms, in other classrooms the relationship struggled under the weight of pressure from standardized testing requirements, compounded by trial and error attempts to figure out how to make the best use of the teacher naturalist in the context of existing classroom norms.

In the start-up year at the Holmes School, the BNC teacher naturalist worked with at least one educator in almost every grade, mainly focusing on modeling hands-on, minds-on science teaching in the classroom. There were some educators, however, for which this relationship was more collaborative.

*"I was just speaking with [the teacher naturalist] last week, and we were planning things for this unit, and she said 'I'll take care of everything.' So for me, more than anything else, more than having more books, or having more whatever, having that person be there to guide has been the best resource to incorporate science into the classroom."*  
- Holmes Educator

### **Emerging science focus at the school**

All participating schools had at least some interest in using the environment to support integrating science more thoroughly into their curricula and brought in the BSEI program to help the school with this goal. At this time, there was a wide range in how much schools focused on science, ranging from almost non-existent to fairly extensive.

At the Mason School, BSEI functioned like a kind of glue, helping hold together a "year of science." The school was focused strongly on integrating science into the curriculum, with several environmental and other Boston Public School science initiatives occurring simultaneously. The teacher naturalist provided a large amount of assistance and support for connecting the school to other resources. For instance, the teacher naturalist coordinated the Food Project work, served on the Outdoor Classroom committee, and built community relationships. Educators and

*"I feel like [science in the school] is more holistic now than it ever was. Are we there where we want it to be? Maybe not, but we're taking the right steps."*

- Mason Educator

administrators expressed confidence that these initiatives provided opportunities to strengthen the kind of hands-on, minds-on science curriculum and interdisciplinary teaching that BSEI actively provided and promoted.

At the Holmes School, in the 2005-2006 school year, it was part of the vision of the principal and the BSEI program to introduce the idea of using science as a thematic base for delivering classroom curricula. There was wide variation in the extent to which educators implemented a scientific approach in their classroom. One educator commented: "It varies greatly from teacher to teacher, classroom to classroom. Some classes aren't doing anything, and some classrooms have science centers as one of the centers that the kids rotate through."

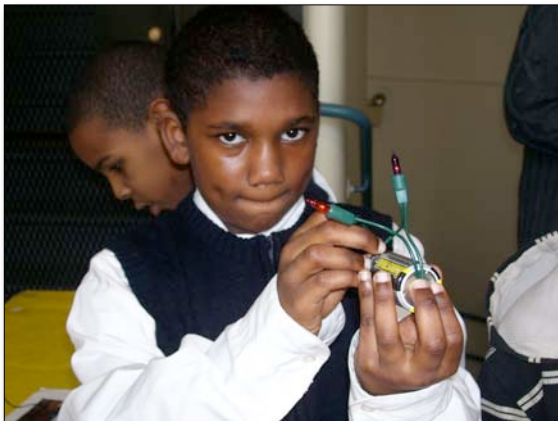
One of the main reasons that the BSEI program was brought to the Curley School was to augment the science curriculum and instruction in the school. The focus of the Curley School had primarily been on literature and the arts, but there was an emerging emphasis being placed on science instruction. Only a few of the educators interviewed taught scientific thinking in their classrooms. Many more educators were primarily using the science kits as the way to teach science, and were not as comfortable connecting science to the outside world or other disciplines.

*"I would love to do more hands-on activities, and I love science, and the kids love science, but you know, they don't give you much time to do these extra projects. They don't give you any time, I should say. The projects that get left out the most are science and social studies, because the big push is math, reading, and writing."* - Curley Educator

### **Early stages of student scientific skills and conservation awareness**

Since teacher naturalists were initiating their work with classroom educators, who were just beginning to understand and begin implementing hands-on, minds-on science, there was not a lot of evidence of increases in student outcomes during the start-up phase. Yet, the BNC teacher naturalists did work with several students at each school, and so noticed the beginnings of student conservation awareness, and increased observation skills. At some schools, changes in student outcomes were almost imperceptible to educators, but at other

schools (where educators were teaching more science already), educators did describe changes in their students.



In the start-up year at the Curley School, the BNC naturalist was successful in getting students outside, planting and working in the garden. Several educators felt that with science being so scripted (with the science kits), there was not a lot of room left for going outside or doing conservation projects. One educator even said, "We don't even have afternoon recess anymore." Despite this obstacle, many educators interviewed

wanted to get outdoors and use the schoolyard more frequently in their teaching. When speaking about the advantages of the BSEI program, one educator said, "It has brought the school outside, where it should be."

Similarly, the baseline evaluation at the Holmes School indicated that educators did not include conservation as a regular part of the classroom curriculum. When asked how often she used the outdoors as a classroom, one educator commented, "not very much. I think that [the schoolyard] is not used to its capacity." Still, the science teacher and BNC teacher naturalist both managed to take students outside to work in the garden and the dedicated outdoor science area occasionally.

*"[Science] is something that piques [students'] interest... they've been given the opportunity [with the teacher naturalist] to find out answers for their questions. And so I really do see that's much more meaningful to them than just being handed information."*  
- Holmes Educator

Classroom educators at the Mason School, in the start-up year of the BSEI program, mentioned that they already saw evidence of students' observational skills increasing, and that students were moving towards more critical thinking.

*"The students are asking more questions. They think a little bit more critically because it's right there. They learn how to appreciate the worm instead of wanting to smash up the worm."*

*- Mason Educator*

### **Initiating plans to implement a school wide conservation project**

School wide conservation projects were found to be a cornerstone of success at schools with the BSEI programs. In the start-up phase, most schools were beginning to think about possible projects, but had not yet fully implemented a school wide project. It was still early in the process for the majority of schools, with the teacher naturalist introducing the idea and gathering implementation information. Other schools were further along, with some conservation projects already underway, which the teacher naturalist planned to expand upon. In addition to (or instead of) conservation projects, some schools had culminating events that served a similar purpose.



The BNC teacher naturalist at the Holmes School discussed plans to implement some sort of school wide conservation project, possibly a recycling program (although there were some obstacles with the Boston Public Schools trash system). The hope was to make conservation a larger part of the curriculum, and to generate excitement and interest from educators, students, and parents for the BSEI program.

*"The kids did do some gardening last year and went to the Food Project and we made some different potato dishes. We have a little plot outside where the kids got to dig up potatoes."*  
*- Mason Educator*

At the Mason School, there were several conservation projects that had been initiated by the BSEI program, including composting, classroom worm bins, and a recycling program. The BNC teacher naturalist planned and led all of these projects with the students. Educators suggested that there could be more student involvement with the recycling program and that it could be more student initiated. Several

interviewees mentioned the Food Project as a wonderful opportunity for students to get outdoors and make real life connections.

The Curley School had a "Sweet and Sappy" event that marked the culmination of a cross grade study of trees and the products they produced. Students tapped trees on site and families also tapped trees in their own yard. Classrooms created tree poems, studied parts of the trees, and looked at sap and its role for the tree. The conclusion of the event was a day-long, in-school presentation where students learned about how to make maple syrup and how trees have different characteristics that allow us to identify them. Students also engaged

in hands-on science lessons where they practiced tapping a tree. While the event itself lacked the sort of support it needed to be a sustained programmatic initiative, it did model for the school one potential strategy for connecting the curriculum to the local community, integrating science across disciplines, and implementing hands-on instruction of scientific concepts.

*"The Sweet and Sappy science event represented a great early step in the process of connecting the school curriculum, the community and the local environment through a creative and fun event."*

*- BNC Administrator*

### **Indicators of readiness to move from Start-up phase to Program Expansion phase**

- The BSEI program has established a strong base for a working relationship between the school and the BNC
- The teacher naturalist is more widely recognized as a part of the school, rather than as an outsider
- The school has a specific plan to extend and expand the reach and role of the teacher naturalist in coming years

### **Recommendations for Start-Up phase**

- Be intentional about choosing a strategy to introduce science into the classroom
- Introduce the program slowly, starting with early adopters or select grades
- When choosing to work with schools, build on the historical relationship between BNC and the school



## *Program Expansion Phase*

As time went on, schools began to make progress with the BSEI program, and the logic model outcomes, entering the Deliberation and Designing phases, where most educators were intending to make changes and were convinced of the potential benefits of the BSEI program. At this point, most educators had come to realize that the program was staying, and recognized the value of the BSEI program. Many educators who at first had resisted were now working with the teacher naturalist, and acknowledged the benefits of hands-on, minds-on science. The primary role of the teacher naturalists shifted from primarily modeling to a combination of modeling and mentoring educators, with some coaching of early adopters. Schools in this phase tended to show evidence of exciting but somewhat isolated exemplar projects.

Indicators of this phase included:

- Expanding the role and reach of the teacher naturalist
- Increasing focus on science in schools
- School wide conservation project galvanized support for BSEI
- Hands-on, minds-on science impacted student scientific thinking/conservation awareness

### Expanding the role and reach of the teacher naturalist

During the start-up phase, the BNC teacher naturalist worked with some strategically selected subset of educators at each school. In the following years of the program, the teacher naturalist began to work with more educators at each school. Whereas the teacher naturalist mainly modeled hands-on, minds-on science in the beginning, during this phase the teacher naturalist began to mentor and coach classroom educators. Indeed, several educators at the schools began to teach science in the classroom themselves. Of course, there was substantial variation in how much this occurred at each school, ranging from only a few educators to the majority of the school.

By the end of the second program year at the Philbrick School, the BNC teacher naturalist had made a lot of progress, going from primarily working with the science teacher, to direct work with many educators in their classrooms. Yet, many educators still expressed discomfort teaching hands-on, minds-on science in the classroom. Some educators interviewed were even relieved that they did not have to teach science, because they did not feel it was their area of expertise. Many discussed the great job that the science teacher and teacher naturalist from BNC did in teaching science. By the third year of the program at the school, the teacher naturalist worked with even more educators in the Philbrick School, and increased the comfort level of those educators in including scientific thinking throughout their curriculum.



The second year of BSEI at the Curley School saw the focus shift to a school-wide re-commitment to the program rather than expanding the role and reach of the teacher naturalist. This was primarily due to the considerable changes from the first year to the second, including changes in the BSEI program (new teacher naturalist), and planning for the changes in the structure of the school (going from elementary school to K-8). Yet, there was a consensus among those interviewed that the BSEI program was working much better in the second year. There was also a lot of enthusiasm for the BNC teacher naturalist. Educators reported that the teacher naturalist was very helpful with providing science instruction, providing resources, and keeping educators on task and enthusiastic about teaching science.

*"There is a marked difference in the [BSEI] program. This year the program is working the way that I envisioned it to work, with the teachers working collaboratively with the students."*

*- Curley Educator*

At the Holmes School the teacher naturalist worked in some capacity with most teachers in the school by the end of the second year of BSEI. Sometimes the teacher naturalist provided resources, other times the teacher naturalist co-taught or led lessons. There was a wide variety of work the teacher naturalist performed, depending on classroom teachers' needs, skills, and time.

*"It's been great to have [the teacher naturalist's] expertise, because there's a lot of stuff that I never would have thought to do. She definitely helped me integrate all of it together."*

*- Holmes Educator*

### Increasing focus on science within schools

Whereas the start-up year saw an emerging focus on science with the schools, during the program expansion years, the schools began to integrate science more fully across disciplines. Each school had a different strategy to achieve this goal, ranging from focusing on curricula that educators already used to introduce science, to using a culminating event with an emphasis on science. Additionally, there was an emerging recognition among educators that science was important for student education.

At the Philbrick School, a primary objective during the program expansion years was to "build a bridge" between science and the classroom, using non-fiction literature as a primary mechanism. There were several examples in the evaluation interview data of classroom teachers doing hands-on, minds-on science projects, such as researching animal habitats, gardening, and conservation. Further evidence that science was becoming integrated throughout the curriculum was the planning meeting sponsored by BNC and attended by Philbrick teachers. This meeting, held at the Boston

*"The way things worked in [one of the] grades was the best possible scenario. The kids did hands on work in the science room, and then they went on a field trip with the classroom teacher. They went to a marsh, and looked at different critters. Then, the kids wrote reports about animal adaptation."*

*-Philbrick Educator*

Nature Center, consisted of BSEI staff guiding Philbrick educators through the planning of their hands-on, minds-on science curriculum for the upcoming year.

At the Holmes School, in the second year of the BSEI program there seemed to be a consensus that science was emerging as a focus. Some examples of the science focus included a mural, a science committee, Science Week, an outdoor science area, a three-day per week science teacher, and a science lab. One indicator of progress toward science integration was that scientific concepts were being incorporated in readers and writers workshops. For instance, the third grade class created a class book from three seasonal visits to the schoolyard.

In the second year of the BSEI program at the Curley School, data indicated that there was an emerging emphasis being placed on science instruction. The BNC teacher naturalist worked with more grades at the school, and there was a school wide science exhibition where students were encouraged to display some of the science projects they had been doing in their classrooms. Every classroom participated in this science exhibition, and BSEI staff reported that parents were impressed with the quality and quantity of science at the school. Indication that the Curley School intended to increase its science focus even more was that there were plans for a room dedicated to science, and the Curley School's science specialist, planned to increase time at the school by a day and a half.

*"[The teacher naturalist] kept me on task with science. I always do the science units, all hands-on."  
- Curley Educator*

### School wide conservation project galvanized support for BSEI

One way that the BSEI program gained traction at schools during these years was to organize a school wide conservation project that everyone could get excited about. Recycling was a popular project started at several schools.

The recycling program at the Philbrick School was very important to educators, students, and parents at the school. Almost everyone interviewed mentioned the project, and expressed excitement about it. The BNC teacher naturalist initiated the program, but the students seemed to have really taken the project on as their own. Educators discussed how much their students had accepted responsibility for the project, and held their teachers accountable for their recycling efforts. In fact, the recycling project seemed to be the central inspiring and motivating factor for the environmental education efforts of the BSEI program at the Philbrick School at this time.



*"When we kicked off the recycling program last year, it started in the after school program, with the older groups...and they've been responsible for collecting the recycled materials and getting it to the curb before the pick up, and they've been fantastic. So if I accidentally put a piece of paper in the trash can now, I get yelled at, because it's just part of their routine, which is nice, and a big change for us."  
- Philbrick Educator*



At the Holmes School, the Science Week was touted by nearly everyone as a “huge success,” with the teacher naturalist recognized as instrumental in making it all happen. Educators talked about the fair as a chance for cross-grade collaboration, and a great way to get out of their own boxes to see what other teachers and students were doing. In particular, the recycling presentation was really beneficial for the students, who were known to remind teachers and other students to pick up trash. The recycling project, spearheaded by the fifth graders, reached across the entire school. According to BSEI staff, the recycling program had a bit of a slow start, until one of the teachers got her students to do recycling presentations to the whole school, and then every class in the school recycled.

*"The excitement in some of the kids was so energizing. They are so interested in getting involved with recycling at home and in their school. I think with the right tools, they will really get into recycling."  
- Staff from Waste Management*

### Hands-on, minds-on science impacted student scientific thinking/conservation awareness

As the BSEI program continued to gain traction over these years, the benefits accrued not only to school curriculum and to educators, but to students as well. Educators began to notice improvements in their students’ scientific thinking skills, especially their observation skills and student vocabulary. Furthermore, educators reported that they saw gains in their students’ conservation awareness.



In the third year of the BSEI program at the Philbrick School, several educators spoke about seeing an increase in the comfort level of students in nature, as well as in students’ observational skills. At least one educator reported that some of the students were beginning to translate what they were learning about conservation into actions. This piece of going from awareness to action was quite

important, and a change from the previous year, when educators had reported some student conservation awareness, but not any behavior change.

At the Curley School, the second year of the program saw many educators reporting increases in both the conservation awareness and level of critical skills that their students showed. Educators claimed that they noticed their students becoming more keen observers of the environment, and being able to ask deeper questions.

*"The students feel like co-scientists. [The teacher naturalist] encourages thinking about the problem some more, she is not just the resource for answers."  
- Curley Educator*

Similarly, in the second year of the BSEI program at the Holmes School, some educators noticed students thinking more scientifically and choosing books and projects with science themes more often, when given the choice. Educators remarked on the expanding vocabulary of students, especially around science themes.

Educator surveys administered at several BSEI schools showed evidence of increased student science thinking. A statistically significant increase of nearly a full standard deviation was observed between Fall 07 and Spring 08 educator reports of how often students discussed observations with each other ( $\Delta X = +.4$ ,  $p < .05$ ).

**Table 4. Summary of Average Survey Changes for BSEI Educator Surveys**

Survey Item	Fall 2007			Spring 2008			$\Delta \bar{X}$
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	
I respond to student questions with more questions.	38	3.0	0.8	40	3.1	0.6	+1
I encourage students to ask "what would happen if..."	38	3.3	0.7	40	3.3	0.5	-
I encourage students to make predictions based on patterns.	38	3.4	0.7	40	3.3	0.5	-.1
I notice students making predictions based on patterns.	38	2.8	0.9	40	3.0	0.6	+2
I notice students discussing their observations with others.	38	2.9	0.6	40	3.3	0.5	+4*
I encourage students to discuss observations with others.	38	3.3	0.6	40	3.5	0.5	+2

**NOTES:** Results of particular interest are shaded purple. Outcome scale range = 1 to 4; N = sample size; X = mean; SD = standard deviation;  $\Delta X$  = change in mean between pre- and post- measures; \* = significant at  $p < .05$ . Most interesting findings shaded in lilac.

### Indicators of readiness to move from Program Expansion phase to Wrap-Up phase

- Professional development norms and practices reflect growing commitment to both science and teacher collaboration
- Enthusiasm and excitement are high within identifiable pockets of the teaching staff
- Formalizing of relevant operational norms (e.g. grade level planning days, teacher naturalist roles and schedule, other professional development activities, leadership from places besides just principal)

### Recommendations for Program Expansion phase

- Sponsor a school wide event or conservation project to increase unification around the science theme
- Publicly celebrate successful projects and outcomes that happen during the "program expansion" phase
- Continue to provide coaching and supportive relationships
- Build skills and capacity of school educators

## Wrap-up Phase

**The central challenge and opportunity that played out during the final years of the BSEI program was the question of the role of science in the future identity of the school.** At this point, most schools had substantial teacher buy-in for the program. Yet, there was some question about the extent to which educators intended to continue to do the work when the BSEI program was completed, without continued support from the BNC or some other resource. Some schools had reached a kind of “tipping point,” where hands-on, minds-on science was integrated into the culture and climate of the school. Other schools, however, were on the verge of reaching that “tipping point,” and probably needed some help to get to the other side.

By the last year of the BSEI program, most schools were in the Doing stage of change for BSEI outcomes. The teacher naturalist was primarily mentoring teachers, with some modeling for new teachers, and a bit of coaching.



Other indicators of this phase included:

- Integrated science focus, with educators teaching science in the classroom
- Student scientific thinking and conservation awareness/behavior deepened
- Expansion of school wide conservation and science projects/events
- Uncertainty and anxiety about sustainability of BSEI goals without BNC support

### Integrated science focus, with educators teaching science in the classroom

By the wrap-up year, most classroom educators made substantial progress through the model-mentor-coach continuum, and were teaching science or scientific concepts in the classroom in some way. The BNC teacher naturalist had worked with most of the educators, and they were more comfortable and confident teaching science because of this support. At some schools, the majority of teachers regularly taught hands-on, minds-on science, while at other schools there was still a longer way to go to reach that goal.

At the end of the BSEI program at the Philbrick School, almost all educators mentioned using

*“I can do some science-related activities, and I can integrate it with the other subjects. I would probably be more inclined to do it because of my experiences with [the BNC teacher naturalist].”*

*- Philbrick Educator*

non-fiction literature as a gateway to science teaching in their classrooms. This intentional strategy of introducing science into the classroom through non-fiction literature was quite successful, allowing educators to gradually become used to science content within a familiar framework. The strategy served to increase the comfort of classroom teachers with science content, and no longer relegated science to the science room/teacher alone. Evaluation data showed increased integration of science with other disciplines, and broader integration throughout the school. Planning time between the science teacher, BNC teacher naturalist, and classroom

teachers was a key to successfully integrating science units.

At the Holmes School, in the final year of the program educators noted that the most valued aspect of the BSEI program was that the BNC teacher naturalist brought more science into the school and into classrooms. About half of the educators interviewed noted that the BSEI program brought a more targeted science focus to the school than it would have had without the help of the BNC. In addition, approximately half of the educators noticed a definite progression in their comfort level with and ability to teach science in their classrooms. The other half of the educators still needed substantial help and support in bringing science into their classes, largely because of the high rate of new teachers at the school during this year. In this final BSEI program year, many new teachers came to the Holmes School, resulting in a new teacher in almost every grade. Only one or two educators could be firmly placed in the coaching phase, although nearly all teachers had certainly made some progress along the model-mentor-coach continuum.

*"[The BNC teacher naturalist] is certainly a mentor, and helps me in terms of science. We meet and decide what we're going to do, she'll teach and if she's not there then I'll take over and teach. After she leaves I continue with the students. We do journaling. She does half, I do half."*  
- Holmes Educator

### Student scientific thinking and conservation awareness/behavior deepened

As in previous years, educators continued to note improvements in students' scientific thinking skills and conservation awareness.

At the Holmes School, as the BSEI program wrapped up, BNC staff remarked that students made improvements in their observation skills, use of details, and ability to make predictions. Students were also perceived as more interested and excited about science. For instance, when fourth graders worked on a unit on electricity and built solar ovens, they "were genuinely excited to test out their ovens."

*"The students love being outside and making discoveries about their trees. I notice that as the weeks go by their journal entries become more and more detailed."*  
- BSEI Staff

During the wrap-up year at the Philbrick School, educators made a link between having science more integrated into the curriculum and a deeper student understanding of scientific concepts. Educators reported increases in student engagement in learning and science vocabulary. Science preparation from other classrooms and prior years allowed teachers to deepen science teaching in their classrooms. In addition, many educators mentioned that students enjoyed participating in nature activities, and felt more ownership of the schoolyard. Educators discussed expected links between this enjoyment and future environmental stewardship.

*"I think that's how stewardship starts. Kids are connected to this place so they're taking care of this place. Maybe as they get older they'll understand that they're responsible for their neighborhood and their city."*  
- Philbrick Educator

## Expansion of school wide conservation and science projects/events

In order to consolidate the science focus during the wrap-up phase, school wide conservation and/or science projects and events were continued and expanded upon.

At the Philbrick School, they added to the successful recycling project such other projects as schoolyard clean-ups, composting, and a green roof investigation. Conservation projects also increased in number and occurred in more classrooms. There were many field trips to places with an environmental focus, including the BNC, Arnold Arboretum, and other locations.

*"[Families] do the beautification here around the school. And I was real surprised, because the last time we had a cleanup day, I had more people really show up than I needed... which is great."*

*– Philbrick Family Member*



The Holmes School continued to focus on and expand upon the Science Week. During this week, science was the focus school-wide. Science Week fit the model that some thinkers have put forward (Chawla, 2007; Sobel, 1996), that the best way to introduce conservation ideas to young children is through small experiences in which they can feel successful right away (rather than large conservation projects that can be overwhelming).

## Uncertainty and anxiety about sustainability of BSEI goals without BNC support

At the Philbrick School, many educators expressed anxiety about the BSEI program coming to an end. Since there were many ongoing projects, educators felt that they needed additional assistance, and requested continued support from BNC. Most of the sustainability concerns were connected with the prospect of losing the support of the teacher naturalist, who was well regarded by all. One change that had helped the BSEI program to gain a stronger foothold in the classrooms during this wrap-up year was having the teacher naturalist work more consistently with more teachers, on a fixed schedule.

*"It's just still sort of up in the air exactly what's happening next year. I would cry if [the Boston Nature Center] said we were totally cut off. I don't know what I would do with myself."*

*–Philbrick Educator*

The final year of the program at the Holmes School saw similar anxieties voiced about the uncertain future of science at the Holmes School. Several interviewees expressed concern about the sustainability of the tenets of the BSEI program without the full and continued support of the BNC. This concern was heightened by the upcoming merger with the Stone School, a school with less focus on and training for hands-on, minds-on science in the classroom. Expressions of uncertainty and anxiety were, however, often coupled with expressions of hope and openness to possibility.

*"I'm nervous that if BNC decides not to be here things will halt, because [the teacher naturalist] keeps us on our toes."*

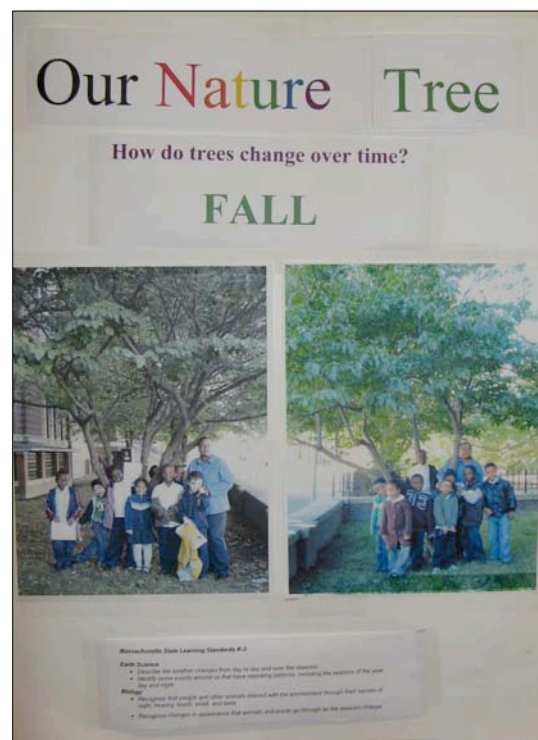
*-- Holmes Educator*

## Indicators of readiness to move from Wrap-Up phase to Follow-Up phase

- A key sign that the school is moving toward the next phase is adoption of a school wide theme that is science or environmentally oriented
- The school has specific plans for sustaining goals of the BSEI program either without BNC support, or has funding to keep BNC support available

## Recommendations for Wrap-Up phase

- Continue to include the wider school community, possibly with a vision-to-action forum to garner support for science and conservation at the school
- Determine the optimal way to stay engaged with the school, while transitioning out gradually and empowering them to continue without BNC
- Celebrate, support, and encourage successful projects and activities



## Follow-up Phase

During this phase, the level and type of ongoing commitment to science revealed the extent to which it had become part of the core fabric of the school. One of the schools evaluated provided an example of what a school can look like several years after the conclusion of the formal BSEI program. Having completed a rich combination of the BSEI and related programming, this school was very far along the logic model outcomes continuum, primarily in the Deepening phase, where teaching science in the classroom is almost automatic. The primary role of the teacher naturalist at this phase was coaching educators at the school. The school showed its commitment to sustaining the goals of the BSEI program by seeking other resources to continue with aspects of the program. Although the BSEI program may not have been sufficient on its own to attain total school change, it was a very critical piece of the long-term sustainability puzzle.



Other indicators of this phase included:

- Highly collaborative school climate
- Drive toward coherent curriculum focused on thematic integration related to environment
- Thematic integration impacted student outcomes
- Continued concern about sustainability of program goals without BNC support

### Highly collaborative school climate

At the Haley School, collaboration among educators was the norm, and was built into the school climate. A majority of educators mentioned that what attracted them to the school was the community feeling among the staff, and all talked about how it kept them happy and excited to stay there. Educators were given plenty of planning time in their grade teams, with a common planning time every day, and 45 minutes every week to meet with the administration. There was also BNC planning time, which consisted of three-hour chunks, three times a year, planned to coincide with the beginning of each new theme.

*"I came to the Haley School, because it was a small, close-knit community. I wanted a community where I could build relationships with colleagues."*

*– Haley Educator*

In addition, there was a strong focus on collaborating with the school community. One way that educators accomplished this goal was to bring in family members who were professionals in some area to help teach part of the curriculum.

## Drive toward coherent curriculum focused on thematic integration related to environment

In the follow-up phase, environmental themes and hands-on, minds-on science were completely integrated into the school curriculum and educators were committed to teaching science in the classroom. At the Haley School, teachers were increasingly interested in and supportive of the integrated thematic curriculum promoted by the school administration. The teacher buy-in happened gradually over time. The previous principal had been focused on seeding the idea of place-based education (PBE) (using the local environment and community as the core integrating context for the curriculum) with a few teachers who were especially interested (the “early adopters” in a diffusion of innovation approach). The current Haley principal continued to move this process forward by presenting place-based education, or thematic integration as a way to motivate students, and overall improve student learning.

*“There’s been a shift to understanding the power of real experiences, more hands-on projects going on. Certainly people have gotten the message that, although people took plenty of field trips before, they were isolated, now you choose field trip based on [your curriculum].”*  
- Haley Educator

There was a sharp focus on the coherence of the curriculum across disciplines and across grades. The Haley School planned to employ a full-time curriculum specialist, whose job was to coordinate the curriculum across the school. Moreover, the school built in planning time to plot out the curriculum as a grade team, as well as time to document the themes. Integrating themes across disciplines started with field trips that would be “spark experiences” for what they were learning, and ended with showcases tied into the learning that went on in the classroom.

The school had three themes over the course of the year, and all were related to the environment and/or science. Several educators mentioned that part of what drew them to the school was the focus on the environment and nature. One educator said, “[the school] exuded an environmental sense when I came into the foyer.” The school had a well-used outdoor classroom, and also regularly went to the Boston Nature Center.

### Thematic integration impacted student outcomes

The focus at the Haley School on place-based education, or thematic integration motivated students, increased student vocabulary, and encouraged higher levels of critical thinking. Educators saw evidence in their class of students engaged in higher level thinking, such as applying ideas learned in one setting to other settings. Some educators noted that students made connections from the “spark experiences” to the classroom, and even to home. Educators were very excited to see this type of advanced learning in their students.

*“An example, to highlight the passion, and how students were more involved with science, was that last year younger students were paired with the 5<sup>th</sup> grade class. The older students became tour guides, and really owned their product. They were able to explain it, and they were really excited. They took over and really made it their own.”*  
- Haley Educator



### **Continued concern about sustainability of program goals without BNC support**

There was not a consensus about the level of sustainability of PBE/thematic integration at the Haley School without BNC support. Interviewees were all over the map in terms of what level of sustainability they predicted. Only a few interviewees believed that PBE would sustain itself at a fairly high level. Most others believed that without a person dedicated to the job, there would be less thematic integration, and a few believed that no BNC support would lead to the dwindling away of PBE altogether.

*"I would hate for the BNC to not be there. It's a wonderful relationship. It's almost like an old friend that you don't want to give up. Even though they have done more to make us more independent, you don't want to give up your old friend."*

*- Haley Educator*

Some interviewees could imagine a point in the future where the Haley would need less support from the BNC - after the schoolyard is set and curricula are documented. However, they also noted that this sustainability would be dependent on the comfort level and skill set of new teachers who come in to the school, and what types of support they needed. There was a strong sense that there would always be some sort of relationship between the BNC and the Haley School, because of their history, and because of their proximity to one another.

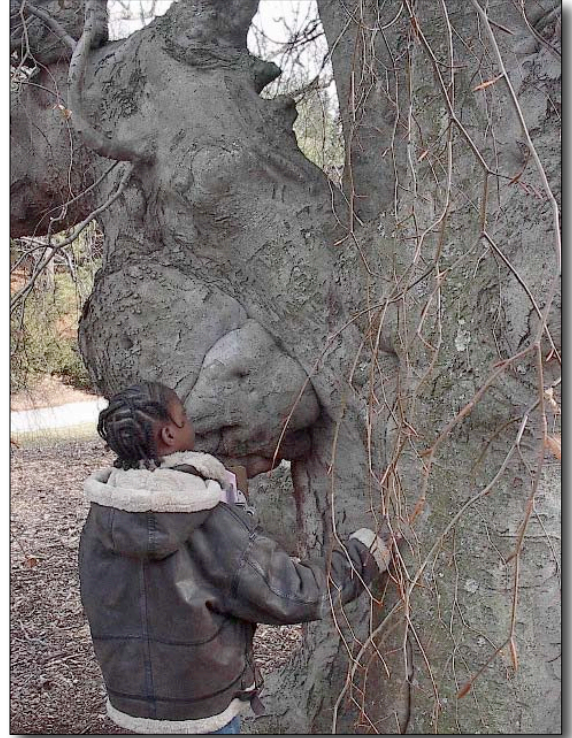
### **Indicator of ongoing success at the Follow-Up phase**

- Science/ environmental theme work is a main lens for hiring leadership and staff

### **Recommendation for the Follow-Up phase**

- Guide school in finding other sources of support and resources for this work





## CONCLUSIONS AND RECOMMENDATIONS

The data from several years across multiple sites provided definite evidence for progress along the Stages of Change continuum, such that schools that worked with the BSEI program over time improved systematically in the logic model outcomes identified by the BSEI program. This progress looked to be a developmental process, which could be likened to that of a growing plant. In the beginning, the main task of the BNC and the school is to sow the seeds for the BSEI program, so that it can grow into its fullness over the course of the four-year program. In the middle years of the BSEI program, the seeds sown in the start-up years begin to sprout and send off shoots. Relationships between the BNC and the school, the roots of this program, have deepened, and more teachers understand the BSEI program and are beginning to implement aspects of the program. By the final year of the BSEI program, what started out as seeds four years prior have grown into hearty plants. A deep and ongoing relationship has been established between BNC and the school, and there is a lot of buy-in from the teachers and school community for the tenets of the BSEI program. Once the formal BSEI program has been completed, there is still some tending of the plant to be done to ensure that it continues to grow strong and yield fruit.

It is striking that this developmental pattern persisted despite considerable variations by school. Indeed, adaptability of the BSEI model to the unique context of each school seemed to be a fundamental key to achieving the greatest success. Every school was encouraged to adapt the model to their own culture. This high level of local control by the schools increased buy-in, and allowed schools to use the BSEI program to further their own agenda.

The main recommendation for continued BSEI implementation is to continue to formalize the program model. The theory of change described by the logic model has been through multiple iterations, and has performed very well as a structure for both shaping program decisions and focusing program evaluation. Continued reflection on the logic model, and whether it still exemplifies the BSEI program model would be a useful undertaking for the BSEI program. Indeed, revision of the logic model at this stage of BSEI program development may be warranted. In addition, BNC staff would be well served to continue to complete logic model tables (a methodology developed and tested for this evaluation) for each school during each program year. Minimally, BNC staff could fill out the tables, and if possible, having external evaluators validate the data would be ideal. This data has shed light on the progress made by each school, and the optimal way that BSEI can serve the schools.

This evaluation of the BSEI program strongly indicated positive effects of the program on the schools. The BNC has created a dynamic model that is adaptable to schools. The year-to-year evaluations were also taken seriously by BNC, such that the staff used the evaluation data to improve the program along the way. Consequently, the BSEI program model is quite mature and strong, and the evaluators believe that the BSEI program has much to offer to the wider community of place-based education practitioners and researchers.

Other areas to explore in future evaluation include: a finer grained investigation into the active ingredients of success; documentation of impacts on students over time, such as student journal data; and documentation of impacts on the environment, such as students doing conservation projects assessing their impact on the environment.



## EXECUTIVE SUMMARY FOR HALEY

The Dennis C. Haley Elementary School (Haley School) serves approximately 300 students, grades K-5, and is located on a busy highway in Roslindale, MA. Haley has an unusually



large schoolyard for an urban school, with a grass field, play equipment, and a constructed wetland, all renovated or created in partnership with the Boston Schoolyard Initiative. The Haley School has a mission to become a model environmental school, and has partnered with several organizations and programs to further this mission.

One such program was the Boston Schools Environmental Initiative (BSEI), which was

initiated at the Haley School in the fall of 2006. BSEI was designed to work with selected participant schools in Boston to foster “hands-on, minds-on” science and environmental awareness.<sup>7</sup> This program was run by the Boston Nature Center (BNC), which placed a teacher naturalist in the school and provided ongoing professional development and project coordination. The goal of the program was to move through a model-mentor-coach cycle over the course of a four-year period.

BSEI program components at the Haley School included:

- BNC teacher naturalist on site 1 day per week in a coaching role to support all K-5 teachers to lead their own science lessons
- BNC teachers naturalist planning and leading field-based investigations for students in the schoolyard, community and beyond
- BNC teacher naturalist supporting the school to take older students on overnight experiences designed to learn about the environment
- BNC teacher naturalist coordinating with school curriculum specialist to design integrated unit planning and documentation with teachers
- BNC teacher naturalist serving as advisor to Outdoor Classroom committee
- BNC staff providing facilitation and consultation to the school-based steering committee leading its science and environmental planning efforts

*“[The teacher naturalist] is invaluable. She’s so much more than a teacher naturalist. She’s sort of our expert in science and environmental education. But more so, she’s an expert in thinking about how to frame instruction, and how to help seed ideas with teachers.”*

*– Haley Educator*

<sup>7</sup> “Hands-on, minds-on” science refers to an experiential approach to learning that engages students in asking and answering their own questions and hypotheses.

## *Evaluation Methods*

External evaluators from PEER Associates, Inc. conducted an evaluation of the Haley School in the fall of 2008. The primary goals of the evaluations were to: 1) inform program improvement during the program; and 2) provide follow-up data in order to document the range of outcomes from baseline to longer term. To that end, interviews were conducted with 12 educators, two school administrators, two family members, and two BNC staff. In addition, BNC staff filled out project summaries and ratings of logic model outcomes for the Haley School for this evaluation.

## *Findings*

The primary finding was that **the BSEI program was an essential piece of the Haley School's progress in integrating place-based education and thematic curricula throughout the school.** The level and type of ongoing commitment to science revealed the extent to which it had become part of the core fabric of the school.

Specific findings included:

- *Highly collaborative school climate*
- *Drive toward coherent curriculum focused on thematic integration related to environment*
- *Thematic integration impacted student outcomes*
- *Essential components of BNC support identified: teacher naturalist support, planning time, and funding*
- *Continued concern about sustainability of program goals without BNC support persisted*



## *Conclusions and Recommendations*

As the BSEI program reached formal closure at the Haley School, there was a lot of anxiety about how to continue the mission of the program. All interviewees wanted the program to continue, and hoped that the BNC teacher naturalist could continue in some role at the school. There were also plans in process for ways that other funding could be obtained to continue some of the current plans.

*"I would hate for the BNC to not be there. It's a wonderful relationship. It's almost like an old friend that you don't want to give up. Even though they have done more to make us more independent, you don't want to give up your old friend."*

*– Haley Educator*

## EXECUTIVE SUMMARY FOR PHILBRICK

The John D. Philbrick Elementary School (Philbrick School) may be one of Boston's smallest



public schools, but it is big on community. The school profile asserts that, "The size of the school enables teachers to provide personal attention to all children and establish an environment that is intimate and nurturing." The school is located only one mile from the Boston Nature Center, in Roslindale. The Philbrick School currently has a full-time science specialist, who works with all of the students in the school at least twice a week.

The Boston Schools Environmental Initiative (BSEI) program was initiated at the Philbrick School in the fall of 2004, and officially ran through the spring of 2008. BSEI was designed to work with selected participant schools in Boston to foster "hands-on, minds-on" science and environmental awareness.<sup>8</sup> This program was run by the Boston Nature Center (BNC), which placed a teacher naturalist in the school and provided ongoing professional development and project coordination. The goal of the program was to move through a model-mentor-coach cycle over the course of a four-year period.

BSEI program components at the Philbrick School included:

- BNC teacher naturalist on site 3 days per week for first year of this evaluation period, two days per week in the second year and one day per week in subsequent years
- BNC teacher naturalist moving from modeling science activities in the classroom to mentoring and coaching, to increase comfort of K-5 teachers leading science lessons
- BNC teacher naturalist planning and leading field-based investigations for students in the schoolyard, community and beyond
- BNC teacher naturalist supporting the school to take older students on overnight experiences to learn about the environment
- BNC teacher naturalist coordinating with the school science specialist for integrated unit planning and documentation with teachers
- BNC teacher naturalist working with school science specialist to identify grade level appropriate books about science topics to align with the school's literacy curriculum
- BNC staff providing professional development workshops support and planning to all grade level teachers
- BNC supporting the implementation of a school and community wide strategic planning process known as a "Vision to Action Forum."

*"I would cry if [the Boston Nature Center] said we were totally cut off. I don't know what I would do with myself."*

*- Philbrick Educator*

<sup>8</sup> "Hands-on, minds-on" science refers to an experiential approach to learning that engages students in asking and answering their own questions and hypotheses.

## Evaluation Methods

External evaluators from PEER Associates, Inc. conducted evaluations of the Philbrick School from the fall of 2005 to spring of 2008 (the second through fourth years of the BSEI program at the school). The primary goals of the evaluations were to: 1) inform program improvement during the program; and 2) provide baseline, check-in, and wrap-up data in order to document the range of outcomes from baseline to longer term. To that end, interviews were conducted with almost 20 educators, the school administrator every year of the evaluation, five family members, and seven students. Educator surveys were administered in fall of 2007 and spring of 2008. In addition, BNC staff filled out project summaries and ratings of logic model outcomes for the Philbrick School in every year of the evaluation.

*"I think that's how stewardship starts. Kids are connected to this place so they're taking care of this place. Maybe as they get older they'll understand that they're responsible for their neighborhood and their city."  
– Philbrick Educator*

## Findings

The primary finding was that **the BSEI program was successful in many of its goals at the Philbrick Elementary School**, including: integrating science more widely throughout the school; introducing more conservation projects/themes; and increasing classroom teacher comfort with hands-on science in the classroom. Beyond impact on teacher practice and school culture, there was also a considerable impact on students, including: increased science vocabulary; deeper understanding of scientific concepts; and steps towards environmental stewardship. Specific findings included:

- *Science became more integrated throughout the classroom and school wide curricula*
- *Educators reported improved student engagement in learning and science vocabulary*
- *Conservation projects and student environmental stewardship increased*
- *Schoolyard became a more central focus of family/community involvement*
- *Vision-to-Action Forum, "Philbrick of Tomorrow," galvanized support for science and conservation at the school*
- *Uncertainty about sustainability of BSEI mission at Philbrick persisted*

## Conclusions and Recommendations



As the program reached formal closure at the Philbrick School, there was a lot of anxiety about how to continue the mission of the BSEI program. All interviewees wanted the program to continue, and hoped that the BNC teacher naturalist could continue in some role at the school. There were also plans in process for ways that other funding could be obtained to continue some of the current plans.

As the Philbrick School continues on the path described by the BSEI logic model, next steps might include formalizing shared planning time for teachers and/or adopting a school-wide environmental science oriented theme.



## EXECUTIVE SUMMARY FOR HOLMES

The Oliver W. Holmes Elementary School (Holmes School) offers a welcoming and diverse community, with a focus on the arts and science. The school is located in Dorchester, one of the largest neighborhoods within Boston. The school profile asserts that, “The Holmes School



is an inclusion school. Our mission is to educate our students in a safe, nurturing environment that encourages creativity and self-esteem and maximizes students’ academic achievement within a learning community.” The Holmes School currently employs a science specialist to come to the school three days a week. The science program is supported by resources from the Museum of Science, the New England Aquarium, the Franklin Park Zoo, and the Children’s Museum.

The Holmes School was also part of the Boston Schools Environmental Initiative (BSEI) program, a program out of Mass Audubon’s Boston Nature Center that helps teachers become engaged in inquiry-based learning and teach science using an integrated approach. BSEI was initiated at the Holmes School in February of 2006. The program placed a teacher naturalist in the school and provided ongoing professional development and project coordination. The goal of the program was to move through a model-mentor-coach cycle over the course of a four-year period.

BSEI program components included:

- BNC teacher naturalist on site 3 days per week and working with teachers from all K-5 grade levels modeling science-based classroom lessons
- BNC teacher naturalist planning and leading field-based investigations for students in the schoolyard, community and beyond
- BNC staff working with Holmes staff to plan annual ‘Science Week’, where classes celebrate science work through assembly programs and classroom displays
- BNC staff providing facilitation and consultation to the school-based steering committee leading its science and environmental planning efforts
- BNC staff providing professional development support and planning to all grade level teachers, multiple times per year
- BNC staff supporting the principal to hold monthly discussions with staff about the integration of science and literacy during principal professional development time
- BNC staff leading planning effort to implement the Holmes-Stone Coming Together event, including facilitation of planning with staff from both schools to assist with an effective merger

*“The science week is making science more of a focus [at our school]. [We have started] looking at Science Week more as a way to display what we’ve learned rather than as a chore.”*

*- Holmes Educator*

## Evaluation Methods

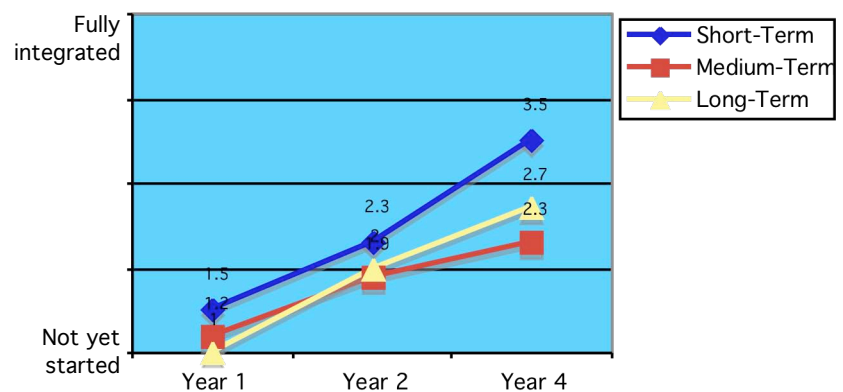
External evaluators from PEER Associates, Inc. conducted evaluations of the Holmes School in the spring of 2006, 2007, and 2009 (during the first, second, and fourth years of the BSEI program). The primary goals of the evaluations were to: 1) inform program improvement during the program; and 2) provide baseline data, check-in, and wrap-up data in order to document the range of outcomes from baseline to longer term. To that end, interviews were conducted with 45 educators over the course of 3 years, and a school administrator and the BNC teacher naturalist each year of the evaluation. Educator surveys were administered in fall of 2007 and spring of 2008. In addition, BNC staff filled out project summaries and ratings of logic model outcomes for the Holmes School for each year of the evaluation.

## Findings

The primary finding was that by the final year of the BSEI program, the **Holmes School made some specific plans and substantial progress for integrating hands-on, minds-on science into the school.** Ratings for target outcomes tended to be almost fully integrated for short-term outcomes, and were well on their way to integration for medium- and long-term outcomes.

Although forward momentum toward some kind of critical mass of science teaching at the school was evident, two daunting challenges were also present: the upcoming merger with the Stone School; and a desire for more and/or ongoing BSEI-like support.

Figure H1. BSEI Logic Model Outcomes, for Holmes



Specific findings included:

- *Educators made substantial progress through the model-mentor-coach cycle*
- *School valued BNC teacher naturalist bringing more science into the school and classrooms*
- *Students made improvements in their observation skills, use of details, and predictive ability*
- *The school had several exemplary BSEI projects*
- *Educators expressed some anxiety about the uncertain future of science at the Holmes School, faced with the merger with Stone School, and less BNC support*

## Conclusions and Recommendations

After four years of the BSEI program, the Holmes School made substantial progress, and was poised on the edge of a “tipping point” towards full integration of BSEI goals. In order to sustain progress, and to help the Holmes School over the edge, here are some ideas for shaping science at the Holmes in coming years:

- ✓ *(Specifically) Continue to focus on Professional Development opportunities.*
- ✓ *(Generally) Increase science focus at school*
- ✓ *(Strategically) Link the Stone School merger and the Holmes School science program*

## EXECUTIVE SUMMARY FOR CURLEY

The James M. Curley Elementary School (Curley School) is a medium-sized school located a few blocks from the parks and ponds along the busy Jamaica Way southwest of Boston proper. The school profile asserts that, "The James Michael Curley Elementary School is a small school with a big emphasis on individual instruction. The long-standing relationship with Lesley University as a Literacy Collaborative School has supported best practice in reading and writing instruction." The Curley School currently has a full time art teacher and employs a science specialist to come to the school once a week. The school is popular among parents for its sense of community. According to one parent, "we love to celebrate diversity, but yet we are all on one team."



The Boston Schools Environmental Initiative (BSEI) program was initiated at the Curley School in the fall of 2005, and officially ran through the spring of 2007, at which point BNC and the Curley School made a strategic decision to change to the BSI program. The BSEI program was a more intense program, which required a more significant commitment from the school than the BSI program, which still offered the school beneficial resources. This decision to change the program was based on external factors, primarily that the school was changing from an elementary only to a K-8 school, which required the lion's share of the school's focus and energy. The school and BNC agreed that continued support in the form of the BSEI program would not be as productive, given this upcoming merger. Yet, both parties did want to continue their relationship and carry on with the goal of integrating science more substantially into the curriculum.

BSEI program components at the Curley School included:

- BNC teacher naturalist on site 3 days per week leading and modeling science-based classroom lessons
- BNC teacher naturalist planning and leading field-based investigations for students in the schoolyard, community and beyond
- BNC staff providing facilitation and consultation to the school-based steering committee leading its science and environmental planning efforts
- BNC staff working with the parent science committee to identify reading resource lists to expand classroom libraries to include more science and environmental topics
- BNC staff supporting the school's "Sweet and Sappy" science week and family night

*"The students feel like co-scientists. [The teacher naturalist] encourages thinking about the problem some more, she is not just the resource for answers."*

*- Curley Educator*

## EXECUTIVE SUMMARY FOR MASON

The Samuel W. Mason Elementary School (Mason School) is located in the Roxbury neighborhood of Boston, MA. At the Mason School, educators work collaboratively as a professional learning community, offer rigorous content with curriculum and instruction designed to provide active student engagement, and frequently assess student performance. The outdoor classroom allows students to engage in hands-on, experiential learning, fostering an appreciation and respect for the environment.



The Mason School was part of the Boston Schools Environmental Initiative (BSEI) program, a program out of Mass Audubon's Boston Nature Center that helps teachers become engaged in inquiry-based learning and teach science using an integrated approach. BSEI was initiated at the Mason School in the fall of 2007. The program placed a teacher naturalist in the school, during the school year, and provided ongoing professional development and project coordination. The goal of the program was to move through a model-mentor-coach cycle over the course of a four-year period.

BSEI program components at the Mason School included:

- BNC teacher naturalist on site 3 days per week working with teachers representing all K-5 grade levels to model science-based classroom lessons
- BNC teacher naturalist planning and leading field-based investigations for students in the schoolyard, community and beyond
- BNC teacher naturalist supporting the school to take older students on overnight experiences to learn about the environment
- BNC staff providing facilitation/consultation to the school-based steering committee for science and environmental planning efforts and collaboration with other grants
- BNC staff providing professional development workshop support and planning to all grade level teachers, multiple times per year
- BNC staff providing specific training to school staff to utilize its new outdoor classroom resource provided to the school by the Boston Schoolyard Initiative

### *Evaluation Methods*

External evaluators from PEER Associates, Inc. conducted evaluations of the Mason School in the fall of 2007 and the spring of 2008 (two points in the first year of the BSEI program). The primary goals of the evaluations were to: 1) inform program improvement during the program; and 2) provide baseline data in order to document the range of outcomes from baseline to longer term. To that end, interviews were conducted with 16 educators, a school administrator each time, and the BNC teacher naturalist. In addition, BNC staff filled out project summaries and ratings of logic model outcomes for the Mason School for this year.

## Findings

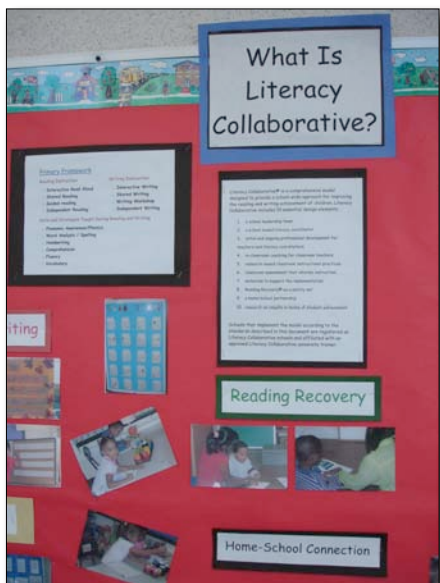
The primary finding was that the **BSEI program had great potential for success at the Mason School** due to the current overall focus on science and the educators' level of readiness and general interest in this movement. The implementation of non-fiction literature throughout the school was an effective way to begin the science integration process in the classrooms.

Specific findings included:

- *BSEI functioned like a kind of glue, helping tie together a “year of science” at Mason*
- *Several conservation projects were initiated by BSEI, with program awareness still building*
- *Educators requested more science content training and resources*
- *BSI to BSEI transition worked well, with some growing pains along the way*

## Conclusions

Greater progress and faster educator buy-in may occur as more professional development around science is provided in combination with increased resources of the same.



*“I feel like [science in the school] is more holistic now than it ever was. Are we there where we want it to be? Maybe not, but we’re taking the right steps.”*  
– Mason Educator

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## APPENDIX A – LOGIC MODEL TABLES

**Table B1. BSEI Logic Model Short-Term Outcome Progress for Year 1 Schools\***

Logic Model Outcome	Curley 05-06, Year 1	Holmes 05-06, Year 1	Mason 07-08, Year 1
1) BNC used as community resource by students, families, and teachers	➤ <b>1</b> - not much discussion of using BNC in interviews	➤ <b>1</b> - not much discussion of using BNC in interviews	➤ <b>2</b> - the K teachers use the BNC, several kids went to camp
2) School educators see science/math as important for student education	➤ <b>2</b> -emerging focus on science, 1 <sup>st</sup> time science teacher at the school	➤ <b>2</b> - emerging focus on science as integrating context for the school	➤ <b>3</b> - science is perceived as the new school focus
3) Hands-on, minds-on science engages diverse group of students	➤ <b>2</b> - little mention of engaging students	➤ <b>2</b> - little mention of engaging students	➤ <b>4</b> - many educators mentioned benefits of hands-on education for diverse groups of students
4) Underserved populations reached	➤ <b>Yes</b>	➤ <b>Yes</b>	➤ <b>Yes</b>
5) Inquiry planning provides teachers with models of science integration	➤ <b>1</b> - no planning with BNC mentioned	➤ <b>1</b> -planning with BNC requested	➤ <b>2</b> - Wed. educator planning, some TN planning
6) Teachers/students use hands-on, minds-on science across disciplines to understand natural world	➤ <b>2</b> - some teachers beginning to incorporate science and scientific thinking a bit more	➤ <b>2</b> - some teachers beginning to incorporate science and scientific thinking a bit more	➤ <b>1</b> - OC and non-fiction literature may help move this integration along
7) Students design interdisciplinary science projects	➤ <b>1</b> - science happens within science class	➤ <b>1</b> - science happens within science class	➤ <b>1</b> - science happens within science class
8) BNC staff engages school in conservation	➤ <b>2</b> - some talk of recycling. Sweet and Sappy event	➤ <b>1</b> - recycling to begin next year	➤ <b>2</b> - recycling project has slowly begun, Food Project, schoolyard
9) Teachers progress through model-mentor-coach approach	➤ <b>2</b> - main role of TN at Curley was modeling in K-3 classrooms	➤ <b>2</b> - main role of TN was modeling in classrooms	➤ <b>3</b> - lots of co-teaching, TN/resource support
10) BNC staff offer PD to help teachers develop inquiry science curriculum	➤ <b>1</b> - not offered this year	➤ <b>1</b> - not offered this year	➤ <b>3</b> - 2 days @ BNC, 2-hr. workshop at school
11) Increased involvement of schools in integrating BSEI into curriculum	➤ <b>1</b> - school still skeptical about future of BSEI program	➤ <b>2</b> - some educators willing to integrate BSEI more	➤ <b>2</b> - educators ready and willing for curriculum change with science focus
12) School considers outdoor schoolyard to be a classroom	➤ <b>2</b> - TN brought students outside. Tapping trees for Sweet & Sappy	➤ <b>2</b> - school created OC, TN used it	➤ <b>2</b> - early childhood garden and eventual OC
13) Broader community becomes an outdoor classroom	➤ <b>1</b> - no mention of this yet	➤ <b>1</b> - no mention yet	➤ <b>2</b> - Food Project, Shirley Eustis House

\* Using the Stages of Change Model: **1 = Disinterest** - issue not yet acknowledged; **2 = Deliberation** -issue acknowledged, not ready to address it; **3 = Designing** - getting ready to change; **4 = Doing** - change behavior initiated; **5 = Deepening** - maintaining behavior change.

**Table B2. BSEI Logic Model Medium-Term Outcome Progress for Year 1 Schools\***

<b>Logic Model Outcome</b>	<b>Curley 05-06, Year 1</b>	<b>Holmes 05-06, Year 1</b>	<b>Mason 07-08, Year 1</b>
1) Evidence of BSEI students attending other BNC programming	➤ 1 - no evidence yet	➤ 1 - no evidence yet	➤ 2 - mention of TN providing BNC materials and brochures
2) Conservation communities created within the schools	➤ 1 - little conservation at school	➤ 1 - little conservation at school	➤ 1 - little conservation at school
3) BSEI students demonstrating conservation behavior	➤ 1 - little student conservation behavior	➤ 1 - little student conservation behavior	➤ 1 - little student conservation behavior
4) Minorities/English Language Learners engaged with more science than without BSEI	➤ 1 - little mention of this one way or the other	➤ 1 - little mention of this one way or the other	➤ 1 - little mention of this one way or the other
5) Students demonstrate scientific skills and application to other settings	➤ 1 - not mentioned by teachers	➤ 2 - some mention by teachers	➤ 2 - educators mentioned some occurrences
6) Students demonstrate conservation skills, connection to nature	➤ 2 - in relation to plants and schoolyard	➤ 1 - no mention	➤ 2 - in relation to food project and science class
7) School community continues initial efforts of BSEI program	➤ 1 - nothing yet	➤ 1 - nothing yet	➤ 3 - OC to be built this summer, non-fiction literature in classrooms, parent council
8) Evidence of student led community service projects	➤ 1 - no community service projects mentioned	➤ 1 - no community service projects mentioned	➤ 1 - recycling project in school
9) BSEI embraced as integral part of school	➤ 2 - many teachers have worked with TN	➤ 2 - many teachers have worked with TN	➤ 2 - many teachers have worked with TN
10) School community working together for academic achievement and healthy environment	➤ 1 - school hoping to increase science instruction, which was reason for bringing BSEI	➤ 1 - energy exists, support and focal project might help	➤ 1 - energy exists, support and focal project might help
11) School emphasizes need for resources to continue program	➤ 1 - not mentioned	➤ 1 - not mentioned	➤ 2 - need exists and voiced

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation - issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.



**Table B3. BSEI Logic Model Long-Term Outcome Progress for Year 1 Schools\***

<b>Logic Model Outcome</b>	<b>Curley 05-06, Year 1</b>	<b>Holmes 05-06, Year 1</b>	<b>Mason 07-08, Year 1</b>
1) Schools use science as thematic base for delivering integrated curricula	➤ 1 - science only emerging as a focus	➤ 1 - science only emerging as a focus	➤ 2 - non-fiction literacy has been implemented
2) Increased appreciation for role of EE in schools	➤ 1 - not mentioned	➤ 1 - not mentioned	➤ 3 - educators recognize EE TN is bringing; teachers see value and excited to do more EE
3) Schools and communities engage in conservation practices	➤ 1 - talk of recycling program	➤ 1 - talk of recycling program	➤ 1 - recycling program
4) Culturally competent work magnifies other program outcomes <sup>9</sup>	➤ N/A	➤ N/A	➤ N/A
5) Students use scientific/critical thinking to understand world	➤ 1 - educators did not notice this yet	➤ 1 - educators did not notice this yet	➤ 1 - educators mentioned this need
6) BSEI participants and educators join BNC education advisors	➤ 1	➤ 1	➤ 1
7) Expanded interactions between schools and communities	➤ 1 - not yet	➤ 1 - not yet	➤ 1 - on the right track with food project and OC

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

<sup>9</sup> Through the evaluation process, it became clear that the subject of cultural competency was much more complicated than the scope of this evaluation. BNC participated with two other environmental organizations in a Barr Foundation study to create metrics for Cultural Competence.

**Table B4. BSEI Logic Model Short-Term Outcome Progress for Year 2 Schools\***

<b>Logic Model Outcome</b>	<b>Philbrick 05-06, Year 2</b>	<b>Curley 06-07, Year 2</b>	<b>Holmes 06-07, Year 2</b>
1) BNC used as community resource by students, families, and teachers	➤ 4 - several families involved with BNC outside of school	➤ 2 - some families may have gone to camp at BNC	➤ 2- some families may have gone to camp at BNC
2) School educators see science/math as important for student education	➤ 3 - several educators discussed how science engages students	➤ 3- some educators agree with this vision	➤ 3 - many educators discussed how science engages students, but not many acting on it yet
3) Hands-on, minds-on science engages diverse group of students	➤ 4 - some educators claimed engages students with difficulty academically	➤ 2 - some teachers mentioned this	➤ 2 - some teachers mentioned this
4) Underserved populations reached	➤ Yes	➤ Yes	➤ Yes
5) Inquiry planning provides teachers with models of science integration	➤ 2 - some inquiry planning with BNC TN and science teacher	➤ 3 - BNC TN modeled inquiry planning for some classes	➤ 2 - inquiry planning with BNC TN
6) Teachers/students use hands-on, minds-on science across disciplines to understand natural world	➤ 2 - non-fiction literature used as a bridge; some teachers doing this, but mainly science specialist	➤ 2- art teacher extended science lesson	➤ 2 - Science Week included cross-grade and discipline collaborations
7) Students design interdisciplinary science projects	➤ 1- students not designing projects	➤ 1 - no known examples from data	➤ 2 - some occurred for Science Week
8) BNC staff engages school in conservation	➤ 3 - recycling project a huge success	➤ 1 - Planned for future	➤ 2 - school wide recycling project underway
9) Teachers progress through model-mentor-coach approach	➤ 2 - most teachers in modeling phase, some mentor or coach	➤ 2- because of recent transitions, this has been fleeting	➤ 2 - Holmes educators making some progress
10) BNC staff offer PD to help teachers develop inquiry science curriculum	➤ 3 - informal PD at school	➤ 3 - informal PD at school; teachers requested formal PD	➤ 3 - PD at BNC to plan science curriculum
11) Increased involvement of schools in integrating BSEI into curriculum	➤ 2-administrator and science teacher heavily invested, some others engaged	➤ 2 - more buy-in from teachers, but administration not very strongly	➤ 2 - educators and administrators interested
12) School considers outdoor schoolyard to be a classroom	➤ 4 - TN and science specialist using outdoors	➤ 4 - project summary showed several examples of this	➤ 4 - project summary showed several examples of this
13) Broader community becomes an outdoor classroom	➤ 3 - trips to BNC	➤ 4 - project summary showed several examples of this	➤ 3 - project summary showed several examples of this

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

**Table B5. BSEI Logic Model Medium-Term Outcome Progress for Year 2 Schools\***

<b>Logic Model Outcome</b>	<b>Philbrick 05-06, Year 2</b>	<b>Curley 06-07, Year 2</b>	<b>Holmes 06-07, Year 2</b>
1) Evidence of BSEI students attending other BNC programming	➤ 4 – summer camp, vacation camp, other BNC activities	➤ 2 – possibly summer camp	➤ 2 – possibly summer camp
2) Conservation communities created within the schools	➤ 2- beginning around the recycling program	➤ 2 – Recycling started, but not full scale yet	➤ 2 – recycling project, Science Week
3) BSEI students demonstrating conservation behavior	➤ 2 - some students, not all	➤ 1 – not much evidence	➤ 1 – not much evidence
4) Minorities/English Language Learners engaged with more science than without BSEI	➤ 4 - BSEI engages minorities at Philbrick	➤ 4 – BSEI engages minorities at Curley	➤ 4 – BSEI engages minorities at Holmes
5) Students demonstrate scientific skills and application to other settings	➤ 2 – educators reported some progress in this area	➤ 1 – not much evidence	➤ 2 – thinking more scientifically, increased vocabulary
6) Students demonstrate conservation skills, connection to nature	➤ 2 – few teachers mentioned	➤ 1 – not much evidence	➤ 2 – outdoor science area
7) School community continues initial efforts of BSEI program	➤ 2 – school interested in continuing to deepen BSEI	➤ 2 – Initiated	➤ 2 - Initiated
8) Evidence of student led community service projects	➤ 2 – recycling	➤ 1 – not much evidence	➤ 2 – recycling
9) BSEI embraced as integral part of school	➤ 2 – more teachers interested	➤ 2 – more buy-in from teachers	➤ 2 – most educators on board with program
10) School community working together for academic achievement and healthy environment	➤ 2 – recycling	➤ 2 – transitions this past year made this challenging	➤ 2 – Science Week used community resources
11) School emphasizes need for resources to continue program	➤ 2 – teachers recognize importance, science teacher applied for grant	➤ 1 – not much evidence	➤ 2 – Applied for BPS environmental classroom grant

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

**Table B6. BSEI Logic Model Long-Term Outcome Progress for Year 2 Schools\***

<b>Logic Model Outcome</b>	<b>Philbrick 05-06, Year 2</b>	<b>Curley 06-07, Year 2</b>	<b>Holmes 06-07, Year 2</b>
1) Schools use science as thematic base for delivering integrated curricula	➤ 2 - starting with non-fiction literature	➤ 2 - more than last year, and plans for more next year	➤ 2 - not core organizing principle yet, but making progress
2) Increased appreciation for role of EE in schools	➤ 2 - administration and educators beginning to appreciate EE	➤ 2 - educators beginning to recognize this	➤ 2 - educators beginning to recognize this
3) Schools and communities engage in conservation practices	➤ 2 - recycling	➤ 1 - little evidence	➤ 2 - recycling
4) Culturally competent work magnifies other program outcomes <sup>10</sup>	➤ N/A	➤ N/A	➤ N/A
5) Students use scientific/critical thinking to understand world	➤ 2 - students better observers	➤ 2 - becoming more keen observers	➤ 2 - students thinking more scientifically
6) BSEI participants and educators join BNC education advisors	➤ 1	➤ 1	➤ 1
7) Expanded interactions between schools and communities	➤ 2 - connections to BNC, lots of parent and family involvement	➤ 3 - examples in summary sheets	➤ 3 - examples in summary sheets

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

<sup>10</sup> Through the evaluation process, it became clear that the subject of cultural competency was much more complicated than the scope of this evaluation. BNC participated with two other environmental organizations in a Barr Foundation study to create metrics for Cultural Competence.

**Table B7. BSEI Logic Model Short-Term Outcome Progress for Year 3, and 4 Schools\***

<b>Logic Model Outcome</b>	<b>Philbrick 06-07, Prog. Year 3</b>	<b>Philbrick 07-08, Prog. Year 4</b>	<b>Holmes 08-09, Prog. Year 4</b>
1) BNC used as community resource by students, families, and teachers	➤ 5 - several families involved with BNC outside of school	➤ 5 - families involved with BNC, BNC used for school events	➤ 3 -teachers used BNC for trips, but no evidence of family/student use
2) School educators see science/math as important for student education	➤ 5 - many educators discussed how science engages students	➤ 5- increased educator comfort for science in classroom	➤ 4- more educators talked about importance of integrating science, and feeling more comfort
3) Hands-on, minds-on science engages diverse group of students	➤ 4 - some educators claimed that this type of science engages students who otherwise have difficulty academically	➤ 4 - many educators claimed that hands-on science engaged diverse group of students	➤ 4- educators noted that students who have trouble with regular work shine in this kind of work
4) Underserved populations reached	➤ <b>Yes</b>	➤ <b>Yes</b>	➤ <b>Yes</b>
5) Inquiry planning provides teachers with models of science integration	➤ 4 - inquiry planning with BNC TN and science teacher	➤ 5 - TN & science specialist led planning, TN offers support	➤ 4 - TN co-teaching with more teachers, TN offers support
6) Teachers/students use hands-on, minds-on science across disciplines to understand natural world	➤ 3 - Philbrick bridging science and other disciplines, starting with non-fiction literature	➤ 5 - Science/literacy units, multiple field experiences, after-school program	➤ 3 - Science Week more integrated in curriculum, and expanded from last year
7) Students design interdisciplinary science projects	➤ 2- science connected to non-fiction literature	➤ 3 - in some grades students designed such projects	➤ 3 -4 <sup>th</sup> grade solar ovens, and 3 <sup>rd</sup> grade does some
8) BNC staff engages school in conservation	➤ 4 - recycling project a huge success	➤ 5 - recycling project continued, plus other projects	➤ 3 - 4 <sup>th</sup> grade recycling, Field Day planting project, recycling quilt
9) Teachers progress through model-mentor-coach approach	➤ 4 - Philbrick definitely making progress in this area	➤ 5 - educators continued to progress	➤ 4 - lots of educators progressed, but not many at coaching level
10) BNC staff offer PD to help teachers develop inquiry science curriculum	➤ 4 - PD at BNC to plan science curriculum	➤ 5 - planning time expanded this year	➤ 4 - 1 day whole school planning at BNC; informal monthly planning
11) Increased involvement of schools in integrating BSEI into curriculum	➤ 4 - educators and administrators invested and engaged	➤ 5 - even with principal transition, school involved, seek outside funds	➤ 4 - school seeking pilot status to continue BSEI work
12) School considers outdoor schoolyard to be a classroom	➤ 4 - project summary showed several examples of this	➤ 5 - schoolyard used more often and central focus	➤ 3 - outside used as classroom by TN, but not by teachers so much
13) Broader community becomes an outdoor classroom	➤ 4 - trips to BNC, Neponset	➤ 5 - field trips to BNC, Blue Hills, Neponset, zoo, Carson Beach	➤ 3 - field trips as spark experiences, little use of local com.

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

**Table B8. BSEI Logic Model Medium-Term Outcome Progress for Year 3, 4, and 4+ Schools\***

<b>Logic Model Outcome</b>	<b>Philbrick 06-07, Prog. Year 3</b>	<b>Philbrick 07-08, Prog. Year 4</b>	<b>Holmes 08-08, Prog. Year 4</b>
1) Evidence of BSEI students attending other BNC programming	➤ <b>5</b> – summer camp, vacation camp, other BNC activities	➤ <b>5</b> – summer camp, vacation camp, other BNC activities	➤ <b>2</b> – only 1 or 2 students in summer camp
2) Conservation communities created within the schools	➤ <b>3</b> – around the recycling program	➤ <b>3</b> – several conservation projects planned	➤ <b>2</b> – Science Week, designated E2 school, but little other evidence
3) BSEI students demonstrating conservation behavior	➤ <b>2</b> - some students, not all	➤ <b>3</b> – environmental stewardship through schoolyard	➤ <b>2</b> – whole school recycling, some planting projects
4) Minorities/English Language Learners engaged with more science than without BSEI	➤ <b>4</b> - BSEI engages minorities at Philbrick	➤ <b>4</b> - BSEI engages minorities at Philbrick, and efforts to bring Spanish translations to families	➤ <b>4</b> – BSEI engages ethnic minorities at Holmes
5) Students demonstrate scientific skills and application to other settings	➤ <b>3</b> – educators reported progress in this area	➤ <b>4</b> – educators reported deeper student understanding of scientific concepts	➤ <b>2</b> – some examples of students bringing in science concepts to other lessons
6) Students demonstrate conservation skills, connection to nature	➤ <b>3</b> – students more connected to nature	➤ <b>4</b> – students engaged in schoolyard conservation, and other conservation projects	➤ <b>3</b> – increased connection to nature through schoolyard; not increase in conservation skills
7) School community continues initial efforts of BSEI program	➤ <b>4</b> – grants for science; some teacher do inquiry teaching; science/schoolyard committee	➤ <b>4</b> – science teacher continued to apply for additional grants/funding	➤ <b>3</b> – worm bins continuing, slug program continuing, plan for PD to continue
8) Evidence of student led community service projects	➤ <b>3</b> – recycling, cistern project, after-school made posters and board game (TN-led activities)	➤ <b>1</b> – projects planned, but few are student led	➤ <b>1</b> – nothing mentioned
9) BSEI embraced as integral part of school	➤ <b>4</b> – most educators on board with program	➤ <b>5</b> –staff and students seek out TN, and work to expand outdoor experiences	➤ <b>3</b> –most educators want to continue BSEI program, seen as integral to science focus
10) School community working together for academic achievement and healthy environment	➤ <b>4</b> – green roof investigation, recycling, reported increase in MCAS scores, schoolyard work days, science/schoolyard com.	➤ <b>4</b> – green roof investigation, recycling, reported increase in MCAS scores	➤ <b>2</b> – Science Week used community resources
11) School emphasizes need for resources to continue program	➤ <b>3</b> – grants received and applied for by science teacher	➤ <b>4</b> – grants received and applied for by science teacher	➤ <b>3</b> – recognize need for resources, but little action

\* Using the Stages of Change Model: **1 = Disinterest** - issue not yet acknowledged; **2 = Deliberation** -issue acknowledged, not ready to address it; **3 = Designing** – getting ready to change; **4 = Doing** – change behavior initiated; **5 = Deepening** – maintaining behavior change.

**Table B9. BSEI Logic Model Long-Term Outcome Progress for Year 3, 4, and 4+ Schools\***

<b>Logic Model Outcome</b>	<b>Philbrick 06-07, Prog. Year 3</b>	<b>Philbrick 07-08, Prog. Year 4</b>	<b>Holmes 08-09, Prog. Year 4</b>
1) Schools use science as thematic base for delivering integrated curricula	➤ 3 - working towards this goal	➤ 4 - initiated plan of using science content in non-fiction literature	➤ 3 - mixed messages about science as focus of school
2) Increased appreciation for role of EE in schools	➤ 4 - administration and educators recognize this	➤ 4 - administration and educators recognize this	➤ 3 - educators valued role of EE in providing experiential learning to students
3) Schools and communities engage in conservation practices	➤ 3 - recycling, investigating green roof	➤ 3 - preparing for several conservation projects	➤ 1 - no progress yet
4) Culturally competent work magnifies other program outcomes <sup>11</sup>	➤ N/A	➤ N/A	➤ N/A
5) Students use scientific/critical thinking to understand world	➤ 3 - some students in beginning stages	➤ 3 - more students using scientific thinking	➤ 2 - more detailed observations
6) BSEI participants and educators join BNC education advisors	➤ 1	➤ 1	➤ 3 - Principal on the Board, but does not come to meetings
7) Expanded interactions between schools and communities	➤ 2 - examples in summary sheets, plan for Vision to Action underway.	➤ 3 - Philbrick of Tomorrow a success; talk of reaching out to diverse community members	➤ 3 - through field trips and received resources from SLUG; Stone School bringing in more of this

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

<sup>11</sup> Through the evaluation process, it became clear that the subject of cultural competency was much more complicated than the scope of this evaluation. BNC participated with two other environmental organizations in a Barr Foundation study to create metrics for Cultural Competence.

**Table B10. BSEI Logic Model Short-Term Outcome Progress for Year 4+ Schools\***

<b>Logic Model Outcome</b>	<b>Haley 08, Prog. Year 4+</b>
1) BNC used as community resource by students, families, and teachers	➤ 5 -families involved with BNC outside of school (camp, hikes, etc.)
2) School educators see science/math as important for student education	➤ 5- all educators talked about importance of integrating science
3) Hands-on, minds-on science engages diverse group of students	➤ 5- many educators claimed that this science engages students with IEPs and working-class
4) Underserved populations reached	➤ <b>Yes</b>
5) Inquiry planning provides teachers with models of science integration	➤ 5 - BNC TN works with teachers at BNC and at school to plan curricula
6) Teachers/students use hands-on, minds-on science across disciplines to understand natural world	➤ 5 - science is the focus and integrating concept of the school
7) Students design interdisciplinary science projects	➤ 2 -interdisciplinary science projects, but teacher-designed
8) BNC staff engages school in conservation	➤ 5 - schoolyard composting and plant growing, & other projects
9) Teachers progress through model-mentor-coach approach	➤ 5 - many educators just need coaching, others progressing
10) BNC staff offer PD to help teachers develop inquiry science curriculum	➤ 5 - planning time at BNC 3x/year, and at school
11) Increased involvement of schools in integrating BSEI into curriculum	➤ 5 - school seeking pilot status to continue BSEI work
12) School considers outdoor schoolyard to be a classroom	➤ 4 - many teachers involved in teaching in the schoolyard
13) Broader community becomes an outdoor classroom	➤ 5 - BNC used often, spark experiences

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.



**Table B11. BSEI Logic Model Medium-Term Outcome Progress for Year 4+ Schools\***

<b>Logic Model Outcome</b>	<b>Haley 08, Prog. Year 4+</b>
1) Evidence of BSEI students attending other BNC programming	➤ <b>4</b> - summer camp, other BNC activities
2) Conservation communities created within the schools	➤ <b>4</b> - school focus on schoolyard, environment
3) BSEI students demonstrating conservation behavior	➤ <b>3</b> - environmental stewardship through schoolyard
4) Minorities/English Language Learners engaged with more science than without BSEI	➤ <b>4</b> - BSEI engages ethnic minorities & students with IEPs
5) Students demonstrate scientific skills and application to other settings	➤ <b>4</b> - educators reported deeper student understanding of scientific concepts
6) Students demonstrate conservation skills, connection to nature	➤ <b>4</b> - students engaged in schoolyard conservation, and other conservation projects
7) School community continues initial efforts of BSEI program	➤ <b>5</b> - school seeking pilot status, with PBE as core integrating factor; Earthwatchers is a solid institution
8) Evidence of student led community service projects	➤ <b>1</b> - projects planned, but few student-led
9) BSEI embraced as integral part of school	➤ <b>5</b> -going forward with pilot school; staff understand that Haley=place-based education
10) School community working together for academic achievement and healthy environment	➤ <b>4</b> - pilot school seeking better instruction for students, and schoolyard improvements
11) School emphasizes need for resources to continue program	➤ <b>4</b> - pilot school status, other grants pursued

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

**Table B12. BSEI Logic Model Long-Term Outcome Progress for Year 4+ Schools\***

<b>Logic Model Outcome</b>	<b>Haley 08, Prog. Year 4+</b>
1) Schools use science as thematic base for delivering integrated curricula	➤ <b>5</b> - units of study begin with science/social studies standards
2) Increased appreciation for role of EE in schools	➤ <b>5</b> - all teachers expressed appreciation for EE, as did many parents
3) Schools and communities engage in conservation practices	➤ <b>3</b> - school engaged in schoolyard conservation, don't know of other community projects
4) Culturally competent work magnifies other program outcomes <sup>12</sup>	➤ N/A
5) Students use scientific/critical thinking to understand world	➤ <b>4</b> - using Bloom's taxonomy/critical thinking charts to plan curriculum
6) BSEI participants and educators join BNC education advisors	➤ <b>1</b>
7) Expanded interactions between schools and communities	➤ <b>2</b> - many units involve study of the community, but not really interacting with it

\* Using the Stages of Change Model: 1 = Disinterest - issue not yet acknowledged; 2 = Deliberation -issue acknowledged, not ready to address it; 3 = Designing - getting ready to change; 4 = Doing - change behavior initiated; 5 = Deepening - maintaining behavior change.

<sup>12</sup> Through the evaluation process, it became clear that the subject of cultural competency was much more complicated than the scope of this evaluation. BNC participated with two other environmental organizations in a Barr Foundation study to create metrics for Cultural Competence.



Page Two – Boston Schools Environmental Initiative Logic Model

Inputs	Activities	Outputs - Short Term Successes (1-4 years)	Outcomes – Mid Term/Results (4-7 yrs)	Impacts – Big Picture/Vision Results (7-15 yrs)
<p><i>Cultural Competency</i></p>	<p>Professional development on cultural competence delivered to BNC staff.</p> <p>Culturally competent practices used by BNC teacher naturalist in classes and schools.</p>	<p>Inquiry-based and hands-on teaching approaches engage a diverse group of students.</p> <p>Underserved populations are reached.</p>	<p>Minorities/ELLs/immigrants engaged with more science that they would have otherwise had.</p>	<p>Culturally competent work magnifies all other program outcomes.</p>
<p>A designated teacher naturalist is assigned to each school for the 4 years or the program.</p>	<p>Teachers are supported to make hands-on/minds-on connections to BPS curricula.</p> <p>Students investigate the urban natural environment across disciplines and apply developmentally appropriate scientific skills and content.</p> <p>Conservation is modeled and implemented with school classes.</p>	<p>Inquiry based modeling and planning provides resources for teachers to be leaders of integrated science instruction.</p> <p>Teachers and students use multi-disciplinary inquiry-based learning to understand the natural world.</p> <p>Students design interdisciplinary science projects.</p> <p>BNC staff engages school in conservation.</p>	<p>Students demonstrate scientific skills and understanding beyond school to other life experiences in their environment.</p> <p>Students demonstrate conservation skills, connection to nature and strong scientific thinking skills.</p>	<p>Students use scientific and critical thinking as a way to understand the world.</p> <p>Students pursue a life long interest in science.</p> <p>A generation of critical thinking citizens motivated to take action for conservation.</p>

Page Three -- Boston Schools Environmental Initiative Logic Model

Inputs	Activities	Outputs - Short Term Successes (1-4 years)	Outcomes – Mid Term/Results (4-7 yrs)	Impacts – Big Picture/Vision Results (7-15 yrs)
<p><i>Professional Development for School and BNC staff through BNC philosophy:</i>  <b>Model</b> – Teacher naturalist plans class initiatives with teachers and models teaching.  <b>Mentor</b> – BNC staff co-lead lessons with staff.  <b>Coach</b> – BNC staff support/advise teachers to lead class lessons.</p> <p><i>Human Resources: Consultants – Senior BNC Staff, Higher Education Partners, Research Partners and Education Advisors</i></p>	<p>Weekly planning with teachers and science specialists.</p> <p>Regularly scheduled curriculum planning meetings/events held at Boston Nature Center.</p> <p>BNC educators work with higher education and research partners to improve teaching and learning.</p> <p>Professional Development exchange for school and BNC staff.</p>	<p>Teachers develop and demonstrate skills in planning and implementing integrated science curriculum.</p> <p>School teachers progress thru the Model, Mentor, Coach approach.</p> <p>BNC staff applying their professional development to guide teachers to develop quality inquiry based science curriculum.</p> <p>Staff capacity increases for supporting new BNC staff members in the work/goals of the BSEI program.</p>	<p>Based on BSEI experiences, teachers embrace an integrated approach to science instruction as focus of approach to teaching.</p> <p>BNC programming grows and is designed to address BPS education needs.</p>	<p>BSEI participants, teachers and administrators join the BNC education advisors.</p> <p>BSEI model is embraced by BPS and a pedagogical strategy.</p>

Page Four -- Boston Schools Environmental Initiative Logic Model

Inputs	Activities	Outputs - Short Term Successes (1-4 years)	Outcomes – Mid Term/Results (4-7 yrs)	Impacts – Big Picture/Vision Results (7-15 yrs)
<p><i>School facilitation and work with broad based stakeholders of school community.</i></p> <p><i>BSEI design to create professional development networks between BSEI schools.</i></p>	<p>School based steering committee guides process and parent council is involved.</p> <p>Connect schools and teachers with local community resources.</p> <p>Working with the school community to develop, design and use outdoor classrooms and schoolyards as learning spaces.</p> <p>Hosting networking meetings between BSEI school teachers and their leadership.</p> <p>The network is used as a resource to provide feedback and improve the BSEI program.</p>	<p>Increased involvement of parents, staff and students for integrating work of BSEI in to schools.</p> <p>Community views this model as important for a schools delivery of science education.</p> <p>Having teachers, students and community members think of outdoor schoolyard as a classroom.</p> <p>Professionals within school networks are created through partner schools.</p> <p>The broader community becomes an outdoor classroom.</p>	<p>Initial efforts developed by the program, are continued by the school community and staff.</p> <p>Evidence of student led community service projects.</p> <p>BSEI is embraced as an integral part of the school. School takes action steps to continue the program at end of initial funding cycle.</p> <p>All elements of the school community working together for academic achievement and a healthy environment.</p>	<p>Conservation communities are created that are composed of diverse community members.</p> <p>Expanded interactions between schools and communities to positively influence the direction of each school.</p>

**Page Five – Boston Schools Environmental Initiative Logic Model**

<b>Inputs</b>	<b>Activities</b>	<b>Outputs - Short Term Successes (1-4 years)</b>	<b>Outcomes – Mid Term/Results (4-7 yrs)</b>	<b>Impacts – Big Picture/Vision Results (7-15 yrs)</b>
<i>Funding – Grant and Endowment</i>	BSEI external evaluation, staffing and consultation.  People understanding that funding supports all this.	Writing and advocating for more resources to be dedicated to this work.	Schools emphasize the need for internal and external resources to continue the program.	Expanded fiscal support for EE in public schools.  Expanding advocacy for EE in public schools.
<i>External Evaluation</i>	Evaluation data collection process and recommendations. (Qualitative reflection)	Data and recommendations to monitor BSEI progress and to inform strategic decision making as the project evolves.	Public schools and BNC use BSEI evaluation as a tool to assess school results and inform decision making for the school and BSEI project.	Broad constituents (schools, staff, parent) using multiple assessment strategies to measure progress and results.