Environmental Volunteers:
Evaluation Findings for the Digging Deeper Program

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Executive Summary: Evaluation Findings for the Environmental Volunteers' Digging Deeper Program

In Fall 2004, the Environmental Volunteers (EV) launched the Digging Deeper Collaborative three-year pilot program at the East Palo Alto Charter School (EPACS). The primary goal of the program is to coordinate environmental education resources to provide an in-depth and multi-faceted natural science educational experience to underserved student populations starting with students at EPACS. A second important goal is to use this pilot to create a model that is replicable at other schools. The EV is partnering in this collaborative effort with a number of other community-based organizations and public agencies (Collective Roots Garden Project, the City of Palo Alto Regional Water Quality Control Plant, Bring Me a Book Foundation, Field Trip Foundation, and Save The Bay) to achieve these goals with EPACS students in grades K-5. Specific program goals include increasing children's knowledge of specific scientific topics, enhancing interest and enthusiasm in science, increasing general learning skills, and fostering environmental stewardship.

Digging Deeper Provides High Quality Education

The Digging Deeper Collaborative has brought to EPACS high-quality environmental education aligned with state scientific standards, and this pilot project has proved to have extremely exciting results in both the first and second years of evaluation. As is demonstrated by the dramatic increases in test scores between the beginning and the end of the school year (for both years), students learned and retained a great deal of scientific information. In addition, teachers report that the positive effects went beyond simply retaining information – students also improved their general learning skills, such as the ability to concentrate, their engagement in learning, and critical thinking skills. This pilot project provides evidence that environmental education is a great way to teach science and to get young people excited about and engaged in learning. In an era of struggling schools, funders should invest in this highly effective mode of pedagogy.

This report covers the evaluation findings of the Digging Deeper program for the 2006-07 academic year, as well as highlights selected from the 2005-06 evaluation. The evaluation assesses outcomes for students in the second through fifth grades. The evaluation measures outcomes in the areas of increased science knowledge, interest in science, general learning skills, and stewardship. It uses a variety of quantitative and qualitative data sources, including pre- and post-test of grade specific scientific knowledge, teachers' assessments of their students, focus groups, and a survey of environmental attitudes for fourth and fifth grades. The evaluation also investigates the program model and explores its strengths, areas for development, and recommendations for program improvement.

Key Findings

Students are receiving an expansive high quality science education that would not otherwise be available to them. Having a collaborative of community-based environmental education organizations provides students with a comprehensive science education that teachers at EPACS would not be able to deliver on their own.

The Digging Deeper program has two years of evaluation data that demonstrate its positive impact on student learning and environmental education. Year two of evaluation confirms

results found in the first year of evaluation showing significant increases in student learning during participation in the program and valuable science education support for teachers across grade levels.

Students in the Digging Deeper Program show a remarkable increase in their scientific knowledge and general learning skills. The evaluation results are extremely positive. In the past two years of evaluation, most grades have experienced dramatic average increases in the scores from the pre- to post-tests. Between the beginning and the end of the 2006-07 school year, within each grade the proportion of students scoring higher on the follow-up test ranges from 48% to 97%. In addition, teachers report a significant increase in both scientific knowledge and general learning skills, and qualitative focus group data reveals that students are retaining information and enjoying the field trips. There is evidence of a cumulative over-time effect of the programming on students' scientific learning. A critical component of the program model is that curriculum is coordinated across grades – new knowledge is meant to build on previous knowledge as the children move through the grade levels. Looking at baseline teacher assessments for scientific knowledge, we see that students score higher in the second year. This indicates that they have built knowledge from their previous year of programming.

Students learn about environmental stewardship. Data from both 2005-06 and 2006-07 show that fourth and fifth grade students also have positive attitudes about environmental stewardship. These students indicate they understand how their actions affect the environment, and care about behaving in more environmentally responsible ways in the future. Focus group data from 2005-06 reveal that all grades are aware of what types of behaviors are harmful to the environment.

I. Introduction

Background on School and Program

EPACS is a K-8 school, with a total enrollment of 405 students during the 2005-06 school year. EPACS prides itself on small class sizes. Grades 2-4 have a maximum classroom size of 20 students, and grade 5 has a maximum classroom size of 26.

Exhibit 1
Student Demographics
(n=405)

Characteristic		Percent of Students
Ethnicity	Hispanic/Latino	82%
	African American	25%
	Asian/Pacific Islander	3%
Enrolled in Free Reduced-Price Lunch Programs		86%
English Language Learners		66%

Source: California Department of Education

In Fall 2004, the Environmental Volunteers (EV) launched the Digging Deeper Collaborative three-year pilot program at the East Palo Alto Charter School (EPACS). The primary goal of the program is to coordinate environmental education resources to provide an in-depth and multi-faceted natural science educational experience to underserved student populations starting with students at EPACS. A second important goal is to use this pilot to create a model that is replicable at other schools. The EV is partnering in this collaborative effort with a number of other community-based organizations and public agencies (Collective Roots Garden Project, the City of Palo Alto Regional Water Quality Control Plant, Bring Me a Book Foundation, Field Trip Foundation, and Save The Bay) to achieve these goals with EPACS students in grades K-5.

Information from teacher focus groups indicates that the student body has very little turnover from year to year. Students who join the school as Kindergarteners are very likely to remain at EPACS through their entire elementary school experience. Thus, the Digging Deeper program not only has an effect on students in each individual grade, but on children's overall awareness of environmental issues as they are exposed to environmental education through the Digging Deeper program multiple years in a row.

The Evaluation

Purpose of the Evaluation

In the summer of 2005 the EV contracted with the independent research and evaluation firm LaFrance Associates, LLC (LFA) to conduct a comprehensive evaluation of the Digging Deeper Collaborative. The focus of the evaluation is to assess the degree to which program participation has contributed to science learning and learning-readiness among students in grades 2-5. Specifically, how has participation:

- Increased grade-specific scientific knowledge?
- Enhanced interest in, and enthusiasm for, scientific learning?

- Improved general learning skills?
- Increased the sense of environmental stewardship among older students?

The evaluation has also investigated the collaborative program model. LFA gathered feedback from the EV, the partners, and EPACS on the ways in which the program model worked well, as well as some areas for development.

During the second and final year of the evaluation, LFA's evaluation activities have included:
- Implementation of instruments designed to measure student scientific knowledge;
- Collecting quantitative data from students and teachers on student achievement;
- Collecting qualitative data from teachers, partners, and the EV on the program model; and
- Analyzing data in light of goals and anticipated outcomes.

This report summarizes the findings from the second year of data collection and analysis including both quantitative and qualitative information. Where appropriate it also discusses information gathered in Year One, such as student focus groups that were only conducted during the first year of the evaluation. It presents results within the categories of:
- Program Feedback
  - Strengths
  - Areas for Development
  - Suggestions for Improvement
- Student Outcomes
  - Scientific Knowledge
  - General Learning Skills
  - Stewardship

Data Collection

Evaluators collected both quantitative and qualitative data for this evaluation. This report includes data from the following sources:
- Digging Deeper Pre- and Post-Tests of scientific knowledge (completed by students in 2nd- 5th grades)
- Pre- and Post-Tests from Collective Roots (completed by students in 2nd- 5th grades)
- Student Exit Forms (completed by teachers for all students in 2nd- 5th grades)
- Stewardship Surveys (completed by students in 4th and 5th grades)
- STAR Data (standardized test data for 5th grade students)
- Focus Groups with classroom teachers
- Key Informant Interviews with the EV and partner organization staff

Instrument Design

Evaluators designed the Digging Deeper pre- and post-tests with the specific curriculum components of the Digging Deeper program in mind, and questions on surveys and in the focus groups were designed to reflect the program materials. As mentioned in the introduction, Digging Deeper is a collaborative program with different components run by various partners. LFA designed a pre- and post-test (referred to as the Digging Deeper test throughout the report) to measure knowledge of content taught by all collaborating organizations except the Collective Roots Garden

Project; Collective Roots administers its own pre and post test, and those results are also discussed in this report. Survey questions were designed to be age appropriate. In addition, they were designed to be difficult enough so that if students had not learned or retained the information, it would be hard to get the right answer. LFA also ensured that the questions covered grade-level scientific standards.

Strengths and Limitations of the Evaluation

This evaluation has two main methodological strengths. First, the data come from a variety of sources and perspectives. There were a number of sources that gathered data from both teachers and students. Due to having multiple data sources, evaluators were able to "triangulate:" to use data from one source to validate the findings from other data sources. Secondly, the pre- and post-test taken by students were actual science tests that measured knowledge according to grade specific curriculum standards. For students to improve on the test, they must actually remember specific scientific information. Therefore, this is an objective measure of their learning.

The evaluation also has a few limitations. There was no control or comparison group. In other words, students were not randomly assigned to treatment and control groups or participants and non-participants, nor was there a comparison group of similar students who did not participate. Instead, the results are measured as improvement from the beginning of the school year to the end. Therefore, evaluators cannot say for certain that scientific knowledge would *not* have improved to the same degree *without* exposure to the Digging Deeper program.

There are also several limitations that are specific to some of the instruments. Stewardship surveys, which were given to fourth and fifth graders, have a positive response bias; people always tend to answer stewardship question in a way that makes them appear to have strong environmental values. The Student Exit Forms ask teachers to assess their students' scientific knowledge and general learning skills at the beginning of the year and the end of the year. However, the instrument was administered at the end of the year, and teachers were asked to think back to their students' abilities at the beginning of the year. This retrospective assessment is a limitation, as teachers may not have accurately remembered what level their students' abilities were at baseline.

There may have also been limitations in the degree to which the third grade Digging Deeper pre- and post-test instrument accurately measured scientific knowledge among third graders. Unlike other grade levels, third grade students show an average drop in test scores from the beginning of the year to the end of the year, and in 2005-06, the average improvement for third graders was smaller than improvement for the other grades. Those who were in third grade in 2006-07 showed improvement the previous year (in second grade), and those who were in third grade in 2005-06 showed improvement in the following year (in fourth grade).Several things are important to note. First, the drop was extremely small (close to zero). These findings suggest that the third grade test may be lacking in validity as a measurement instrument. That is, it may not adequately test the material third graders were meant to learn. Therefore, it may be worth revisiting this survey instrument to ensure that survey questions are in alignment with program curriculum and goals.

II. Program Feedback

Environmental Volunteers' Digging Deeper program employs a collaborative service delivery model. Several organizations provide services and educational programs to the EPACS students during the year. For instance, Collective Roots provides garden-based educational experiences, the Field Trip Foundation sponsors and organizes an annual trip to Año Nuevo, and the Palo Alto Regional Water Quality Control Plant teaches children about how water is used and how their personal behaviors affect the quality of water supply. These organizations and their programming existed before the Digging Deeper program, but they had not been pulled into a partnership serving one student body until Environmental Volunteers created the Collaborative. Each of these organizations agreed to collaborate to provide students with a more comprehensive and coordinated environmental education than any organization would be able to provide alone. In this way, the students can receive a wider range of services than they otherwise would. However, maintaining a wide and relatively loose collaboration also has its challenges. This section of the report discusses the program's strengths and areas for development within the context of this collaboration.

Program Strengths

Students Receive a Comprehensive Environmental Education Experience

> The basic concept is hugely important. To have community organizations partnering together is a brilliant idea and it really gives the kids a sense of place and teaches them what is happening in their local environment.
> *- Digging Deeper Collaborative Partner*

Perhaps the greatest strength of the Digging Deeper program is the comprehensive environmental education experience that students receive. The EV staff, partners, and teachers all commented on the value of having an existing collaborative that is able to deliver the high level of services it does. Students receive 40 hours of environmental education a year, spanning the strengths and program offerings of a range of organizations. As an EV staff member commented, "The unique part is about the collaborations. Bringing in different partners to provide a depth of experience is unique." She went on to say, "Working with the partners has been a big success—showing that a project of this scale can work."

Additionally, the Digging Deeper program is able to provide lessons to students that differ from what they learn in the classroom. This is both because of the expertise that each of the service organizations brings, and the time constraints teachers face as they develop science curriculum. EPACS places a great deal of importance on math and literacy lessons, and as a result the teachers often feel they have little time to spend on science lessons. The EV plays a critical role by providing the science pedagogy. One teacher said that "Digging Deeper is definitely a highlight. It's a really difficult thing to pull a meaningful science curriculum together because we are so math and language arts focused." Another teacher commented that "a huge part of the science lessons came from [Collective Roots]. To have another person that is pulling together materials and lesson plans is huge. It's like I'm the assistant and it's fantastic."

Students are Enthusiastic about the Program

> A lot of kids get exposed to the natural world for the first time [through this program]. Some of these kids haven't even seen the Pacific Ocean.
> *- Digging Deeper Collaborative Partner*

During interviews with partner organizations and teachers, the evaluation team heard repeatedly about how excited the children are to participate in Digging Deeper activities and how much they learn. The teachers emphasized how much their students enjoyed the EV lessons. "Science is so hands on, so they are definitely really excited about [Digging Deeper]. They look forward to it."

On the whole, the program activities are well designed and well targeted for elementary age children. (There are a few exceptions, and these are discussed in the "Areas for Improvement" section below.) The lessons generally involve movement, hands-on activities, and new experiences for the children. These are all components that keep the children engaged and interested in environmental education. One teacher commented on how much her students liked the water lessons: "The water was so hands-on, so they were always so engaged. They asked me if [the staff member from the Water Plant] was coming today!"

Links to EPACS' Curriculum

Teachers appreciate that the EV ties its lessons into EPACS' core curriculum and the work that the students do as part of their math and writing learning. One teacher commented, "A lot of what the EV does ties into our open core units. For instance, what they learned about camouflage in our class was tied into what they learned in Digging Deeper. We also tried to tie in garden activities into their writing."

Another teacher gave specific examples of how her classroom integrates Digging Deeper and other classroom lessons, saying, "The Año Nuevo trip really ties into so much of what we do in the classroom. We tied what we learned with the EV into our reading and literary activities, learning about the 1906 earthquake. Knowing what is coming with curriculum is so much better because you really get to integrate it with your lesson plans."

Areas for Program Development

More Coordination between Environmental Volunteers and EPACS

The evaluation team heard from teachers that they would like more information and coordination from the EV. Teachers asked both for more contact in general throughout the year, and also more specific information on the lessons the EV conducts in their classrooms. The teachers did acknowledge they had received a binder of information in the beginning of the year, but noted that without someone to walk them through it, or get in touch with them throughout the year, it was hard to be prepared for every EV lesson.

One teacher described the way that having more specific information on the lesson ahead of time would help her to maximize the EV's impact on her kids. "I think one thing I could have used beforehand was some information of what was going to be brought in, like the lesson plan. I have a lot of kids who are behaviorally challenging. I would have liked to see what lesson plan was going to be in place so that I could have decided whether some of those kids could participate, because

honestly, they tend to bring the class down in some situations. Some are not behaviorally capable of doing things such as sitting down for long periods of time."

The EV staff did acknowledge that program coordination and administration takes more time than initially anticipated. As one staff member described, "It involves a lot of oversight and check-ins. You can't just put things on the calendar and assume they will happen. We learned that oversight is important and we didn't anticipate having to spend that much time on it." The EV does understand how vital this high level of coordination is, so it may be the program coordinator needs to continue to spend the time to ensure things run smoothly.

The EV staff also noted that coordination between the EV and the EPACS teachers is challenging because of the relatively high level of teacher turnover at EPACS. Each year there are new teachers to be brought up to speed on the collaboration and the services provided by the partner organizations.

More Coordination between Environmental Volunteers and Partner Organizations

The partner organizations that the evaluation team spoke with also felt there was more room for coordination between the EV and participating organizations. One partner organization spoke about how she would appreciate more information about the big picture goals of the collaboration. She explained, "I do think that it was hard for me to understand what the collaboration was about. I didn't understand it until the end of the year when I finally met with the EV. I didn't know who the partners were. We were left to our own school, and it would be nice for my director and the teachers to know what the partnership was all about."

Another partner believes that achieving a greater understanding of what the other organizations in the Digging Deeper collaboration are doing would give her a more complete picture of the key messages. She described her ideas by saying, "It feels that one of the true benefits could be greater coordination so that I have an opportunity to understand on a deeper level what each organization does and to talk about some of their key messages. We should all be able to deeply integrate that into our own curriculum so that I can speak to some of the activities that other partners do with the students. There needs to be some bridging that could really deepen what the kids get."

Age Appropriateness of Activities

> In general [my students] are really into EV, moving from station to station. But for a part of the water lesson they were sitting on the ground for a long time, like 45 minutes.
>
> *- EPACS Teacher*

While teachers generally agree that almost all of the EV activities are well designed for elementary school age children, there were a few comments on specific activities that did not seem as age appropriate as the other activities. One teacher didn't like some parts of a field trip her class went on. She described it by saying, "I'm not crazy about the field trip to Los Trancos because the kids do a lot of walking. They are going out to see a fault line, and they think it will be huge, but they are a little disappointed when they get there and say, 'This is it?'." Another teacher felt one of the activities her class participated involved too much time sitting and listening.

Recommendations

More Coordination with Teachers

The teachers had a few suggestions about how the EV and EPACS could coordinate better. One teacher suggested that the EV should hold a meeting with them in the beginning of the year and walk them through the information in the binders that are distributed. These teachers admitted they did not look at the information they were sent, but think that having someone actually explain it to them would encourage them to use the binder throughout the year.

Teachers also thought that there were more opportunities to continue to link the EV lessons and activities with the EPACS curriculum. They believe that with some more communication between the EV and the teachers, this can occur. One teacher commented, "There were some units that could really tie in nicely with our curriculum. It would be nice to coordinate them more with us rather than just be given a schedule of the EV activities. They tell you we can change the schedule, but we don't know what could be changed because there is a lack of knowledge unless we have gone through the program before."

Hold More Meetings of the Full Collaborative

Several partners suggested more frequent meetings and contact among the collaborative organizations. These meetings should update the partner organizations both on logistics and scheduling issues as well as discuss big picture topics, such as the collaborative's goals and how the organizations can work more closely together. One partner commented that "it would be good to have the big picture meetings more often. We didn't really know what was going on."

Another partner remembered that there had been more meetings early on in the program's history, and felt those meetings were helpful. "Early in the first two years, we had group meetings with all the partners. That was helpful to get a face to face, to hear the challenges and successes they were having, and get a verbal overview from the EV of what they were doing. That meeting didn't happen this year. For me, I felt like it created a sense off isolation. I just felt like I was doing my own thing, whereas in the beginning I felt more like part of a collaborative. It was really valuable to touch base with the other partners, and know who they are rather than just on paper."

More Flexibility with Grant Funds

The teachers suggested that, if possible, there be more flexibility for the money that is allocated to their classrooms so they can adapt and redirect funds if unexpected situations come up throughout the year. One teacher described her situation as follows, "We had an extra field trip and we didn't end up using because of timing issues. We had wanted to use it for the Book Foundation, but couldn't, so that $500 didn't get used. I wish there was more flexibility in how to use the money—it felt like a waste. $500 in science books, boy that would have made me happy!"

III. Student Outcomes

This chapter examines quantitative results measured through the Digging Deeper test, Student Exit Forms, and Stewardship Surveys. Similar to 2005-06 evaluation data, survey results from 2006-07 are highly positive, showing significant improvements over time across grade levels and survey instruments. The one exception to these findings is Digging Deeper test results among students in third grade (see discussion of results below).

Scientific Knowledge

Overall, the evaluation results in the Scientific Knowledge outcome area are extremely positive. Three out of four grades experienced a statistically significant increase in the overall scores from the-pre to-post-tests, and high percentages of students improved their score over time. Teachers also note an increase in scientific knowledge through the student exit forms they completed.

Digging Deeper Tests

Exhibit 2
Digging Deeper Test
Summary of Student Pre- and Post-Test Findings

Grade	Number of Respondents	Number of Test Items	Mean Improvement	Percent of Students who Improved
2nd	35	25	5.4***	97%
3rd	35	24	-.1	46%
4th	46	38	4.7***	78%
5th	45	32	5.2***	82%

* = p<.05, ** = p<.01, *** = p<.001.

Analysis of the pre-/post-tests for students in 2nd-5th grades (Exhibit 2) shows positive improvements across grades and content area. In comparing the number of correct answers on the pre- and post-tests, second graders show the greatest improvement, with 97% improving their scores on the post-test. Over three-quarters of 4th graders (78%) and 5th graders (82%) show improvement from the beginning of the year.

However, less than half of third graders (46%) show improvement. Unlike other grade levels, third grade students show an average drop in test scores from the beginning of the year to the end of the year. Several things are important to note. First, the drop was extremely small (close to zero). Second, these findings (unlike the finding on improvement in the other grades) were *not* statistically significant. Furthermore, in contrast to Digging Deeper test results this year, third grade teachers' ratings of students' improvement on the Student Exit Form are highly positive.

Similar to the results of Digging Deeper pre- and post-tests, the Collective Roots pre- and post-tests show tremendous improvement in students' scientific knowledge among grades for which data was collected.

Exhibit 3
Collective Roots Test
Summary of Student Pre- and Post-Test Findings[1]

Grade	Number of Respondents	Number of Test Items	Mean Improvement	Percent of Students who Improved
2nd	39	24	6.7***	97%
4th	49	35	9.5***	96%

* = p<.05, ** = p<.01, *** = p<.001.

Both second and fourth grades have approximately 96% of students showing some improvement from pre to post test. Also striking is the magnitude of improvement for both grades. The average point increase represents nearly 30% of the total test points for both second and fourth graders. These highly statistically significant increases from both the Digging Deeper and Collective Roots tests are very remarkable and point to the positive effect the program has on students.

Teachers' Ratings

Students' scientific knowledge was also measured by asking their teachers to rate their students' knowledge in the beginning and at the end of the school year on a score of 1 to 5 (1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced) in the following areas:

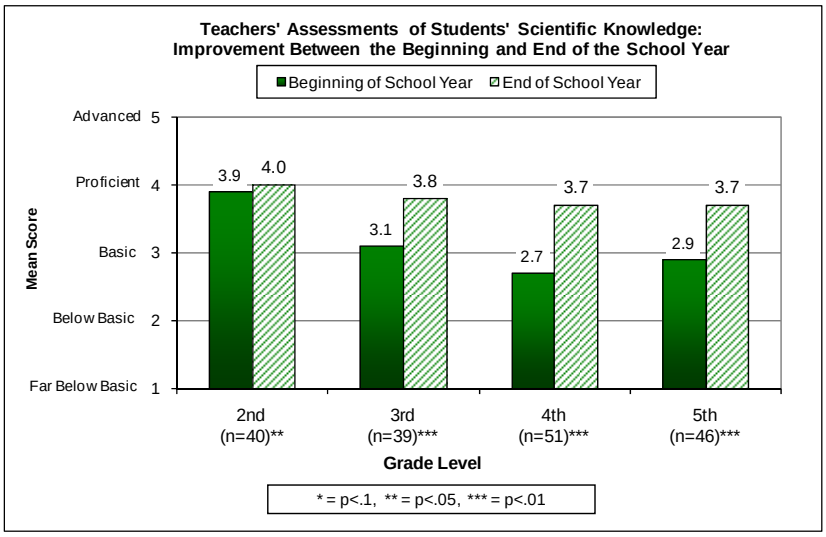
- Comprehension of Key Science Concepts
- Making Scientific Guesses (early versions of hypothesis testing)
- Verbal or Written Expressions of Key Concepts
- Vocabulary (scientific terminology)

LFA aggregated the scores for all four items to come up with a mean score of scientific knowledge for each grade, both at the beginning and end of the year.[2] Exhibit 4 below shows that each grade's average score of scientific knowledge, as measured by their teachers, substantially increased. Statistical testing reveals that the increase for each grade is significant. Grades began the year with a range of scores. Fourth graders average the lowest score at baseline with 2.7 at the beginning of the year, which translates into below "Basic." Second graders' average baseline score is the highest, 3.9, which translates into just below "Proficient." By the end of the year, the average scientific knowledge for all grades was at least 3.7, with the second graders scoring the highest by reaching 4.0, or "Proficient." For detailed information about each grade's score in the four topics and statistical significance, please see the Appendix.

[1] Collective Roots collected and sent LFA pre and post data for two of the four grades. Post data for grades 3 and 5 were not available.

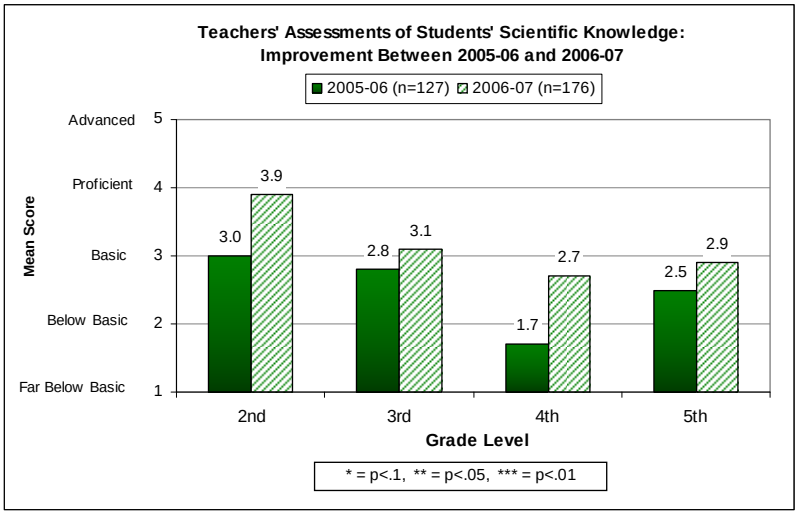
[2] A correlation analysis was run for the items in each of the four areas. For each grade, 100% of the correlations are statistically significant at p<.05, and at least 85% of the pairs have a correlation of .5 or higher. Because of the strong inter-correlation among items, we were able to create an aggregated scale for each area.

Exhibit 4



As was discussed in the introduction, a key component of the program model is that students are able to build on previous knowledge as they move through each grade level, showing a cumulative effect in learning. Teacher assessments from 2005-06 and 2006-07 demonstrate that students in fact appear to be accumulating learning from one year to the next. Exhibit 5 shows the baseline teacher assessments of science knowledge in 2005-06 and compares this to baseline assessments in 2006-07. At the beginning of 2006-07, teachers gave higher average ratings on scientific knowledge than they gave at the beginning of 2005-06. These are highly positive findings, indicating that students are accumulating knowledge from year to year, something that will set them up for success later in their school careers. It should also be noted that the measure of scientific knowledge includes the ability to engage in hypothesis testing – an ability that is critical to effective learning, and thus an ability that will serve the students well in all subject areas.

Exhibit 5



Results show substantially higher baseline scores in 2006-07, suggesting that students in all grades each of whom have had previous exposure to the program[3], have retained information over time and increased their pre-test scores. This is especially true for second and fourth grade students.

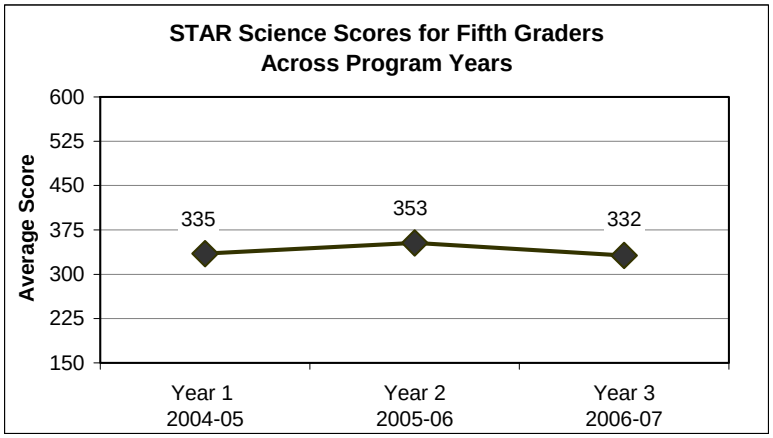
STAR Scores

Another measure of scientific knowledge is how well students do on their Standardized Testing and Reporting (STAR) Science tests. Because this test is taken only by fifth graders, it does not provide the opportunity to assess improvement over time within a group of children. However, it is possible to examine the scores from the test taken by fifth graders in the past two years (2004-05 and 2005-06) and the scores of the students who took it in 2006-07. The important difference is that students who took the STAR Science test in 2004-05 had had only one year of the Digging Deeper Program in their classrooms, while they were in the fifth grade. The students who took the STAR Science test in 2005-06 had had two years of exposure to the Digging Deeper Program, while they were in the fourth and fifth grades. Lastly, students who took the STAR science test in 2006-07 had three years of exposure, while in third, fourth and fifth grade. Exhibits 6 and 7 show STAR science scores for fifth graders during each school year.

Exhibit 6
STAR Science Scores for Fifth Graders
2004-05, 2005-06 & 2006-07

Average STAR Science Score 2004-05 (n=52)	Average STAR Science Score 2005-06 (n=51)	Average STAR Science Score 2006-07 (n=52)
335	353	332

Exhibit 7



While the results show an increase in 2005-06, the second year of the Digging Deeper program, the general trend shows that STAR science scores have remained constant over the two-year period, with a similar average score from 2004-05 and Year 3 of the program. A STAR science score of 350 translates into a level of Proficiency.

[3] This evaluation examines student outcomes for the second, third, fourth, and fifth grades; however the program provides services to Kindergarten and first grade students as well. Thus, all grades included in the evaluation have had previous exposure to the program.

The Evaluation team probed the EPACS Principal on some possible reasons why the STAR science scores may have seen such an increase and then a decrease to former levels. First, she noted that the STAR test covers much more science material than is covered in the Digging Deeper curriculum. So, while it is valuable to understand how science scores vary from year to year, the performance should not be considered a reflection on the Digging Deeper program, as the test covers a much wider range of topics. Secondly, the 5th grade teachers especially focused on increasing reading levels for the 2006-07 5th graders. Therefore, she believes that the focus on reading skills during the second year of the evaluation may have taken some time away from science lessons and this is why the STAR science test scores dipped down.

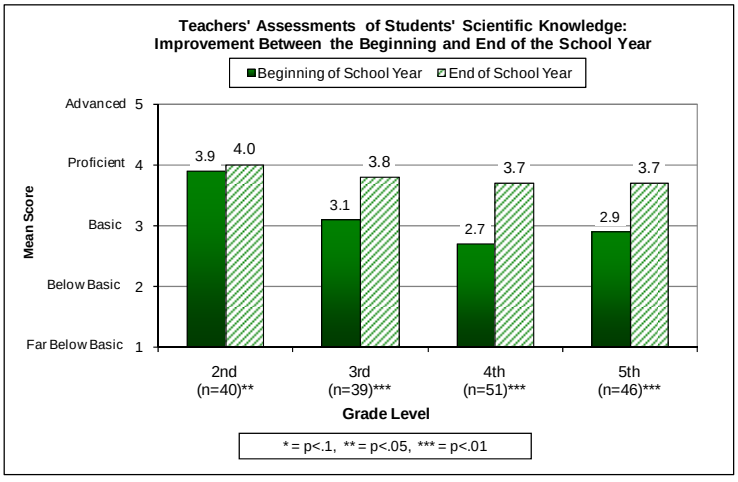
General Learning Skills

Changes in students' general learning skills were measured by their teachers' assessments on the student exit form and from information collected during focus groups. As with scientific knowledge, there are significant increases in general learning skills in all grades.

Teachers were asked to rate each of their students on a 1 to 5 scale ("Far Below Basic" to "Advanced") in the following areas:

- Ability to Concentrate
- Desire to Achieve
- Engagement in Learning
- Enjoyment of Learning
- Appreciation for Own Skills
- Active Classroom participation
- Critical Thinking Skills

Exhibit 8



Evaluators employed the same technique with teachers' ratings of general learning skills as with scientific knowledge. Evaluators aggregated the seven subscales and calculated an average score for each grade.[4] As seen above in Exhibit 8, each grade's average general learning skills score, as

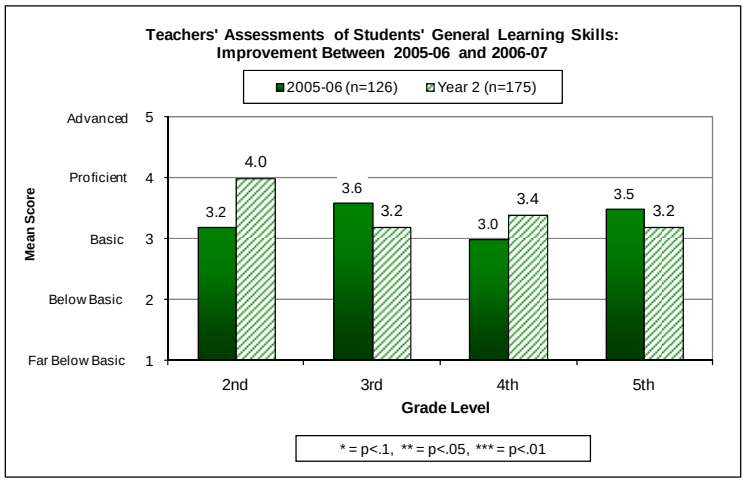
[4] A correlation analysis was run for the items in each of the seven areas. For each grade, 100% of the correlations are statistically significant at $p<.05$, and at least 85% of the pairs have a correlation of .5 or higher. Because of the strong inter-correlation among items, we were able to create an aggregated scale for each area.

measured by their teachers, increased (and increases are statistically significant). All grades began the school year with an average score between 3.2 and 4.0, which translates into scores from "Basic" to "Proficient." Each grade's average score at the end of the year is approximately 4.0, or "Proficient."

The fourth graders improved the most on this measure with an increase in the mean score of a full point. Third graders also showed significant improvement according to their teachers' ratings. These findings from teachers are not consistent with Digging Deeper test results presented in the previous section where third graders show the least improvement among grade levels. Third grade teachers' positive reports of student improvement lend further support to the need to review the third grade test tool. For detailed information about each grade's score in the four topics and statistical significance, please see the Appendix.

As was shown with teachers' assessments of scientific knowledge, Exhibit 9 compares baseline teacher assessments of general learning skills in 2005-06 with baseline assessments in 2006-07.

Exhibit 9



The results show an increase in average score over time among second and fourth grade students, but not among third and fifth grades students. These findings suggest that the program did not have a cumulative effect on all grade levels with regard to general learning skills.

Stewardship

Evaluators measured stewardship in two ways. During focus groups in 2005-06, all grades were asked the questions, "What can you do to help protect the environment?" and "What do you like best about being outside in nature?" Additionally, fourth and fifth graders are given a Stewardship Survey that asked them to rate their agreement with a series of statements about their effect on the environment. Overall, students commented on stewardship regularly throughout the focus groups and the survey results for fourth and fifth graders indicate the students are aware of what practices are good for the environment and which are harmful. A full report of focus group findings as they relate to stewardship can be found in the 2005-06 Evaluation Report. However, in order to provide a full picture of how the Digging Deeper curriculum affects students' notion of stewardship, we have included some highlights of those focus group findings along with the Stewardship Survey items below.

Second Grade

Some of the stewardship goals of the Digging Deeper program for second graders are to teach students about recycling, composting and protecting endangered species. Of these goals, students seem to understand most the importance of not littering and of recycling. When asked what they'd learned about protecting the environment, one student says, "Don't litter because animals will come and eat it and it might be bad for them." Another student adds, "Recycle—put it where it belongs and put the trash in the trash." Students are also able to explicitly make the connection between littering and the danger to the San Francisco Bay; "[It is important to] to keep the world safe, because the water goes to the Bay and all of the fish will die if it's dirty and we can't eat anything."

Third Grade

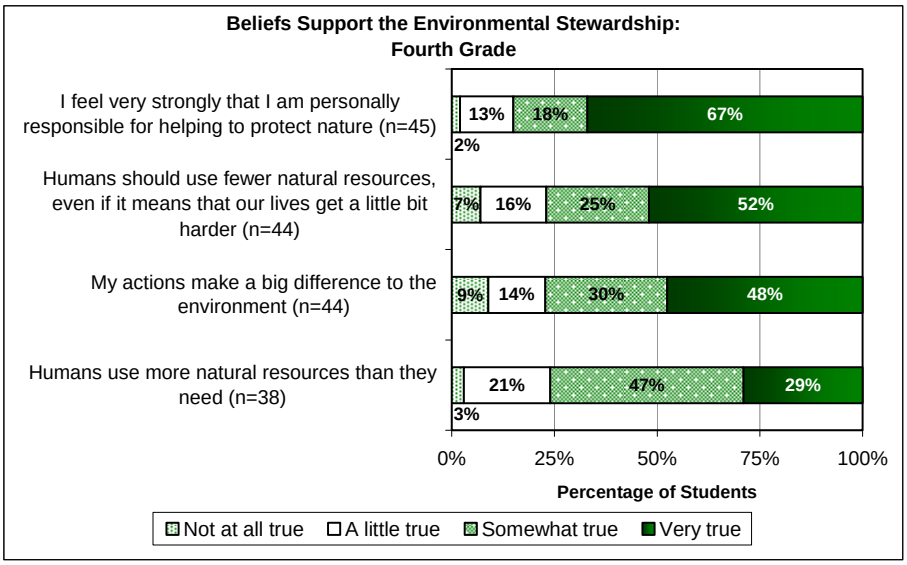
The third grade students also commented on the importance of not littering during focus groups in 2005-06. Furthermore, they are able to make the connection between littering and harming animals. As one student says, "I learned that one way to help our environment is not littering, because some birds can die from that." Another student comments, "Don't throw trash in the sea because sea lions could eat them and choke on them."

The use of alternative transportation methods emerges as another theme during the third grade focus groups. One student says she learned it was important to "use bicycles instead of cars to not spread pollution, or take the skateboard." A student in another class says "[you could] ride your bike instead of riding your car [because] cars waste gas and pollute."

Fourth Grade

Fourth grade students' attitudes about environmental stewardship were measured through a stewardship survey given at the end of the year. Additional information was also gathered during the focus groups. Overall, the results from the stewardship survey indicate that fourth graders' beliefs and actions support environmental stewardship. In regard to beliefs, students were asked to rate how true they thought statements about conservation and their personal actions were (Exhibit 10).

Exhibit 10

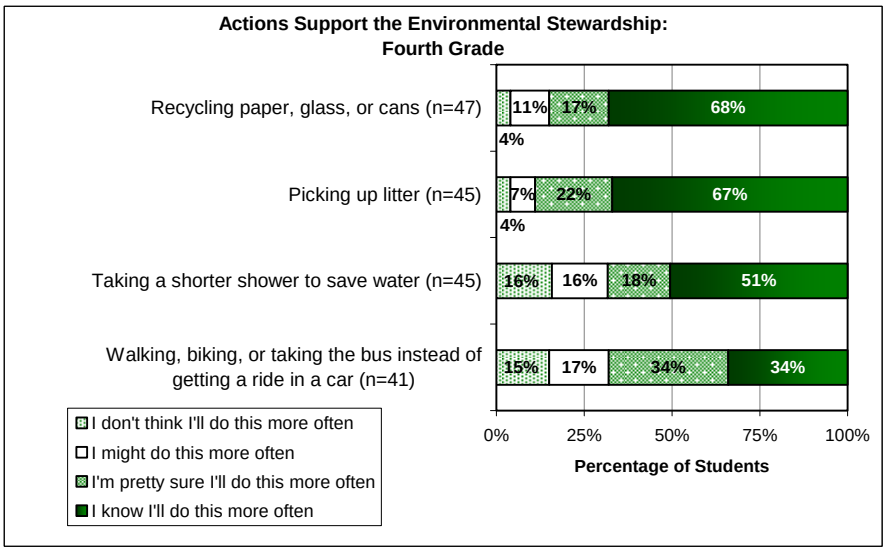


Percentages may not total 100% due to rounding

For three out of four statements, more students choose "very true" than any other option. The statement most commonly rated as "very true" is "I feel strongly that I am personally responsible for helping to protect nature," with 67% of students answering this way.

Exhibit 11 shows the results from the portion of the stewardship survey asking students whether or not they would do certain behaviors more often. For three out of four statements, more than 50% of students choose "I know I will do this more often." Sixty-eight percent of students indicated they would recycle paper, glass or cans more often, this being the statement with the highest positive results.

Exhibit 11



Percentages may not total 100% due to rounding

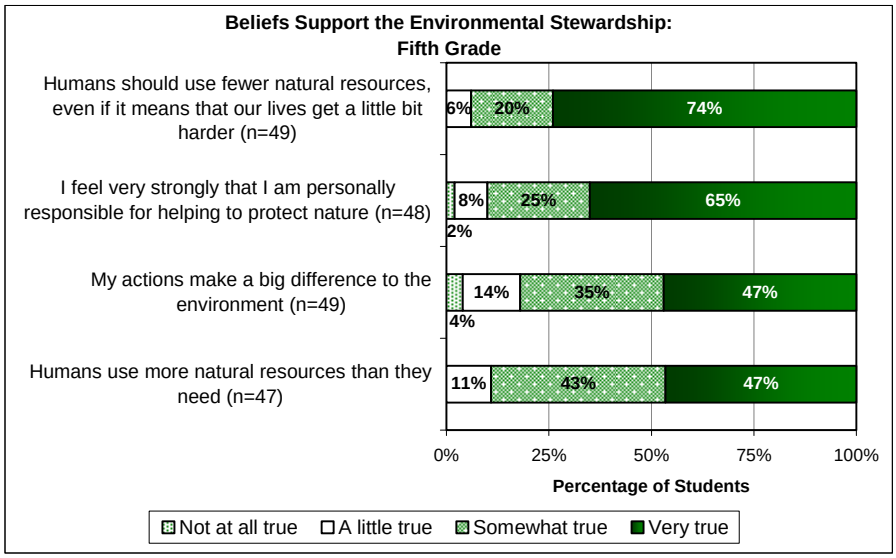
The fourth grade students comment on a wide range of topics related to stewardship in focus groups conducted with them in 2005-06. Like those in the other grades, they understand that

littering is dangerous to the environment. "If you see something floating in the water, you [should] pick it up." Students' comments also suggest consideration of positive environmental behaviors; "I think we should plant more trees," "Build more protected areas for endangered species," and "Don't use too much water." The variety of comments indicates that the Digger Deeper program teaches children a variety of stewardship principles.

Fifth Grade

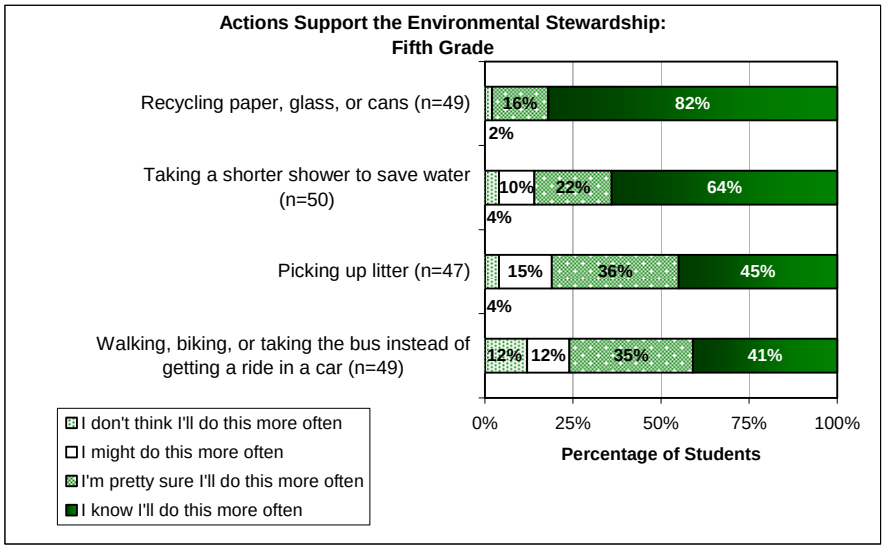
Fifth graders' results from the stewardship survey are very similar to those of fourth graders although with somewhat more positive results. More students choose "very true" than any other choice for each statement that measured their beliefs about stewardship. The statement most commonly rated as "very true" is "Humans should use fewer natural resources, even if it means that our lives get a little bit harder," with 74% answering this way. Exhibit 12 shows the complete results and percentages from the belief section of the stewardship survey.

Exhibit 12



Students were also asked how likely they were to do certain activities that reflected environmental stewardship (see Exhibit 13 below). More than half of all students respond "I know I will do this more often" to "Taking a shorter shower to save water" and "Recycling paper, glass or cans." The statement that receives the highest number of students responding "I don't think I'll do this more often" is "Walking, biking, or taking the bus instead of getting a ride in a car," with 12% of students responding this way. Overall, though, the results indicate that fifth graders do think they will engage in environmentally responsible behaviors more often than before.

Exhibit 13



Fifth grade curriculum focuses specifically on water conservation and how to prevent water pollution. Students' comments in the focus groups reflect this. One student says s/he learned not to "wash a car in the street because the soap goes down to the storm drain." Other students echo this with similar comments, "don't throw your trash in the drains," and "turn off water when you don't need it."

IV. Conclusion

The results from the second year of evaluation of the Environmental Volunteers' Digging Deeper Program are extremely positive, confirming the effectiveness of this program as shown in the first year of evaluation. Students from second, fourth and fifth grades show significant increases in both scientific knowledge and general learning skills. The results found by assessing changes between pre- and post-tests are affirmed by teacher assessments of students' abilities. Test results from third grade students are an exception, with the data showing no significant change in average score. However, teacher assessments report positive improvements in third graders' scientific knowledge and general learning skills. Positive findings for all grades are reinforced with comments from student and teacher focus groups.

The findings in the stewardship outcome area are also positive. The survey results from fourth and fifth graders indicate that many of them have encouraging beliefs and attitudes about their responsibility to the environment. Findings from the focus groups show that students from all grades are thinking about stewardship on some level.

Program feedback from teachers and collaborative partners lends further support to the positive impact of the Digging Deeper program. Teachers and partners comment that, through the program, students are receiving an expansive high quality science education that would not otherwise be available to them. Having a collaborative of community-based environmental education organizations provides students with a comprehensive science education that teachers at EPACS would not be able to deliver on their own. While these represent the major strengths heard from teachers and partners, interviewees also comment on the need to develop stronger coordination between collaborative partners and the EV staff, as well as between the partners and EPACS. Digging Deeper can address these areas for improvement by strengthening the links to learning among partner programs and between partners and EPAC's core curriculum. A full collaborative meeting at the beginning of the year as well as ongoing follow-up meetings between teachers and the EV staff may serve well as steps towards strengthening such coordination.

The Digging Deeper Collaborative has brought to EPACS high-quality environmental education aligned with state scientific standards, and this pilot project has proved to have extremely exciting results in both the first and second year of evaluation. As we saw in the dramatic increases in test scores between the beginning and the end of the school year, students learned and retained a great deal of scientific information. In addition, teachers report that the positive effects went beyond simply retaining information – students also improved their general learning skills, such as the ability to concentrate, their engagement in learning, and critical thinking skills. This pilot project is exciting not only for these individual students, but also provides evidence that environmental education is a great way to teach science and to get young people excited about and engaged in learning. In an era of struggling schools, funders should invest in this highly effective mode of pedagogy.

Appendix

Detailed Student Exit Data Charts

Scientific Knowledge

Exhibit 1
According to their Teachers, Students Showed Improvement in Their Scientific Knowledge
Second Grade
n=40

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Comprehension of key science concepts	3.85	3.95	.10**
Making scientific guesses (early versions of hypothesis testing)	3.95	4.08	.13**
Verbal or written expressions of key concepts	3.85	4.00	.15**
Vocabulary (scientific terminology)	3.83	3.98	.15**
Aggregate Scientific Knowledge Score	3.89	4.0	.15**

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

Exhibit 2
According to their Teachers, Students Showed Improvement in Their Scientific Knowledge
Third Grade
n=39

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Comprehension of key science concepts	3.08	3.77	0.69***
Making scientific guesses (early versions of hypothesis testing)	3.08	3.95	0.87***
Verbal or written expressions of key concepts	3.08	3.67	0.59***
Vocabulary (scientific terminology)	3.10	3.67	0.57***
Aggregate Scientific Knowledge Score	3.08	3.76	.69***

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

Exhibit 3
According to their Teachers, Students Showed Improvement in Their Scientific Knowledge
Fourth Grade
n=51

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Comprehension of key science concepts	2.82	3.82	1.00***
Making scientific guesses (early versions of hypothesis testing)	2.59	3.55	.96***
Verbal or written expressions of key concepts	2.84	3.63	.79***
Vocabulary (scientific terminology)	2.71	3.63	.92***
Aggregate Scientific Knowledge Score	2.74	3.66	.92***

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

Exhibit 4
According to their Teachers, Students Showed Improvement in Their Scientific Knowledge
Fifth Grade
n=46

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Comprehension of key science concepts	2.98	3.74	.76***
Making scientific guesses (early versions of hypothesis testing)	3.02	3.76	.74***
Verbal or written expressions of key concepts	2.93	3.78	.85***
Vocabulary (scientific terminology)	2.85	3.70	.85***
Aggregate Scientific Knowledge Score	2.95	3.74	.79***

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

General Learning Skills

Exhibit 5
According to their Teachers, Students Showed Improvement in Their General Learning Skills
Second Grade
n=40

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Ability to concentrate	3.93	4.15	.22***
Desire to achieve	4.00	4.15	.15**
Engagement in learning	4.03	4.15	.12**
Enjoyment of learning	4.03	4.15	.12**
Appreciation for own skills	4.03	4.15	.12**
Active classroom participation	4.08	4.20	.12**
Critical thinking skills	4.08	4.20	.12**
Aggregate General Learning Skills score	4.02	4.16	.14**

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

Exhibit 6
According to their Teachers, Students Showed Improvement in Their General Learning Skills
Third Grade
n=39

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Ability to concentrate	3.00	3.62	.62***
Desire to achieve	3.33	4.13	.80***
Engagement in learning	3.13	3.92	.79***
Enjoyment of learning	3.28	4.03	.75***
Appreciation for own skills	3.18	3.82	.64***
Active classroom participation	3.10	3.92	.82***
Critical thinking skills	3.33	3.92	.59***
Aggregate General Learning Skills score	3.19	3.91	0.72***

Each item has 5 possible points.
* = p<.1, ** = p<.05, *** = p<.01.

Exhibit 7
According to their Teachers, Students Showed Improvement in Their General Learning Skills
Fourth Grade
n=51

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Ability to concentrate	3.12	3.90	.78***
Desire to achieve	3.58	4.18	.60***
Engagement in learning	3.49	4.22	.73***
Enjoyment of learning	3.71	4.25	.54***
Appreciation for own skills	3.53	4.00	.47***
Active classroom participation	3.61	4.39	.78***
Critical thinking skills	3.12	3.82	.70***
Aggregate General Learning Skills score	3.45	4.12	.67***

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

Exhibit 8
According to their Teachers, Students Showed Improvement in Their General Learning Skills
Fifth Grade
n=46

Scores: 1=Far Below Basic, 2=Below Basic, 3=Basic, 4=Proficient, 5=Advanced			
	Mean Score at		**Mean Improvement**
	Beginning of School Year	**End of School Year**	
Ability to concentrate	3.22	3.83	.61***
Desire to achieve	3.30	4.02	.72***
Engagement in learning	3.17	3.80	.63***
Enjoyment of learning	3.41	4.02	.61***
Appreciation for own skills	3.22	3.91	.69***
Active classroom participation	2.98	3.72	.74***
Critical thinking skills	2.98	3.79	.81***
Aggregate General Learning Skills score	3.18	3.87	.69***

Each item has 5 possible points.
* = p<.05, ** = p<.01, *** = p<.001.

Evaluation Instruments

- Second Grade Student Focus Group Protocol
- Third Grade Student Focus Group Protocol
- Fourth Grade Student Focus Group Protocol
- Fifth Grade Student Focus Group Protocol
- Teacher Focus Group Protocol
- Stewardship Survey
- Student Exit Form

EVOLS Digging Deeper
Youth Focus Group Protocol: Second Grade

Hello, my name is Rachel and this is Laura. We are here to talk about the Digging Deeper program (the program when some adults came to your classroom to do science projects and take you on nature field trips). We want to know what you learned, what you liked, what you didn't like, and how the Digging Deeper program has taught you more about nature and the world around us. We want to hear everything you have to say because what you tell us about the program helps to make the program better. So I am going to ask you some questions and please remember to raise your hand to speak. I'll make sure that everybody gets a chance to say something.

First, to get our minds back in nature and science mode, let's go around the room and have each person say their name and then name one animal or organism that lives in the San Francisco Bay. So, I might say "My name is Laura and seals live in the San Francisco Bay."

Are you ready to begin? Does anybody have any questions?

1. **Let me see a show of hands from those of you that are interested in science.**
   Did the Digging Deeper activities make you more interested in science?

2. **What have you learned about nature after spending time outdoors with Digging Deeper?**
   - What do all living things need for survival?
   - What is a life cycle? Do all living things have life cycles? Are they all the same?
   - Can humans have an effect on plants and animals?
   - What is a habitat?
   - What are endangered species?

Activities:
- Went to Palo Alto Baylands for the fieldtrip.
- Fieldtrip to Coyote Point Museum Masters of Disguise (camouflage) Program
- Env. Volunteers kits in the classroom: looked at bird study skins, looked in bay mud for living things, played a feet and beaks game, did a food web exercise.

3. **What was your favorite activity that you did with Digging Deeper?**
   Why was it your favorite? Would you want to do it again?
4. **What was your least favorite activity?**
   Why did you not like it? How could it have been more fun?
5. **Think about when you were a Nature Detective for a day. (when you went to Baylands: garden)What did you learn about exploring things in nature?**
   What did you look for? What did you see?
6. **What can you do to help protect the environment?**
   Humans need to stop throwing trash into the Bay and making the Bay dirtier,
   Recycle, compost, protect endangered species
7. **What do you like best about being outside in nature?**
   Have the Digging Deeper activities made you appreciate nature more? How?
8. **Do you have any other stories to share about the Digging Deeper program?**

Thank you for talking with us!

EVOLS Digging Deeper
Youth Focus Group Protocol: Third Grade

Hello, my name is Rachel and this is Laura. We are here to talk about the Digging Deeper program (the program when some adults came to your classroom to do science projects and take you on nature field trips). We want to know what you learned, what you liked, what you didn't like, and how the Digging Deeper program has taught you more about nature and the world around us. We want to hear everything you have to say because what you tell us about the program helps to make the program better. So I am going to ask you some questions and please remember to raise your hand to speak. I'll make sure that everybody gets a chance to say something.

First, to get our minds back in nature and science mode, let's go around the room and have each person say their name and then name one animal or organism that lives in the San Francisco Bay. So, I might say "My name is Laura and seals live in the San Francisco Bay."

Are you ready to begin? Does anybody have any questions?

1. **Let me see a show of hands from those of you that are interested in science.**
   Did the Digging Deeper activities make you more interested in science?

2. **What have you learned about nature after spending time outdoors with Digging Deeper?**
   - What is adaptation? Why do adaptations increase an organism's chance for survival?
   - When the environment changes, what can happen to the plants, animals, and other organisms?
   - What does it mean to be extinct? Can you name an extinct animal?
   - What is an ecosystem? What is a niche?

   Activities:
   - Fieldtrip to tidepools
   - Fieldtrip to Pier 39 in San Fran for Sea Lions in the City program
   - EV kit examples: marine mammals skulls & bones, learned about kelp, looked at marine specimens

3. **What was your favorite activity that you did with Digging Deeper?**
   Why was it your favorite? Would you want to do it again?

4. **What was your least favorite activity?**
   Why did you not like it? How could it have been more fun?

5. **Think about the field trips you took with Digging Deeper where you went on nature discovery walks. What did you learn about exploring things in nature?**
   What did you look for? What did you see?

6. **What can you do to help protect the environment?**
   Recycling and collecting litter, the four Rs to remind us to make sure that water should be as clean as possible (reduce, reuse, recycle, rot), help prevent water pollution (do not litter in the ocean)

7. **What do you like best about being outside in nature?**
   Have the Digging Deeper activities made you appreciate nature more? How?

8. **Do you have any other stories to share about the Digging Deeper program?**

Thank you for talking with us!

EVOLS Digging Deeper
Youth Focus Group Protocol: Fourth Grade

Hello, my name is Laura and this is Rachel. We are here to talk about the Digging Deeper program (the program when some adults came to your classroom to do science projects and take you on nature field trips). We want to know what you learned, what you liked, what you didn't like, and how the Digging Deeper program has taught you more about nature and the world around us. We want to hear everything you have to say because what you tell us about the program helps to make the program better. So I am going to ask you some questions and please remember to raise your hand to speak. I'll make sure that everybody gets a chance to say something.

First, to get our minds back in nature and science mode, let's go around the room and have each person say their name and one new word that they learned from the Digging Deeper program. So, I might say "My name is Laura and I learned the word 'environment'."

Are you ready to begin? Does anybody have any questions?

1. **Let me see a show of hands from those of you that are interested in science.**
   Did the Digging Deeper activities make you more interested in science?

2. **What have you learned about nature after spending time outdoors with Digging Deeper? (field trips, garden and water program)**
   - What is the food chain? What are producers and consumers?
   - Do living things depend on one another for survival? Can you give me an example?
   - What are decomposers? How do they help the environment?
   - What are some examples of geological changes in the Earth? What do rocks have to do with earthquakes?

Activities:
- Fieldtrip to Los Trancos to look at Earthquake zones and geology
- EV kit examples: rock cycle kit, fault lines, plate tectonics (puzzle rug)
- Fieldtrip to Filoli for Native Plants & Native Ways program
- Have Forest and Foothill program in June]

3. **What was your favorite activity that you did with Digging Deeper?**
   Why was it your favorite? Would you want to do it again?

4. **What was your least favorite activity?**
   Why did you not like it? How could it have been more fun?

5. **Think about the field trips you took with Digging Deeper where you went on nature discovery walks. What did you learn about exploring things in nature?**
   What did you look for? What did you see?

6. **What can you do to help protect the environment?**
   Recycling (recycle batteries, fluorescent light bulbs, mercury thermometers to avoid mercury pollution)

7. **What do you like best about being outside in nature?**
   Have the Digging Deeper activities made you appreciate nature more? How?

8. **Do you have any other stories or comments to share about the Digging Deeper program? (will be going on one more field trip)**

Thank you for talking with us!

EVOLS Digging Deeper
Youth Focus Group Protocol: Fifth Grade

Hello, my name is Laura and this is Rachel. We are here to talk about the Digging Deeper program (the program when some adults came to your classroom to do science projects and take you on nature field trips…it was some time at the beginning of the school year). We want to know about what you learned, what you liked, what you didn't like, and how the Digging Deeper program has taught you more about nature and the world around us. We want to hear everything you have to say because what you tell us about the program helps to make the program better. So I am going to ask you some questions and please remember to raise your hand to speak. I'll make sure that everybody gets a chance to say something.

First, to get our minds back in nature and science mode, let's go around the room and have each person say their name and one new word that they learned from the Digging Deeper program. So, I might say "My name is Laura and I learned the word 'environment'."

Are you ready to begin? Does anybody have any questions?

1. **Let me see a show of hands from those of you that are interested in science.**
   Did the Digging Deeper activities make you more interested in science?

2. **What have you learned about nature after spending time outdoors with Digging Deeper?**
   - When we talk about water, what does evaporation and condensation mean?
   - What kind of water covers most of the Earth's surface?
   - What role does the ocean play in the water cycle?
   - Where does the water in your community come from?

Activities:
- Save the Bay Canoes and Sloughs program
- EV water conversation kit examples: travels with water, how much water does it take, water molecule experiments

3. **What was your favorite activity that you did with Digging Deeper?**
   Why was it your favorite? Would you want to do it again?
4. **What was your least favorite activity?**
   Why did you not like it? How could it have been more fun?
5. **Think about the field trips you took with Digging Deeper and the activities they shared with you. What did you learn about exploring new things in the nature?**
   What did you look for? What did you see?
6. **What can you do to help protect the environment? How does conserving water help to protect the environment?**
   Conservation (e.g. planting trees to make freshwater supplies last longer)
   Prevent water pollution (e.g. pick up trash, don't use pesticides, use water carefully), Recycle
7. **What do you like best about being outside in nature?**
   Have the Digging Deeper activities made you appreciate nature more? How?
8. **Do you have any other stories or comments to share about the Digging Deeper program?**

Thank you for talking with us!

EVols: Digging Deeper
Teacher Focus Group Protocol

Thank you for giving us some of your time today. My name is _____ and I am an associate with LaFrance Associates, an independent evaluation and consulting firm. We are working with the Environmental Volunteers to evaluate the Digging Deeper program. We are here today to get some feedback from you on your experience in using this program in your classroom. We are interested in understanding how these activities have had an influence on your students as well as on your own teaching. We want to know what worked well and what you think could be improved. Your feedback and input will help in making improvements and enhancements for the program moving forward. Please speak freely; everything that is discussed here will remain confidential. In our evaluation report, we will use quotes but we will not attribute quotes to individuals. Do you have questions or concerns before we start?

I would like to start by asking you to introduce yourselves. Please tell us your name and the grade that you teach.

1. **Overall, how do you think the kids respond to the Digging Deeper activities and program? Are they excited? Engaged?**

2. **Are there particular activities the students engaged in as part of the Digging Deeper project that seem to make a strong impression?**
   In what way does this make a deep impression? (e.g. do they talk about the experience a lot after it's over; do they bring it up as an example in other parts of their schoolwork; do they apply principles or facts that they learned, etc)

3. **Are there other activities that don't make such a strong impression?**

4. **Do you notice any lasting effects on students in terms of their classroom abilities?**
   Do they apply things that they've learned to other parts of their curriculum?
   Do they apply critical thinking skills more often?
   Have you noticed a change in students' attitudes towards school since the project? Are they more interested in learning? Do they find science more fun? Did they gain new appreciation for certain topics?
   Do they have increased ability to work in teams?

5. **Have you noticed whether students have become more interested in science?**
   Are they more confident in their science knowledge?

6. **Did the program activities tend to involve all students equally, or were there consistently some groups more engaged than others? If yes, do you have any suggestions about how to engage all students equally?**

7. **Do students seem more aware of how their actions impact the environment? If yes, is this a widespread effect, or do you see it in just a few students?**
   Can you give us an example?

8. **Have you learned anything from participating in the Digging Deeper activities that you have been able to incorporate into your own teaching? If so, what have these been?**
   Are there ways that the program can better support your own science curriculum?

9. **What would help you maximize the effectiveness or usefulness of the Digging Deeper program?**

10. **You received an informational packet from the Digging Deeper staff which had a list of activities and curriculum for the school year. Was this a useful resource?**
    Why was it useful or not useful?
    Did you not use it because you forgot about it or because it was not useful?
    Would it be more accessible or easy to use if it was available electronically?

11. **Are there ways that the program could enhance the learning of the kids even more? If you were to design the program, how would you do it differently?**
    Additional curriculum?
    A different way to approach the teaching?
    Pre/post materials given to teachers?
    Other follow-up with teachers?

12. For Katie (if there is time): Have you noticed any cumulative effects of the program on the kids who have participated for multiple years? Do the kids who have had the program for more years seems more aware of the concept of stewardship than the kids who participated the first year?

13. Do you think the program is responsive to the suggestions and requests from teachers over the years?

Thank you for your time!

EVols Digging Deeper

Stewardship Survey

Name: _____ **Grade:** _____

1. Please circle the number that best says how you feel.

	This statement is:				
	Not at all true 	A little true 	Somewhat true 	Very true 	Don't Know
Humans use more natural resources (like water, trees, or gasoline) than they need.	1	2	3	4	☐
I feel very strongly that I am personally responsible for helping to protect nature.	1	2	3	4	☐
My actions make a big difference to the environment.	1	2	3	4	☐
Humans should use fewer natural resources, even if it means that our lives get a little bit harder (for example, we have to take the bus or ride bikes more, instead of getting rides in cars).	1	2	3	4	☐

2. Please circle the number that best says how you feel.

Here are some activities that are good for nature, and that you may have learned about in school. After learning about them, did you decide to do them more often?	I don't think I'll do this more often 	I might do this more often 	I'm pretty sure I'll do this more often 	I know I will do this more often 	Don't Know
Walking, biking, or taking the bus instead of getting a ride in a car.	1	2	3	4	☐
Taking a shorter shower to save water.	1	2	3	4	☐
Recycling paper, glass, or cans.	1	2	3	4	☐
Picking up litter.	1	2	3	4	☐

3. How interested would you be in learning more in school about how to protect the environment?

☐ None
☐ A little
☐ Some
☐ Very much

You finished!
Good job!

Environmental Volunteers' Digging Deeper Project: Student Exit Form

The program developers for the Digging Deeper project would like to understand how your classroom's participation in learning activities have had an impact on each of your students. Please take a few minutes and let us know whether you noticed any difference in the skills of your students between the beginning of the school year and now.

Student Name: _____

General Learning Skills		Performance Scale				
		Far Below Basic	Below Basic	Basic	Proficient	Advanced
Ability to concentrate	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Desire to achieve	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Engagement in learning	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Enjoyment of learning	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Appreciation for own skills	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Active classroom participation	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Critical thinking skills	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐

Specific Scientific Knowledge		Performance Scale				
		Far Below Basic	Below Basic	Basic	Proficient	Advanced
Comprehension of key science concepts	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Making scientific guesses (early versions of hypothesis testing)	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Verbal or written expressions of key concepts	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐
Vocabulary (scientific terminology)	Beginning of the school year:	☐	☐	☐	☐	☐
	Now:	☐	☐	☐	☐	☐