PROJECT EXPLORATION
Changing the Face of Science®

Project Exploration
10-Year Retrospective Program Evaluation

Summative Report

Bernadette Chi, Ph.D.

Juna Z. Snow, Ph.D.

with

David Goldstein

Shirley Lee

Joo Chung

the center for
Research
Evaluation &
Assessment

LHS LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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Project Exploration: 10-Year Retrospective Program Evaluation Report, December 2010
Executive Summary

Project Exploration gives underprivileged students the opportunity to expand their life skills by using science education to learn and grow on a journey that we can create for ourselves and for our community.
—Project Exploration alumnus

Project Exploration (PE) is a nonprofit organization launched in 1999 with the intent to create science-learning opportunities that engage all students, especially students traditionally underrepresented in science professions. Currently, PE youth-development programs engage more than 300 low- to mid-level scholastically achieving Chicago youth, ranging in age from 12 to 17, during out-of-school time (OST). Approximately 85% of PE participants come from low-income families who are predominantly African-American or Latino. Through personalized interactions with real-world scientists and authentic, hands-on science experiences, PE aims to inspire in youth the confidence and belief that science is accessible, and something that each and every one of them is capable of doing.

At the request of the PE staff, a team of researchers from the Center for Research, Evaluation, and Assessment (REA) at the Lawrence Hall of Science, University of California, Berkeley, undertook a 10-year retrospective review of PE participant programming and participation. The REA research team systematically investigated, measured, and assessed former PE participant (i.e., alumni) involvement in PE programs and subsequent educational and career life choices for indicators, as well as themes related to the influence of PE programs. The evaluation goals were twofold: (1) describe PE's influence on its past participants, and (2) explain the organizational practices that support science learning for traditionally underrepresented students in science.

The REA study utilized multiple research methods including survey, interview, and document analysis to gather data both about alumni (ages 18 and over) and about their educational and career achievements and aspirations several years after their initial participation in PE programs. In May 2010, the 904 PE participants on record who have participated in PE programs since its founding were contacted by phone or email to confirm their birthdates and contact information. For those determined to be alumni over the age of 18 based on their actual birthdates or PE participation records, invitations containing a web-survey hyperlink were emailed to alumni with email addresses on record in the PE database (N=547). An additional 99 alumni, who did not have email addresses on record, received paper survey packets via postal mail.

Of the 198 survey respondents (both electronic and paper), 78 were 18 years old or older and completed the entire survey. Because participant birthdates were not collected in the earlier years of the program, PE staff estimated that 259 participants in the database were older than 18 years old, based on birthdates on record or their participation in PE programs. Thus, the survey response rate was approximately 30% (78 of 259). Of the 78 survey respondents, 64% (50 of 78) were female, 31% (24 of 78) were male, and 1% (1 of 78) marked "other." Three respondents did not indicate their sex. As samples of convenience, the survey and interview samples were not necessarily representative of the overall PE alumni population. In addition, there was a bias

toward more recent PE alumni because their contact information is maintained and updated more consistently, and because they are more likely to participate in PE community events. However, the relatively large sample surveyed offers helpful insights into the program and its outcomes. As part of the survey, respondents were asked if they would be interested in participating in a 30-minute interview. Of the 45 PE alumni who responded, REA staff conducted telephone interviews with 18.

Study findings reveal that not only did participants experience a boost in their interest and confidence in doing science, but also they gained skills and insights that enhanced their development as young adults. Moreover, during their time as PE participants, they engaged in a science community that provided strong support to learn and do science. Together, these three major dimensions—increased science capacity, positive youth development, and engagement in a community of practice—are found to be present in PE programs and to have rendered a powerful effect upon participating students. The findings are summarized below:

Increased Science Capacity. Past participants expressed newfound or enhanced interest in science topics and doing science activities after participating in PE programs. This interest contributed to reported confidence to become a scientist, if one so chose; to understand how scientists approach investigations; to learn how to ask questions and to think scientifically (generating questions and use of evidence to back up ideas); to observe or to participate in the day-to-day work of scientists; to understand the trajectory of becoming a scientist; to spark their curiosity about science; to increase their interest in science both in and out of school; to learn and practice science process skills (asking questions, collecting data, presenting data); to learn new science disciplines not offered in school (such as geology and paleontology); to use tools of scientists (instruments, lab equipment, etc.); to further their understanding of the nature of science from a fixed body of knowledge to an evolving set of questions and debates; and to develop a science identity and to understand how science is a way to understand the world.

Positive Youth Development. PE program delivery reflects positive youth development principles that are demonstrated by the life choices and attitudes of past participants. For the past decade, the PE staff has designed and delivered experiential programs that fostered the wonder of science and the character skills in alumni to transform their lives. These include increased self-confidence; improved verbal and written communication skills, especially in terms of public speaking to groups and individuals; skills in working as a team; leadership skills and the desire to seek out leadership opportunities; networking skills; and the motivation to find mentors and to mentor others. In addition, PE participants reported other outcomes relevant to youth development goals, including feeling confidence and independence in pursuing their passion and future goals; desiring to be adventurous and try new experiences; developing friendships and bonds with fellow youth interested in school and in science; and having more positive feelings about their future.

Engagement in a Community of Practice. Past participants reported organizational practices that were very similar to those fostered within communities of practice, a social learning theory (Wenger, 2006) that emphasizes a domain of shared interest and inquiry, a community that nurtures relationships and helps members learn from each other, and members who share not only interests but also practices, though PE did not frame its work in this way. PE creates

a community of practice in which youth are welcomed and encouraged to learn and do science. This community of practice, present in their PE experiences, was a powerful support for participants. For example, PE nurtured highly personal relationships and a community among peers and adults who also value education and science; gave youth hands-on opportunities to practice science research; and introduced students to science experts and mentors who helped them envision and gain advice for possible futures in science, including educational and career options. Envisioning PE as forming a community of practice to help youth learn and do science provides a way to understand and frame PE's focus on youth development and science as one coherent set of organizational strategies and outcomes. By fully including youth as practicing members of a community of science learners, Project Exploration successfully prepares them for future studies and careers in science as well as for life.

Recommendations for improvement of the PE program draw from the feedback received from survey respondents and interviewees as well as the study findings and observations of the research team. Improvements and an expansion in PE programming, such as an extension model used in continuing education, with a focus on alumni needs, would extend the PE experience and foster further the influence of the PE goals for its youth. For example, PE alumni suggest continued programmatic support for past PE alumni in college and beyond in the form of internships, mentoring, scholarships, job opportunities, and alumni-focused events. In addition, study findings indicate that not all past participants are aware of the multiple opportunities for continued participation beyond the initial involvement, and not all PE alumni observed that they themselves were able to design and even lead PE activities. Finally, recommendations to improve the usefulness of the PE database and overall alumni tracking efforts are also provided.

Introduction

I have developed a scientific mind and have a decent scientific background, thanks to Project Exploration.
—Project Exploration alumnus

A critical need exists today to increase the scientific literacy of all students, particularly that of students who have been traditionally underrepresented in science, namely girls and minorities. Fostering scientific literacy can have broad effects, from contributing to improved civic literacy and engagement in public policy issues that have scientific bases (e.g., climate change or stem-cell research) to increasing 21st century workforce readiness and to diversifying the scientific workforce (National Research Council, 2007).

Schools provide a primary opportunity to convey science education and to foster scientific literacy. However, formal science classes do not engage all students; nor are science education resources provided equitably to students across schools and communities (Aschbacher, Li & Roth, 2010; National Research Council, 2009; Oakes, 1990). Thus, out-of-school time (OST) programs present key opportunities to reach and engage youth in science. For example, OST settings offer important flexibility in time, space, and opportunities to learn, in which students can work in teams, conduct hands-on activities and explorations, make real-world connections, and participate in scientific inquiry using problem-solving and critical-thinking skills (Coalition for Science After School, 2007; Friedman & Quinn, 2006; Schwartz & Noam, 2007).

This report summarizes findings from a retrospective study of 10 years of PE alumni experiences since the founding of Project Exploration, an organization that has fostered youth interest and engagement in science through a framework of youth development principles. The study findings also directly address recommendations that have emerged from a recent report of trends, questions, and findings from the field of out-of-school time STEM to identify ways that OST programs can build the capacities of youth to engage in science, and to examine what features promote quality programming that could be scalable (Bevan, Michalchik, Bhanot, Rauch, Semper & Shields, 2010). Although scalability was not a specific focus of this study, the current study helps to illuminate which program features are present in PE programming. Finally, applying a social theory of learning such as "communities of practice" (Wenger, 1998) to youth development science programs for underrepresented students helps to frame and further illuminate the outcomes and practices of such programs in preparing science learners and future scientists as well as productive individuals in society.

Program Description

Project Exploration (PE) is a nonprofit, science-education organization cofounded in 1999 that strives to make science learning experiences accessible to all students—especially those students who traditionally are underrepresented in science, such as girls, minority students, and low-achieving students. Each year, PE programs engage more than 300 city youth, ranging in age from 12 to 17, who participate in its various science programs. PE delivers youth-development programs during out-of-school time (OST) that target low- to middle-level

scholastically achieving Chicago Public School students. Approximately 85% of PE participants come from low-income families that are predominantly of African-American or Latino heritage.

PE programs' potential effects on students are worthy of examination. PE reports that 95% of students who have attended their field programs (Junior Paleontologists and All Girls Expedition) have graduated from high school, and 58% have enrolled in a four-year college. And 32% of all field program students and 40% of girls who graduate from high school as PE field alumni choose to major in science (Project Exploration, 2009).

Through personalized interactions with real-world scientists and by means of authentic, hands-on science opportunities during out-of-school hours, PE aims to inspire youth to become interested and involved in science, and then to provide them with the tools to experience the wonders of science and to transform their lives. PE currently operates four core programs designed to encourage youth interest in science:

(1) Sisters4Science (S4S) is a weekly afterschool program for minority middle school girls that combines science exploration with leadership development. In addition to providing hands-on science activities chosen by the program participants themselves, S4S exposes approximately 100 girls to a wide variety of women-scientist role models each year.

(2) Junior Paleontologists is a summer program that immerses a dozen students, ages 12 to 17, in the world of paleontology and dinosaur fieldwork on-site in the Western United States each year. During the first two weeks at the University of Chicago, the students build academic skills through the study of geology, anatomy, and paleontology. After laying the academic foundation, they travel to South Dakota where they perform hands-on work alongside scientists on fossil-rich terrain. Upon their return, the students receive ongoing mentoring, tutoring, evaluation, and leadership development opportunities, up through their high school graduation.

(3) Dinosaur Giants Team trains high school students to serve as docents to the public at new science exhibits and enables them to fulfill service-learning hours toward their graduation requirements. The team members participate in an eight-hour training program in which they learn the scientific history and facts about the exhibit and how to interpret that information for the public. They then serve a minimum of 12 hours as exhibit facilitators who answer questions, and deliver interactive activities for museum attendees.

(4) All Girls Expedition is an intensive, two-week classroom and fieldwork experience for minority middle- and high-school girls. The expedition begins in Chicago with hands-on classroom sessions in which girls learn practical geology, biology, evaluation, and field skills. Then the team spends one week working in the field alongside scientists. In past expeditions, teams have traveled to Yellowstone National Park and Puerto Rico.

Students may participate in one or more of the programs multiple times, and they often return to serve as team leaders or program presenters in advanced leadership capacities. In addition to administering the four core programs, PE staff intentionally foster a sense of community among the participants and staff, while emphasizing the importance of long-term relationships with their participants. This is reflected in informal organizational practices, including check-ins that PE

staff have with current and past PE participants, invitations to gather to celebrate accomplishments, and significant effort put forth to make contact with PE alumni when email messages or mailings bounce back to the organization (e.g., phone calls to multiple numbers, parent contacts, calls to friends, contacts through Facebook, etc.).

Based on a review of its organizational documents and logic model, Project Exploration appears to embody a unique set of characteristics that are worthy of deeper examination, especially in the context of afterschool, informal science and of out-of-school time research. For example, through the integration of positive youth development (PYD), the potential for science learning expands. The PYD framework has evolved over the last decade (Damon, 2004; Eccles & Gootman, 2002; Lerner, 2005) to include the "Five Cs" of competence, confidence, connection, character, and caring (Lerner, 2005). These characteristics emerge when youth are aligned during their adolescence with resources or developmental assets (Benson, Scales, Hamilton & Semsa, 2006) in their families, schools, and communities. Youth demonstrate these characteristics as personal skills and strengths—for example, their abilities to select healthy, valued goals; to optimize the presence of resources; and to use strategies to attain the means needed to reach these goals (Gestsdottir & Lerner, 2007).

As such, quality OST science programs, especially those that focus on PYD, have the potential to offer practices similar to those needed to engage historically underrepresented populations, which, according to current research, includes such strategies as mentoring, working in groups, fostering positive social relationships among peers and with adults, working on activities that reflect youth voice and interests, and connecting science to youth's future vision of themselves (Basu & Calabrese-Barton, 2007; Fancsali & Froschl, 2006; Jolly, Campbell & Perlman, 2004; Payne, 2008; Schwartz & Noam, 2007).

Although PE does not frame its programming as promoting a community of practice, the youth development-focused strategies that PE utilizes to engage underrepresented students in science exhibit important elements of creating a community of practice to learn and do science in settings that are not limited to school or the science classroom (Lave and Wenger, 1991; Wenger, 1998, 2006). According to Wenger (2006), "communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly." Communities of practice share three characteristics: a <u>domain</u> of shared interest and inquiry, a <u>community</u> that nurtures relationships and helps members learn from each other, and members who share not only interests but also <u>practices</u>. PE creates a community of practice in which youth are welcomed and encouraged to learn and do science.

In other words, the youth development-focused strategies utilized by PE create a strong sense of community among youth who share an interest in science and provide them with authentic opportunities to learn and practice science. This study explores how these strategies fostered youth interest and engagement in science, and, perhaps more importantly, how they encouraged youth to hone both science and broader life skills, with the goal of becoming positive, hopeful, and productive individuals.

Study Method

Goal, Purpose, and Questions. In collaboration with PE staff, a team of researchers from the Center for Research, Evaluation, and Assessment at the Lawrence Hall of Science, University of California, Berkeley, undertook a 10-year retrospective review of PE participant programming and participation. The research team systematically investigated, measured, and assessed patterns of former PE participant (i.e., alumni) involvement in PE programs, and the subsequent educational and career life choices, looking for indicators and themes related to the influence of PE programs. Ultimately, the external evaluation purpose is to educate stakeholders, PE staff, participants, and sponsors about the program merit and worth based on rigorous, empirical research that adheres to the *American Evaluation Association Guiding Principles* (2004/1994) and *The Program Evaluation Standards* (1994). The intended uses of the evaluation products are to improve design and implementation toward program goals, to inform program decision-making, and to provide evidence in accountability requirements.

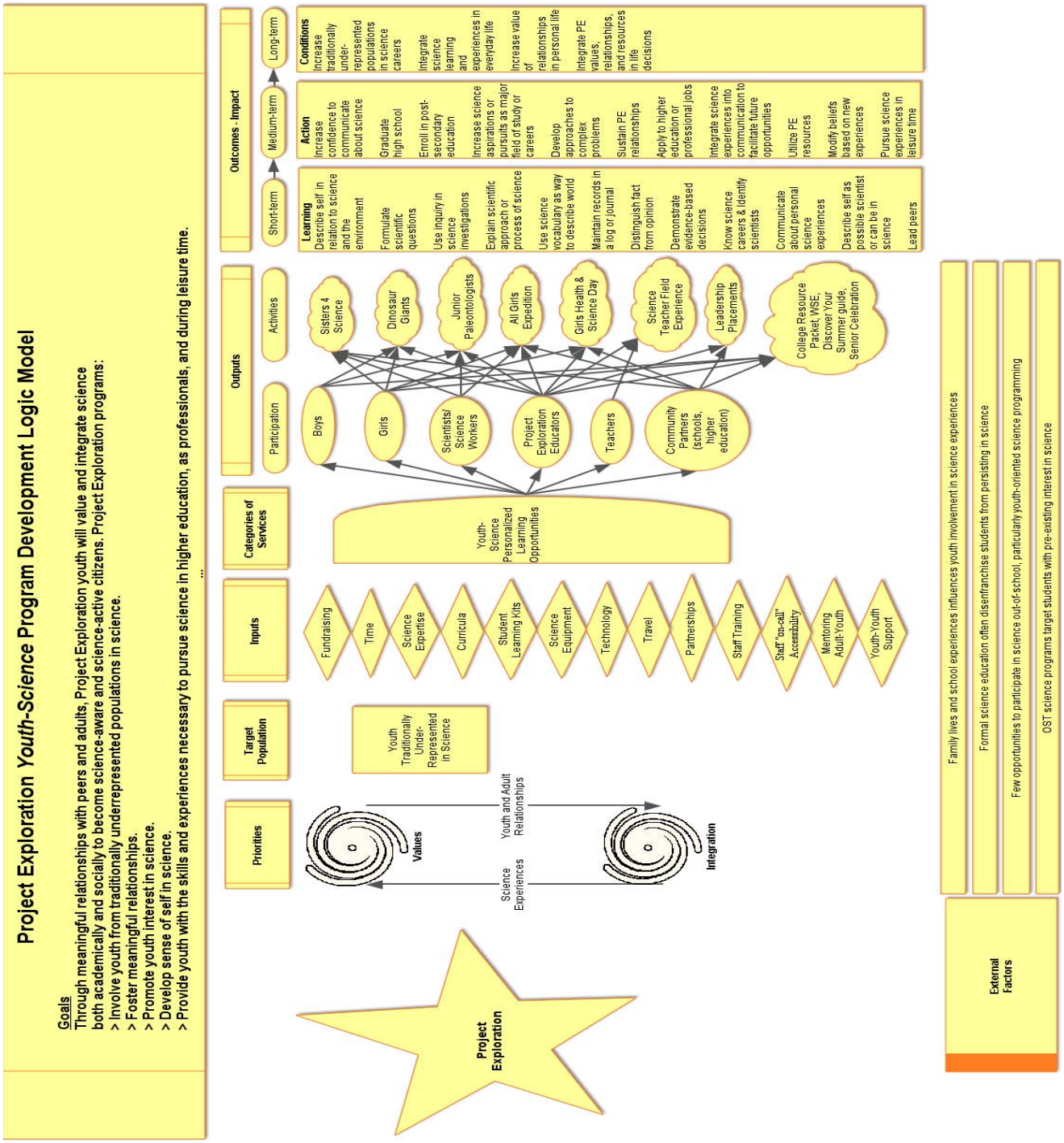
Key questions guided the scope and design of this study:

- In what ways has PE staff and programming influenced the educational and career aspirations of past participants?
- In what ways have past-participant life choices been influenced by PE involvement, and from those how can future PE programming and delivery continue to grow?

Focus and Design. In service of this effort, the multiple-method inquiry involved both qualitative and quantitative data collection and analysis. Methodological triangulation ensured the data internal or descriptive validity (Maxwell, 1992) or trustworthiness (Guba & Lincoln, 1985). Data for the evaluation were collected from January through June 2010, using four well-established methods:

Documents and artifacts analysis, particularly program documents, database records, prior evaluation reports, and samples of participant work.

Logic model that visually represents the program elements and linkages between those elements: priorities, contextual factors, resources, activities, outputs, and outcomes (short-, medium-, and long-term). The logic model development was based on the evaluation document analysis and the program knowledge of the PE staff. Through a collaborative, iterative process, which involved a face-to-face meeting facilitated by the evaluator and involving key PE staff, the PE theory of action was represented visually. A final collaborative logic modeling session will occur as a last step in this evaluation for a final reflection on past actions and for future, strategic planning. The most recent version of the logic model follows.


Project Exploration Youth-Science Program Development Logic Model
Goals
Through meaningful relationships with peers and adults, Project Exploration youth will value and integrate science both academically and socially to become science-aware and science-active citizens. Project Exploration programs:
> Involve youth from traditionally underrepresented populations in science.
> Foster meaningful relationships.
> Promote youth interest in science.
> Develop sense of self in science.
> Provide youth with the skills and experiences necessary to pursue science in higher education, as professionals, and during leisure time.
Priorities
Target Population
Inputs
Categories of Services
Outputs
Participation
Activities
Outcomes - Impact
Short-term
Medium-term
Long-term
Project Exploration
Values
Youth and Adult Relationships
Science Experiences
Integration
Youth Traditionally Under-Represented in Science
Fundraising
Time
Science Expertise
Curricula
Student Learning Kits
Science Equipment
Technology
Travel
Partnerships
Staff Training
Staff "on-call" Accessibility
Mentoring Adult-Youth
Youth-Youth Support
Youth-Science Personalized Learning Opportunities
Boys
Girls
Scientists/ Science Workers
Project Exploration Educators
Teachers
Community Partners (schools, higher education)
Sisters 4 Science
Dinosaur Giants
Junior Paleontologists
All Girls Expedition
Girls Health & Science Day
Science Teacher Field Experience
Leadership Placements
College Resource Packet, WSE, Discover Your Summer guide, Senior Celebration
Learning
Describe self in relation to science and the environment
Formulate scientific questions
Use inquiry in science investigations
Explain scientific approach or process of science
Use science vocabulary as way to describe world
Maintain records in a log or journal
Distinguish fact from opinion
Demonstrate evidence-based decisions
Know science careers & Identify scientists
Communicate about personal science experiences
Describe self as possible scientist or can be in science
Lead peers
Action
Increase confidence to communicate about science
Graduate high school
Enroll in post-secondary education
Increase science aspirations or pursuits as major field of study or careers
Develop approaches to complex problems
Sustain PE relationships
Apply to higher education or professional jobs
Integrate science experiences into communication to facilitate future opportunities
Utilize PE resources
Modify beliefs based on new experiences
Pursue science experiences in leisure time
Conditions
Increase traditionally under-represented populations in science careers
Integrate science learning and experiences in everyday life
Increase value of relationships in personal life
Integrate PE values, relationships, and resources in life decisions
External Factors
Family lives and school experiences influences youth involvement in science experiences
Formal science education often disenfranchise students from persisting in science
Few opportunities to participate in science out-of-school, particularly youth-oriented science programming
OST science programs target students with pre-existing interest in science

Surveys of alumni were conducted using an 88-item, web-based questionnaire with closed- and open-ended questions, approved by project managers (see Appendix A) and administered via email. To alumni for whom PE did not have current email addresses, alternate paper versions of the questionnaire were printed and mailed via postal service with a return-postage-paid envelope. Quantitative data from all respondents were entered into SPSS to facilitate correlations and descriptive statistical analysis. The Results section of this report describes the survey respondent data and is organized by questionnaire construct: PE program participation, Educational or professional life choices, and Science-related attitudes and interests.

Individual interviews were conducted over the telephone with a sample of alumni who were 18 and older. Each formal, audio-recorded interview was approximately 30 to 45 minutes in length and conducted using a semi-structured protocol approved by the PE staff (see Appendix B), for a total of 18 interviews. The key foci of the alumni interview protocol were PE involvement, influence of PE on educational or career decision-making, and future planning.

Description of Instruments and Data Sources. As of May 2010, the PE database stored records of 904 past and current participants. PE contacted its alumni by phone or email to confirm or update contact information. In June 2010, electronic invitations to complete the survey were sent to the alumni who had email addresses on record in the PE database (n=547). Paper survey packets were mailed to an additional 99 alumni who did not have email addresses on record but were considered to be over the age of 18 based on their birthdates or participation in PE programs. Email reminders and phone calls were made incrementally to encourage completion of the survey. In addition, PE staff announced the alumni survey and encouraged participants to complete the survey through using the PE Facebook page.

Of the 198 survey respondents (both electronic and paper), 78 were 18 or older and completed the entire survey. Because participant birthdates were not collected in the earlier years of the program, PE staff estimated that a total of 259 participants in the database were older than 18, based on their birthdates on record or their participation in PE programs. Thus, the response rate is an estimate of 30%.

Of the 78 survey respondents, 64% (50 of 78) were female, 31% (24 of 78) were male, and 1% (1 of 78) marked "other." Three respondents did not mark their gender. Tables 1 and 2 summarize the gender, racial background, and ethnic backgrounds of the survey respondents. As samples of convenience, the survey and interview samples were not necessarily representative of the overall PE alumni population. In addition, there was a bias toward more recent PE alumni because their contact information is maintained and updated in a more consistently, and they are more likely to participate in PE community events. However, the relatively large sample surveyed offers helpful insights into the program and its outcomes.

Table 1. Gender of PE Alumni Database, Survey Respondents and Interviewees

	# in Full Database (n=797)	% Full Database	# Surveyed (n=78)	% Survey Sample	# Interviewed (n=18)	% Interview Sample
Female	560	70.3	50	64.1	9	50.0
Male	167	21.0	24	30.8	9	50.0
Decline to state/Other	70	8.8	1	1.3	0	0.0
MISSING	-	-	3	3.8	0	0.0
Total	797	100.0	78	100.0	18	100.0

Table 2. Ethnicity of PE Alumni in Database, Survey Respondents and Interviewees

	# in Full Database (n=797)	% Full Database	# Surveyed (n=78)	% Survey Sample	# Interviewed (n=18)	% Interview Sample
African-American / Black	407	51.1	29	37.2	6	33.3
Hispanic / Latino	196	24.6	29	37.2	7	53.8
Asian / Asian-American	18	2.3	1	1.3	0	0.0
Pacific Islander (includes Micronesian, Polynesian, other Pacific Islanders)	1	0.1	1	1.3	0	0.0
More than one (Please specify)*	-	-	5	6.4	0	0.0
White / Caucasian	38	4.8	5	6.4	4	22.2
Other (Please specify)	34	4.3	3	3.8	1	5.6
Decline to state**	-	-	1	1.3	0	0.0
MISSING	130	16.3	4	5.1	0	0.0
Total	824	100	78	100.0	18	100.0

* The PE database allowed multiple ethnicities to be selected; thus the total is larger than 797.
** This choice was not an option for the PE database.

As part of the survey, respondents were asked if they would be interested in participating in a 30-minute interview. Of the 45 PE alumni who responded, REA staff conducted telephone interviews with 18 alumni: 9 females and 9 males. The evaluation team attempted to sample the opt-in pool for interviews to reflect the gender and ethnic composition of the alumni population, though our efforts were limited as it was a sample of convenience.

Findings

I. Educational Accomplishments and Aspirations

With PE, they stress the fact that they want you to graduate high school and stress the fact that they want you to go to college and graduate…it's just the people there, they push you to go further and far beyond anything and they don't want you to stop. They want you to reach all your goals and… because of them, that's the reason I'm so far where I am now.
—Project Exploration alumnus

To assess and describe the influence of the PE program delivery on its participants, the alumni survey contained items about high school status, educational accomplishments, and career or educational aspirations. These items were narrowed, with a focus on science and science-related fields of study or employment. For the purposes of this survey, science was defined as part of science, technology, engineering, and mathematics, which is captured in the acronym STEM. The program delivery of PE incorporates STEM content, and therefore the questionnaire survey items reflected the breadth of STEM education and careers.[1]

Seventy-five percent of PE alumni reported high school graduation or equivalency as an accomplishment, and approximately 20% were pursuing high school graduation at the time of the survey completion, as Table 3 displays. In addition to high-school completion, survey respondents indicated post-secondary educational pursuits and actual or intended major field of study.

Table 3. Educational Achievements of PE Survey Respondents

	High School		**Two-Year Degree**		**Four-Year Degree**		**Master's Degree**		**Advanced Degrees**		**Other (Certifications, etc.)**	
	#	%	#	%	#	%	#	%	#	%	#	%
Graduated	59	75.6	1	1.3	17	21.8	0	0.0	0	0.0	4	5.1
Currently Attending	16	20.5	6	7.7	23	29.5	3	3.8	2	2.6	3	3.8
Never Attended	0	0	67	85.9	33	42.3	72	92.3	73	93.6	67	85.9
MISSING	3	3.8	4	5.1	5	6.4	3	3.8	3	3.8	4	5.1
Total	78	100.0	78	100.0	78	100.0	78	100.0	78	100.0	78	100.0

All survey respondents received some post-secondary education beyond high school. A portion of the respondents indicated that they had previously attended a two-year institution, and another subset reported continuing on to graduate-level education. These subsets overlap with each other and within the four-year-institution response data.

For example, seven of the 78 respondents were enrolled in a two-year college, and one respondent was a graduate. Of the seven PE alumni who had attended a two-year college, the one graduate achieved a science degree, and two of the enrolled students were studying science-related majors. Table 4 displays the fields of study at two-year institutions as indicated by the alumni survey responses.

[1] As noted by a recent report from the National Center for Education Statistics, STEM fields can encompass a wide range of disciplines (Chen & Weko, 2009). For example, the National Science Foundation includes social and behavioral sciences such as psychology, economics, and political science within its definition of the sciences (Green, 2007). However, for the purposes of this report, if PE alumni reported a natural, physical, life, or agricultural science major such as chemistry, physics, biology, and the like, those students were categorized as pursuing a "science" major.

Table 4. Fields of Study of the Two-Year College PE Alumni Survey Respondents

Major Field of Study	Graduated (n)	Enrolled (n)
Animal Science*	0	1
Criminal Justice**	0	1
Early Childhood Education**	0	1
Graphic Design	0	1
Nursing*	0	1
Science*	1	0
Unsure	0	1
Total (n=78)	*1*	*6*

* *Indicates science major.*

** *Indicates major other than science that is related to technology, engineering, or mathematics as defined by STEM federal funding agencies (e.g., NSF), ONET, and the US Dept of Employment and Training.*

A total of 40 survey respondents (51.3%) attended a four-year institution; 17 respondents (21.8%) reported having graduated from a four-year college or university; and 23 students (29.5%) were enrolled in college at the time of the survey. Table 5 displays the aggregate responses regarding major fields of study at four-year institutions for PE alumni who responded to the survey.

Table 5. Post-Secondary Fields of Study in Four-Year Institutions of PE Alumni Survey Respondents

Major Fields of Study‡	Graduated	Enrolled
	Count	Count
Animal Science*/Chemistry*	1	0
Animation**	0	1
Anthropology**	0	2
Architecture**/English	0	1
Art/Communications	0	1
Art Education	0	1
Art History	1	0
Biology*/Art	0	1
Business Administration	0	1
Business Management	0	1
Chemistry*	0	1
Community Health*	1	0
Community Health*/Nursing*	0	1
Criminal Justice**	0	1
Earth Sciences*	1	0
Economics**/Psychology**	1	0
Education**	0	1
English	2	0
Gender and Women's Studies	1	0
General Science*	0	1
Geophysics*	1	0
Hospitality Management	1	0
Management Science	1	0
Philosophy	0	1
Political Science**	2	1

Psychology**	2	2
Public Policy	0	1
Recreation, Park, and Tourism Administration	1	0
Social Work	0	1
Sociology**/Public Policy	0	1
Spanish/Russian	0	1
Veterinary Medicine*	1	0
Undeclared	0	1
Total (n=40)	*17*	*23*

‡ *Double majors are listed with a forward slash "/" between fields of study.*
* *Indicates science major.*
** *Indicates major other than science that is related to technology, engineering, or mathematics as defined by STEM federal funding agencies (e.g., NSF), ONET, and the US Dept of Employment and Training.*

The aggregate responses to the fields of study reported by survey respondents who were attending or have graduated from four-year institutions were categorized as a science or STEM field, as summarized in Table 6 below. Of those who had graduated, 58.8% of PE alumni reported majoring in science or STEM. Of those currently enrolled, 60.8% reported studying science or STEM-related fields.

Table 6. Science-Related Fields of Study of Survey Respondents Who Have Graduated or Are Enrolled in Four-Year Institutions

	Graduated		Enrolled	
	Count	Percent	Count	Percent
Science Major	5	29.4	4	17.4
STEM Major	5	29.4	10	43.4
Non-Science Major	7	41.2	9	39.2
Total	17	100.0	23	100.0

As summarized in Table 7, eight survey respondents indicated matriculation in continuing education or graduate degree programs. Three are currently attending master's degree programs in English, architecture, and film and television. Two alumni are enrolled in doctoral programs, one in biology and one in pharmacy. Seven PE alumni are enrolled in or received other certifications: CPR certification, medical diploma for pharmacy technology, pharmacy technician, professional health career certificate, bachelor of science (field not specified), cosmetology, and pre-medicine certificate.

Table 7. Continuing Education Status of PE Alumni Survey Respondents

Status	Count	Percent
Enrolled Master's Degree Student	3	3.8
Enrolled Doctoral Degree Student	2	2.6
Enrolled Other Degree or Certificate	3	3.8
Graduated with Certificate	4	5.1
Total (n=78)	12	15.3

In addition to collecting information about the educational achievement of PE alumni, the survey asked respondents their educational aspirations for the future, as summarized by Table 8 below. Fifty of 78 respondents (64.1%) reported the desire to return to school.

Table 8. Intent to Return to School

	Count	Percent
No	22	28.2
Yes	50	64.1
MISSING	6	7.7
Total	78	100.0

Of those PE alumni intending to return to school for additional education and training, they reported interest in the following fields of study:

Figure 1. Intent to Return to School Fields of Study of PE Alumni Survey Respondents

- Anthropology
- Archaeology
- Art and Design
- Automotive Technology
- Biology
- Business
- Business Management
- Chemical Tech
- Chemistry
- Criminal Justice
- Education
  - Elementary Education
  - Special Education
- English
- J.D.
- M.B.A.
- M.D./Medical
- Mechanical Engineer
- Non-Profit Management
- Nursing
- Philosophy
- Physics
- Political Science
- Psychology
- Science
- Sexuality Studies
- Social Work
- Veterinary Medicine

The intent to pursue higher education, whether immediately following high school or returning to school at a point later in time, was evident in alumni survey and interview responses. Specifically, the responses illustrated a variety of ways in which PE programs and staff encouraged students to continue their education. For example, when asked whether, during their time in Project Exploration, their interest in school overall was increased, 74% of survey respondents (n=78) agreed, with more than half strongly agreeing. When asked if PE introduced them to educational options that they had not considered, 89% of respondents agreed, with almost two-thirds of those respondents strongly agreeing. Moreover, during interviews, PE alumni reported that the PE staff encouraged participants to complete high school, obtain their diploma, and continue on to a post-secondary education.

> *With PE, they stress that they want you to graduate high school and that they want you to go to—and graduate from—college. It's just the people there; they push you to go further, far beyond anything you expected to do, and they don't want you to stop. They want you to reach all your goals … and because of PE, that's the reason I've come so far to where I am now.*

—Project Exploration Alumnus

The PE alumni persisted through high school and attribute that success to their experience in the program, and alumni respondents reported having been inspired by PE when choosing their fields of interest and pursuing their careers.

II. Career Achievement and Aspirations

After exiting PE and high school, 32% of alumni responded that they had held science-related employment since their time at PE. Table 8 presents the science jobs that these respondents performed in since their participation in PE.

Table 8. Science-Related Employment Since High School

	Count	% sample (n=25)
Health Sciences (i.e., medical, nursing, or dental)	6	24.0
Project Exploration Paid Position in a Lab, in the Field, or as a Teaching Assistant	7	28.0
Technology or Computer-Related	2	8.0
Laboratory or Biological Sciences	8	32.0
Physical Sciences	3	12.0
Pharmacy	1	4.0
Home Health Care	1	4.0
Museum Docent or Museum Guide	11	44.0
Science Teaching or Science Teaching Assistant	1	4.0

For those who had not yet held a science-related job, 88% agreed that PE introduced them to STEM career options that they had not considered, and said they could obtain a science-related job, if they wanted one. The following are illustrative quotations of alumni responses.

> *Since participating in Project Exploration, I have attended and graduated from MIT. While there, I learned a lot about how to study science and become a scientist, even though I chose not to pursue science for my career. As such, I feel like I could have gotten a job in science if I wanted to.*
>
> *I can only see myself in a science field and could not be successful or happy in any other career.*
>
> *If I focused hard enough, and it was something I truly wanted, I think I could be successful and get a job in science. However, I am more passionate about other fields of study, but still value the role science plays in my interests.*
>
> *If I wanted to, I could major in science in college that would lead me into a career in science. It would probably take a while, but I know I could be a scientist.*

Many alumni reported that they were indeed pursuing science fields of study and science careers since leaving PE, and attributed their achievements and aspirations, in part, to their PE experience.

In my major, we study Environmental Science, so I feel comfortable addressing issues about the EPA and the environment because of my exposure to science in the PE program.

I am currently majoring in General Science, and I am planning to attend graduate school for a Master's degree in Environmental Engineering. I have already completed internships in the science field, and I am sure that I will have a career in science in the future.

I love science, and I am in school for nursing.

I am a doctoral student in science.

I currently am working on scientific projects; will continue to do so. I cannot see myself doing otherwise. I plan to obtain a permanent job in a scientific position.

I currently work at the planetarium in the education department. I learn about astronomy to share the information with the public, something I really enjoy.

I am currently in a post-baccalaureate program to pursue a career in science. I am confident that with hard work and determination, I will be able to pursue a career in science, specifically medicine.

I am currently a chemistry major and plan to be a chemist.

As described by alumni respondents, this study found that, with persistence in completing high school and with a strong motivation to pursue science or STEM-related fields of study in post-secondary education, STEM careers were either sparked or reinforced through the past participants' experience in the PE program and/or with PE staff. The following section discusses the ways that PE entered the lives of these alumni.

III. Motivations to Join Project Exploration

According to survey responses and interviews, PE alumni were motivated to be involved in Project Exploration for a variety of reasons: (a) they were already interested in science and thought that PE programs would provide additional opportunities not available in school; (b) they were interested in completing mandated community service hours for high school graduation or doing something productive during the summer; or (c) they were interested in adventure, especially travel.

A. PE provided additional opportunities in science not available in school.

Survey Question: Why did you FIRST get involved with Project Exploration?

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	*n*
I liked science and wanted to learn more science.	58.5% 48	29.3% 24	9.8% 8	2.4% 2		4.4	82
I wanted to learn how to become a scientist.	39.0% 32	22.0% 18	19.5% 16	17.1% 14	2.4% 2	3.8	82

The greatest number of survey respondents (59%) strongly agreed that they first got involved with Project Exploration because "I liked science and wanted to learn more science." This statement was the survey item with the highest average (4.4) of all the responses, indicating that this was one of the more important motivations for students to get involved with PE. During the interviews, alumni offered a variety of ways that Project Exploration provided additional opportunities outside of school, especially field work experience and exposure to new science disciplines such as paleontology, that enhanced their interest in and understanding of science, as illustrated by the following quotes from the interviews.

> *I was interested in being a paleontologist, but had no idea how to pursue it; there were very few opportunities for me to explore paleontology, and my school did not offer geology classes of any sort.*

> *It gave me a push to think more deeply about my interest in forensic science. I was always interested in how the bones we discovered got there and what led to the dinosaurs' death.*

> *Project Exploration offers a whole host of different programs that give young students the opportunity to open up to the world of science, especially areas of science not immediately or strongly taught in elementary and high schools.*

> *I thought it would be a wonderful opportunity to learn about a topic in science that I knew very little about.*

> *They were talking about paleontology, earth and environmental sciences. Those weren't really things that I took in high school, so a lot of the stuff I learned about that did come from PE, so maybe what they were teaching us was probably different from just your normal science high school science experience.*

> *One of the ways I found out about PE was my mom, because she looks for summer programs for me to do, and I guess I had started my freshmen or sophomore year. I was interested in studying biology and paleontology so my mom looked up this program, Dinosaur Giants within PE, that has a paleontology theme. So, it was a good fit for me and that's why I decided to join the program.*

In addition, PE alumni also offered feedback as to how PE programs were different from other science opportunities that were available to them and that furthered their interest in science. These distinctions included a sustained focus on building "continuity" or relationships with participants, on enjoying hands-on experiences, on guiding youth, and on explicitly explaining or presenting science experiences, as illustrated by the following quotes:

> *I would say they differ from other outreach, inner-city and minority [programs] that I have been a part of in the sense that they really have this sense of continuity with their students … that they can bring the student back out even if it's not a full-fledged program. And they also do a good job at trying to contact people if they're losing touch with them. They'll make phone calls and send some e-mails so they can give them more of a sense of, like, you know, it's more than just one thing you did that one summer, it's something you continue to do.*
>
> *PE is kind of like a "go-getter" program, you know. They're going to make sure you're out there, and if you want to be involved, they're going to make sure you're involved in whatever it is, you know. You won't be ignored, you won't be left out. I think that's the main thing.*
>
> *They were really hands-on where most schools, most programs aren't hands-on. To me, Jameela and Kristin were really able to tell you, show you and tell you what you, give you all of the elements of what you're going to do. Because a lot of the stuff we were doing I've done in high school … I didn't get it in high school in my class, the whole school year I didn't get it, but when I did it with Jameela and Kristin, I got it right away; I understood it.*
>
> *To me [PE] was the best because I did a few [other] science camps and I didn't like them at all. It was boring… if you had a problem, you had to figure it out on your own. No one is trying to help out doing that whole situation. Eventually that was basically on their whole agenda, so PE was a lot better in my book.*

While the PE alumni described were already interested in science and thus motivated to join PE to learn more about science, a significant number of alumni joined PE for more practical reasons, as described in the next section.

B. PE helped students fulfill community service hours and do something productive during the summer.

PE alumni reported that PE programs provided opportunities to spend their time productively during the summer and afterschool to fulfill required community service hours, to help some of them "do better in science in school" (71% strongly agreed or agreed), and to "get into college" (68% strongly agreed or agreed). For example, survey respondents ranked the statement "I wanted something to do during the summer" as second highest (mean 4.3).

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I wanted something to do during the summer.	53.0% 44	34.9% 29	3.6% 3	6.0% 5	2.4% 2	4.3	83
I wanted something to do afterschool.	30.9% 25	35.8% 29	13.6% 11	14.8% 12	4.9% 4	3.7	81
I thought Project Exploration would help me do better at science in school.	37.3% 31	33.7% 28	13.3% 11	10.8% 9	4.8% 4	3.9	83
I thought it would help me get into college.	28.9% 24	38.6% 32	19.3% 16	12.0% 10	1.2% 1	3.8	83

In addition, open-ended survey responses and interview responses indicated that some students were attracted to Project Exploration's program, Dinosaur Giants, as a way to complete community service hours required for high school graduation. In some cases, teachers, parents, and peers motivated a number of students to apply for the program on this basis, as revealed in the quote below:

> *My science teacher in high school told me to do [Project Exploration] so I did. And she let us all know that it was part of our getting our community service volunteer hours so I thought, okay, well, I'll go ahead and do that because I'm going to have to go do that anyway. But as I did it, I got really interested in the work they were doing so I kept coming back.*

C. PE provided opportunities to students who sought adventure.

Many participants were highly attracted by the prospect of traveling to sites in the field. Although alumni reported that the required coursework was challenging, it was worthwhile to complete because, as "city kids," they felt curious and excited about traveling to Montana or Wyoming to search for fossils.

The following table and quotations illustrate the alumni responses and references to the lure of travel offered as part of the PE experience.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I wanted to travel.	43.2% 35	30.9% 25	9.9% 8	8.6% 7	7.4% 6	3.9	81

> *I first heard about Project Exploration when I was a sophomore in high school. My science teacher was talking about it, and she was like, "There's this program and they travel a lot and it just deals with science." And I know, me first coming into my new school, that I didn't really know anybody, and I was from the suburbs, [not] from the city, so I'm like, "Okay, this would be a great opportunity*

to get to know some more people." And plus traveling, I love traveling. So I decided to try out for the program. I talked with Gabe. I for some reason just knew I was going to get it and therefore I got it and was with Project Exploration ever since.

Project Exploration gave me the chance to do things I would never do. I never thought in my life I would be cleaning up a 2 million year old fossil!

Traveling [to] places and experiencing new things always excites me.

It was fun! I didn't really like science too much before, mainly because it wasn't my strongest subject in school. I loved learning new things and the different experiences in the classrooms and the field kept me interested. Plus, not many people get to say that they have gone digging for fossils in the west!

Interestingly, the least influential motivation for joining PE was "My friends were doing it" with a mean of 2.7 and the largest number of students slightly or strongly disagreeing with that statement (51.9%).

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
My friends were doing it.	12.3% 10	17.3% 14	18.5% 15	34.6% 28	17.3% 14	2.7	81

This suggests that PE participants do not necessarily participate in PE programs with their social group of friends and, though interviewees did not report being ostracized by their friends, some of them noted that their friends "did not understand" the program. This finding, in combination with the following alumni quotations, suggests that though PE participants may not have found support for their involvement from their social group of friends, they found important sources of support and friendship *within* the PE community; this will be discussed in more detail in the section on program outcomes.

You know I think even as I got a little older, going to high school, I sort of lost some interest in science, you know, probably because I was more of a liberal arts type of person. The reason I kept going back was the people. I really did enjoy the people I met. I became friends with a lot of these people and really the only opportunity I had to see them were at PE events.

I think the most important thing I will take away from PE is I met my best friend. We've been like glue ever since and I think that will be the thing I take away from PE over all.

I didn't expect to make so many friends. Like to this day I'm still talking to almost everyone who I had the [Montana] trip with. And we had that trip like five years ago.

To explore reasons why youth may not have continued their participation in PE, survey respondents were asked the following question:

Survey Question: If you chose not to continue in Project Exploration, what were the main reasons why you did not participate? (Check ALL that apply.)

Item	Count	% of sample (n=37)
I had to work.	15	40.5%
I had family obligations.	8	21.6%
I preferred to do other activities instead.	7	18.9%
I found out about them too late to attend.	6	16.2%
I was planning to attend, but forgot.	6	16.2%
It was hard to get to the event.	5	13.5%
Attended college.	5	13.5%
I did not know about other opportunities I could pursue with Project Exploration when I was still in the target age group.	5	13.5%
I did not have money for transportation.	4	10.8%
I moved from Chicago.	2	2.7%
I decided to go to another summer program in another field to have a different experience and to explore more options.	1	2.7%
I did it for service learning hours and I had enough so I didn't need to attend.	1	2.7%
I didn't know anyone there.	1	2.7%
I had other science activities I was involved in and conflict scheduling.	1	2.7%
I wasn't interested enough in science to want to continue.	1	2.7%
I don't remember.	1	2.7%

In addition to the reasons offered above, respondents were also given the opportunity to provide an open-ended response to this question. Based on the survey responses and open-ended responses, youth participants chose not to continue their involvement with PE for a variety of reasons, including the fact that they needed to work or earn money (15), or had other family obligations (8). Seven participants responded that they preferred to participate in other programs or activities. Other youth reported moving from Chicago (2) or attending college (5) and thus no longer being eligible for PE programming. All of these reasons not to participate further in PE programming reflect either personal preferences or choices that were beyond the control of the participants.

There were, however, several reasons that PE staff may be able to address as a means to continue and even increase youth participation. For example, five participants observed that they were not aware that they were allowed to continue participation in other PE programs. Also, more advanced notice or invitations to PE events with follow-up reminders may be useful, as would additional support for transportation.

IV. Project Exploration provided a myriad of opportunities and practices that nurtured a community of practice to build participants' capacity for science and for future success.

Based on a review of the logic model, survey and interview questions were developed to assess PE program characteristics. The information gathered through the survey and interview questions was useful in determining whether PE practices were aligned with their goals and outcomes, and also to determine which practices were considered most often present and available to PE participants. Although PE does not frame its programming as promoting a community of practice, the youth-development-focused strategies described below that PE utilizes to engage underrepresented students in science exhibit important elements of community of practice and of learning and doing science in settings that are not limited to school or the science classroom (Lave & Wenger, 1991; Wenger, 1998, 2006). According to Wenger (2006), "communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly." Communities of practice share three characteristics: a domain of shared interest and inquiry, a community that nurtures relationships and helps members learn from each other, and members that share not only interests but practices. In short, PE creates a community of practice in which youth are welcomed and encouraged to learn and do science.

A. PE created a community of support, high expectations, and sense of "family" for its participants.

Survey findings and interviews provide strong evidence that Project Exploration staff created a culture that served as a "family" to many of the PE participants, a place where questions were answered and advice proffered, hard work was emphasized, and participants were encouraged to "be the best that you can be." This culture of high expectations and support came not only from staff but also from their peers.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I felt welcome.	75.0% 63	23.8% 20	1.2% 1	0% 0	0% 0	4.7	84
I felt part of a special community.	62.2% 51	30.5% 25	6.1% 5	1.2% 1	0% 0	4.5	82

Survey Question: During my time as a Project Exploration participant …

For example, PE alumni reported that they felt welcome (99% strongly agreed or agreed) and part of a special community (83% strongly agreed or agreed) during their time as a PE participant. Many of the interviewees also mentioned this aspect of the PE organizational practice, and told why this was special to them. For example:

I always loved science but everyone there really made it fun and interesting for me to learn it. They have all been so welcoming and just are such a great group of people that I would always want around. They are a GIANT extended family. I LOOOOOOOOOVE my Project Exploration family. Every issue I have ever put in front of PE has been solved and I feel at home.

[What I remember most about Project Explorations is] the warm community. Everyone was helping and just trying out no matter what. If I had a problem… you always have somebody there to help you out.

It's not so extreme with the kids where you won't be noticed. They get a personal relationship with you so that everyone knows your name and what you're doing. That's really what it is.

From my PE experience, I became really, really close with Julio and Kristin. They're an extremely big part of my life now. But just the whole idea of PE is like a big family. We really are just a big family; all of the kids know each other. We're all extremely close and everything.

With Project Exploration … they didn't regulate how many piercings you could have in your ears, or what color your hair had to be dyed. I felt like it was much more accepting of how you express yourself as long as you were also representing Project Exploration and behaving appropriately and wearing your team member shirt. I felt like there was much more room in the program to be who you are and to bring that forward as well as your enthusiasm for the science. So, I got, that was the impression that I got right away.

Mainly most of the smiles, keeping me moving, getting out of the house, enjoying my childhood, there was always something to do, someone to talk to. I got letters in the mail that said, "You rock" or something like that … I just wanted to see my family, they're my family. I just wanted to go back and see everyone, see how they're doing, get all their well-wishes and just talk to everybody.

B. In particular, PE nurtured youth relationships with adults who helped them with science, education, and other issues or challenges.

An important element of PE's success in reaching youths is the way the PE program staff prioritize the students' positive and nurturing relationships with adults who care about the students' interests and academic success.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
Adults showed interest in my academic success.	64.6% 53	30.5% 25	4.9% 4	0% 0	0% 0	4.6	82
I was able to talk to adults about my interest in science.	59.0% 49	33.7% 28	4.8% 4	2.4% 2	0% 0	4.5	83
I was able to talk to adults about my personal interests.	56.6% 47	37.3% 31	4.8% 4	1.2% 1	0% 0	4.5	83
I could go to an adult if I had a problem.	59.0% 49	34.9% 29	4.8% 4	0% 0	1.2% 1	4.5	83

For example, 95% of survey respondents strongly agreed or agreed that "adults showed interest in my academic success," and 93% of respondents strongly agreed or agreed that they were "able to talk to adults about my interest in science." Consistent with a youth development framework, 93% of survey respondents also strongly agreed or agreed that they were "able to talk to adults about my personal interests" even if they were not related specifically to science. For example, in the interviews, PE alumni reported how PE staff and other adults provided transportation to participants, stayed late to help youth participants, provided assistance with college coursework selection and resumes, and, overall, offered assistance and attention to help participants thrive not only in the PE programs but "in life in general."

> *They say it's the science, but I think they have an amazing staff. I really do. It would be a different story if the staff wasn't as amazing as they are, because they're really, really good people.*
>
> *Project Exploration has such a committed staff and personnel who work diligently and with such charisma and personality that it lures you to stay and see what else this awesome organization has to offer. They work with you regardless of your science background or knowledge and build up where you may lack.*
>
> *All the staff members are so supportive in being there for the participants and listening to underlining issues that cause barriers for children living within low-income and crime-infested communities today. Thank you, PE.*
>
> *Project Exploration has such a committed staff and personnel who work past office hours to ensure their students and participants are receiving the assistance and attention they need to be prosperous not only in the programs but in life in general. They are such wonderful individuals, each and every one who works on this elite staff are special and execute amazing work. I'm just eternally grateful for being a part of this species.*
>
> *They were really helpful, like my family.*
>
> *I knew that Gabe and Paul were there to talk to when I got to college about what classes I should be taking.*

Not really being a person at first that loved science, but after joining the Project Exploration scene, I grew to love science and having them to tell that if I don't get something or if I need help with any of my work, just come to the office and they'll sit down and help you with that. That's kind of something that a lot of students need and look for from a person, if they can go to and get the help that they need without having to feel uncomfortable.

Like even until this day, if I'm having problems with a resume or I need help with something or need a reference … I can always call them and someone is there to help.

C. PE provided opportunities for youth to meet and work with scientists.

As another strategy to provide support for youth participants, PE explicitly connected its participants with working scientists to increase understanding of the pathways to become scientists and to expand understanding of the work of practicing scientists.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I got to know some scientists.	56.6% 47	37.3% 31	4.8% 4	1.2% 1	0% 0	4.5	83

Ninety-four percent of survey respondents strongly agreed or agreed that they "got to know some scientists" through their participation in Project Exploration. PE alumni explained in interviews what value they found through that relationship and experience:

I'm getting connected to people and just having all these connections through Project Exploration with like Paul and his groups, and what he does were really important to me.

I think that PE definitely did make me feel more able to be a scientist, so having to participate in it, I was more confident in my ability to do science and such, and … it kind of jump started me to want to do science because I'd never really thought about doing it for a living. I guess before PE I'd never really been exposed to it at a university type setting where people were there studying things they'd want to do their whole life, and I'd never really interacted with scientific professionals very much.

One thing that Project Exploration did for me besides what I've already talked about is there were certain events that allowed me to talk with scientists and paleontologists, and it was great to be able to see what they worked on and sort of understand what exactly a scientist does. And then, I think that positively influenced me [and] solidified more of what I wanted to do with my own life.

If I wanted to get a job in science I feel I could get one because I have the resources and connections to people who have a career in science. I can ask for help if I also wanted to get involved.

And a number of times I remember sort of, whenever Project Exploration brought a paleontologist around, or when Paul Sereno was around and he talked about his materials, it was great to be able to see sort of what they were working on and how professional they took their own jobs, and it was always interesting to learn about the biological and scientific and very technical aspects of their work. And it was very impressive. So that, those events really encouraged me to take a stronger look at science.

D. PE provided youth with opportunities to meet and work with peers who had similar interests in science.

The youth participants who attended PE programs found it rewarding to be able to meet fellow youths who shared their interests in science.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I was able to talk to other young people about my personal interests.	63.4% 52	34.1% 28	2.4% 2	0% 0	0% 0	4.6	82
I was able to talk to other young people about my interest in science.	55.4% 46	41.0% 34	1.2% 1	2.4% 2	0% 0	4.5	83
I met other young people interested in science.	67.5% 56	27.7% 23	4.8% 4	0% 0	0% 0	4.6	83
I had a chance to hang out with people I liked.	61.4% 51	37.3% 31	1.2% 1	0% 0	0% 0	4.6	83

More than 90% of survey respondents reported that through PE they were able to talk to their peers about shared personal and science-related interests and they were able to mingle with people they liked.

It was nice to meet people and your own values are sort of reinforced. To meet people who wanted to achieve more than what they were doing. I mean I approached a guy who helped in grammar school, where you know the answer was, "Do what comes along, don't do more, don't overachieve as much as you should, or you know, don't take as much interest in academics as much as you can." But everyone who was involved with PE wanted to do more than what was asked of them. So, that sort of helped me sort of say, "No, there are other people out there who want to do more than what is asked of them," and you shouldn't feel uncomfortable because of that, feel like you're an overachiever or you're trying to show off.

E. PE provided opportunities for youth to learn science in ways that were different than in school.

For underrepresented youth who do not necessarily connect with or become passionate about science in school, PE offered an important opportunity to engage with the subject in interesting and meaningful ways. Almost 95% of survey respondents reported that they learned science in ways that was different from school.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I did things with science that I did not do in school.	68.7% 57	25.3% 21	2.4% 2	3.6% 3	0% 0	4.6	83
I learned science in a different way than in school.	69.9% 58	27.7% 23	2.4% 2	0% 0	0% 0	4.7	83

In school there weren't many [science activities]—I went to a charter school, so we had really low budgets. A lot of it was textbooks and videos. We'd just be watching videos and stuff like that. What I liked about Project Exploration was that it was hands-on stuff that we were doing that really helped with grasping the ideas and stuff like that in science.

That was pretty eye-opening for me because I'd never really thought of it. I never really thought of the climate in such an integrated way because I'd made science—scientific experiments where you set up to study one thing at a time. The idea of jumping across many other things at once never really came up. That was a pretty vivid memory.

They made it interesting to want to learn and want to become involved. It wasn't just sitting in a classroom and someone is talking to you about science and using terminology that you don't understand … They broke it down to where you will understand it and you'll learn something from it.

Being on the field and the lab. They took us to the lab and let us work in the lab, too. It wasn't just sitting in the classroom answering a bunch of questions. "Did you read your science book?" "Yes, I did." That's what usually happens in school.

F. Project Exploration provided opportunities for youth to ask questions about their interests and to explore new educational and career options.

One of the advantages of a program like PE is that the adults and youth are able to talk about issues that they may not have an opportunity to explore in their typical school science classroom. These issues may relate to science as a discipline, or other educational and career options available to youth.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I was able to ask questions about my interests.	68.7% 57	24.1% 20	6.0% 5	1.2% 1	0% 0	4.6	83
I got a new perspective on my options in life.	53.0% 44	39.8% 33	6.0% 5	1.2% 1	0% 0	4.4	83

Over 92% percent of survey respondents agreed or strongly agreed that they were able to ask questions about their interests, and they received new perspectives about their options in education, work, and life during their participation in PE programming.

> *Gabe and Paul will tell you that they majored in something else and they got here to this life, this exploration life … doing so many different things. So that inspired me to say, "Okay, no matter what I choose, I don't have to set myself to one set if I don't like it … and I can choose something else and be happy with it and do what I love."*
>
> *Project Exploration offered me the opportunity to look into other things. I figured I could learn a little bit more about chemistry, biology, and even other things I didn't necessarily consider science at the time.*
>
> *I think the program was pretty influential because it really gave me a greater appreciation for maybe teaching. And I think that's something that I'm still considering maybe I want to go into… It has definitely encouraged me to pursue a career in science.*

G. PE provided opportunities for participants to design or lead activities.

Leading or designing activities was the program characteristic that was ranked the lowest (mean 3.6) by survey respondents, indicating that they experienced it the least often during their involvement in PE. Just over half (57%) agreed or strongly agreed that they had the opportunity to lead or design PE program activities. This suggests that this program characteristic was less present for some PE participants, for a variety of reasons that could be explored and discussed as one possible way to improve PE programming and communication to participants, given that some people had expressed an interest in such opportunities.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
I helped lead or design the program.	27.7% 23	28.9% 24	24.1% 20	15.7% 13	3.6% 3	3.6	83

For example, one interviewee described how she had suggested that PE participants be able to return to PE programs as peer or team leaders, and many of the interviewees described how they had been involved in such roles. Former participants also reported serving as keynote speakers, board members, and even PE program staff members, and all stated that these service experiences were positive and valuable.

> *I was in All Girls Expedition one year and then the second year I was in it again, but I was a team leader … The team leader's usually the person who motivates all of the people in the group because you have to think about it if we were going one week in a classroom and then another week in a whole other state far away from home. The person that's usually the team leader helps Jameela and all them make sure that no one's getting homesick and everything.*

> *Yeah, I've taught at school science programs. I've been a keynote speaker at… Girls' Health and Science Day probably twice. I was a keynote speaker for Dinner with the Dinosaurs this year, as well as two other years.*

Overall, PE created a community of practice in which youth are welcomed and encouraged to learn and do science. This community of practice present in their PE experiences was a powerful support for participants. For example, PE nurtured very personal relationships and a community among peers and adults who both value education and science; gave youth hands-on opportunities to practice science research; and introduced students to science experts and mentors who help them envision and gain advice for their futures in science, including educational and career options. The following section describes in more detail the outcomes reported by PE alumni that built their capacity for science and youth development and prepared them to participate in a community of practice among both science learners and practitioners.

V. Project Exploration expanded participants' capacity for science in a wide variety of ways that are important in preparing youth to participate in a larger scientific community and in life.

A. Building Youth Capacity for Science

PE alumni reported that their participation in the program enhanced their capacity for science in many important ways, as illustrated by the survey and interview findings below. For example, 98% of survey respondents agreed or strongly agreed that Project Exploration helped them to increase their understanding of "how science is a way to understand the world" (mean 4.6), and 95% agreed or strongly agreed that PE increased their understanding of "how scientists approach investigations in addressing problems" (mean 4.5). In addition, PE alumni reported learning various skills specific to scientific thinking, including learning "how to tell the difference between evidence and opinion" (85% strongly agreed or agreed), "how to use evidence when making an argument" (86% strongly agreed or agreed), and "how to ask scientific questions" (90% strongly agreed or agreed).

Survey Question: I believe Project Exploration helped me to …

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
Increase my understanding of how science is a way to understand the world.	59.3% 48	38.3% 31	2.5% 2	0% 0	0% 0	4.6	81
Increase my understanding of how scientists approach investigations in addressing problems.	59.3% 48	35.8% 29	2.5% 2	2.5% 2	0% 0	4.5	81
Learn how to tell the difference between evidence and opinion.	57.0% 45	27.8% 22	11.4% 9	3.8% 3	0% 0	4.4	79
Learn how to use evidence when making an argument.	56.3% 45	30.0% 24	8.8% 7	5.0% 4	0% 0	4.4	80
Learn how to ask scientific questions.	50.6% 41	39.5% 32	3.7% 3	6.2% 5	0% 0	4.3	81

In addition, according to interviews, PE helped participants to build their understanding of and capacity for learning and doing science:

- Thinking scientifically, even in situations that are not about science:
  I learned to look for certain things, to find out the flaws in things. With PE a lot of situations was always, truthfully, we had to go and figure out like the what-if and the doubt of reason, basically. I learned how to question everything and with my question, always have at least two or three different reasons to back up my reasoning.

- Understanding the day-to-day work of real scientists:
  I think one good aspect of the program, that I'm not sure how frequent it is or how prevalent it is in the other programs, is that bringing on actual scientists or people who are going to be scientists is very helpful, I think, for students to see what scientists do. I guess in just a regular day-to-day thing. People don't really know what a scientist does day-to-day. There's just sort of this whole idea of this guy in a lab coat and he goes into his office and he comes out and invents something new. And I think it's really important for students to understand the process of what scientists have to go through in order to sort of come up with their discoveries and stuff like that. I just think it's really helpful for students to really understand that, sort of the hard work that they put into their jobs.

- Understanding the myriad ways to become a scientist:
  Hearing scientists talk about their experiences, you know, their backgrounds, their previous school, their previous ideas on what they wanted to do and what they're doing now. Like, for example, Paul would say, "I barely finished high school, I went to college to be an art major, and now I'm a well-known paleontologist". I was just, it changed my mind that you don't have to be a straight-A student, you didn't have to always be into scientists, be into science and do well in all your classes to go on and to be a scientist.

- <u>Changing preconceived ideas of what science is and what scientists do:</u>
  My perception of science was always chemistry and biology. Let's say, a lab or you have to be in a lab to do this. The fact that you're actually out in a field doing research probably changed my perception, "No, a lot of the work that is being done in science isn't done in, you know, a lab with test tubes." It's actually out there, you know, out about there, in terms of the land and surveying it and going out and finding things that are important.

In addition to changing participants' understanding of science and development of science skills as described above, PE alumni reported that PE helped to spark their interest in and curiosity about science in a variety of ways:

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
Spark my sense of curiosity about science.	63.0% 51	29.6% 24	6.2% 5	1.2% 1	0% 0	4.5	81
Increase my interest in science outside of school.	56.8% 46	37.0% 30	4.9% 4	1.2% 1	0% 0	4.5	81
Increase my interest in science in school.	55.6% 45	33.3% 27	8.6% 7	1.2% 1	1.2% 1	4.4	81
Motivate me to find other science-related opportunities.	51.3% 41	32.5% 26	11.3% 9	5.0% 4	0% 0	4.3	80
Increase my interest in school overall.	43.2% 35	29.6% 24	23.5% 19	3.7% 3	0% 0	4.1	81

- <u>Keeping an "open mind" when it comes to science:</u>
  Paul Sereno was talking to us about the importance of keeping an open mind when you're studying science. I remember him talking about paleontology or something and he was talking about how that could relate to a lot of other sciences, because you could study basically the fossil record, how species change evolves over time—that's related to biology and genetics for example. You can study the rock structures and how the land formations change over time, how that could affect the environment. That was various things like climatology—and just various other sciences that could be affected, could be enhanced by studying something else. You might go in thinking, "Okay, I'm going to find a fossil of this, this, and this species." And then you find that it's not what's there—the type of rocks that you're looking for isn't there. And then that could mean that the environment was so much different back in the day … That was pretty eye-opening for me because I'd never really thought of it. I never really thought of the climate in such an integrated way because I'd made science—scientific experiments where you set up to study one thing at a time. The idea of jumping across many other things at once never really came up. That was a pretty vivid memory.

[Project Exploration] has solidified my decision to pursue a career in the sciences and has exposed me to many successful scientists who are passionate about their jobs. This has been a great encouragement to me, and I am sure has been an encouragement to many other young students interested in science.

I remember thinking that I wanted to try different sciences hands-on and I remember being given some kind of rock type thing and you had to etch out what you thought the fish bones were and that was kind of neat. I also remember going to this kind of laboratory type set up and using a pipette, I believe. It was like a DNA experimentation type of scenario, I don't really remember, but that was kind of neat. I got to do a lot of different number of hands-on things. It met my expectations and I was kind of impressed actually.

I ended up studying geology as an undergrad so that was a direct influence from my time with Project Exploration. Other than that, there were a lot of opportunities for public speaking with your group or sharing out writing research pieces, learning how to do and put together projects like the data, results, and presentation.

- <u>Being exposed to new science disciplines:</u>
  I remember that I had always been interested in science … I'd been doing science fairs in my elementary school every year since kindergarten. So I'm pretty good at those, like in having won a lot of awards, so I figured I should be more exposed to other areas of physics or science, because I knew a lot about physics, electricity and magnetism … Project Exploration offered me the opportunity to look into other things. I figured I could learn a little bit more about chemistry, biology, and even other things I didn't necessarily consider sciences at the time.

PE alumni reported a variety of ways in which their scientific capacity was fostered. For example, they were able to envision themselves as and feel confident in becoming scientists; to understand how scientists approach investigations; to learn how to ask questions and to think scientifically (generating questions and using evidence to back up ideas); to observe or to participate in the day-to-day work of scientists; to understand the trajectory of becoming a scientist; to spark their curiosity about science; to increase their interest in science both in school and out of school; to learn and practice science process skills (asking questions, collecting data, presenting data); to learn new science disciplines not offered in school (such as geology and paleontology); to use the tools of scientists (instruments, lab equipment, etc.); to further their understanding of the nature of science from a fixed body of knowledge to an evolving set of questions and debates; to develop a science identity and to understand how science is a way to understand the world; and to learn science-related career and educational options that they had not considered.

However, other important PE outcomes were also significant to the development of PE alumni who are successful in science and in life, and these are described in the following section.

B. Nurturing Youth Development Outcomes for Science and for Life

Survey and interview responses indicate that PE alumni left the program with significant gains in youth development outcomes that would support their success in life, regardless of whether or not they went on to study or work in science. For example, outcomes included increased self-confidence and more positive feelings about their future; improved verbal and written communication skills, especially in terms of public speaking to groups and individuals; skills in networking, working as part of a team, and having and serving as a mentor; and enhanced leadership skills development and desire to seek out leadership opportunities. These are important skills and attitudes that will serve these students well no matter what career path they choose, and they are consistent with the "soft skills" currently being encouraged by employers of scientists and engineers (Bancino & Zevalkink, 2007; Kumar & Hsiao, 2007).

- Building self-confidence and hope for the future.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
Increase my self-confidence.	63.0% 51	28.4% 23	3.7% 3	4.9% 4	0% 0	4.5	81
Feel better about my future.	63.0% 51	25.9% 21	9.9% 8	1.2% 1	0% 0	4.5	81
Feel I could do things I never thought I could do before.	59.3% 48	33.3% 27	4.9% 4	2.5% 2	0% 0	4.5	81
Feel special and important.	58.0% 47	32.1% 26	4.9% 4	4.9% 4	0% 0	4.4	81
Feel I have more control over what happens in my life.	50.6% 41	29.6% 24	14.8% 12	4.9% 4	0% 0	4.3	81
Learn how to plan ahead.	45.7% 37	43.2% 35	8.6% 7	2.5% 2	0% 0	4.3	81
Learn how to solve problems.	49.4% 40	34.6% 28	11.1% 9	4.9% 4	0% 0	4.3	81

A lot of the people/scientist/teachers I met were very down to earth, and I felt I could relate to them. I was able to hear that they were not straight A students in high school and they did not know what they wanted to do, but in time they figured it out and did it. They did what they wanted to do, no matter what people said or thought, and they made it so I believe I can too.

Yeah, that's really where Project Exploration has helped me to explore my life and bring me out of my shell and say, "I'm me and it doesn't matter if you like me or if you don't." I'm just going to still be me. So, Project Exploration has really helped me bring me out of my shell on that end.

To be comfortable with who you are, because I'm an artist … that's what I do is art, and … so being with PE and it being about science, they never stopped caring

about me. They even sent opportunities my way that didn't even involve science at all. That's probably the thing I'm most grateful for.

Gabe and Paul will tell you that they majored in something else and they got here to this life, this exploration life, and you know doing so many different things. So that inspired me to say, "Ok, no matter what I choose I don't have to set myself to one set if I don't like it … and I can choose something else and be happy with it and do what I love."

From being so shy all the time, I actually have the courage to speak and be loud.

- Strengthening verbal and written communication and listening skills

Participation in PE programs improved participants' verbal and written communication skills, especially in terms of public speaking to groups and individuals. For example, 96% of PE alumni strongly agreed or agreed that they developed verbal communication skills through their participation in PE programs, and over 80% reported developing their written communication and listening skills.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
Develop verbal communication skills.	63.8% 51	32.5% 26	1.3% 1	2.5% 2	0% 0	4.6	80
Develop written communication skills.	53.8% 43	30.0% 24	10.0% 8	6.3% 5	0% 0	4.3	80
Learn how to listen to people even if I disagreed with them.	49.4% 40	35.8% 29	12.3% 10	2.5% 2	0% 0	4.3	81

These skills are important not only in science professions, enabling practitioners to participate in and contribute to scientific discourse, but such skills are entirely transferrable and useful in other professions and personal lives as well, as evidenced by the following statements from the survey and interviews:

Before PE, I was extremely shy; however, after my first year I developed public speaking skills, writing skills, and I expanded my science knowledge.

It has helped me to better understand most situations in life and has influenced me when I speak to people in groups or during discussions. I think of PE every time I see the Field Museum.

I was kind of a little shy at first … I really didn't talk so much, but it opened me up some more and it gave me more than I'd expected.

Now that I look back it's kind of good because I didn't see myself as a good speaker to begin with, but they definitely helped me to get to a level where I'm

okay to go out and talk to people and I'm not so embarrassed compared to other people I see who wouldn't be able to do it, you know?

In PE, it forced me to talk to different people and learn how to express myself better. At first I was kind of sort of shy, and now I can usually talk to more kids. Now it's easier for me to go out and find a job or go up in front of a big crowd and talk to different people.

- Nurturing teamwork and leadership skills

In addition to written and verbal communication skills, PE alumni reported developing skills that helped them work as part of a team, get along better with others, and develop leadership skills. For example, 97.5% of survey respondents reported that they learned "how to work as part of a team" and 91.3% reported that they developed "leadership skill" as a result of their participation in PE.

Item	Strongly Agree (5)	Agree (4)	Not Sure (3)	Slightly Disagree (2)	Strongly Disagree (1)	Avg.	n
Get along better with people my age.	50.6% 41	33.3% 27	13.6% 11	2.5% 2	0% 0	4.3	81
Learn how to work as part of a team.	64.2% 52	33.3% 27	1.2% 1	1.2% 1	0% 0	4.6	81
Develop leadership skills.	61.3% 49	30.0% 24	5.0% 4	3.8% 3	0% 0	4.5	80
Motivate me to seek leadership opportunities in Project Exploration.	45.7% 37	22.2% 18	19.8% 16	12.3% 10	0% 0	4.0	81
Motivate me to seek leadership opportunities outside of Project Exploration.	54.3% 44	28.4% 23	9.9% 8	7.4% 6	0% 0	4.3	81

I mean these are people that you can end up still talking to five, ten years from now. I know there are two individuals who I still talk to from PE. So, it's nice to know that you can use the resources that they have for you, and not lose sight that it's also [an] opportunity for you to meet new people from all over the city of Chicago who have different experiences from you.

Knowing how to interact with a bunch of different people, it's just something I gathered from PE because I'm not the most sympathetic or empathetic person and dealing with a bunch of people around you or living with someone you don't know for a week, you have to learn to get along with people. That'll be something that I definitely take to college.

Through the Dinosaur Giants program, you learn to be a lot more able to communicate with people. In my own experience, you get a better ability to articulate what you mean or what you're trying to get across to another person.

You've got to work together when you're in these programs. You work together and you grow together.

I wasn't really much of a leader kind of person and from PE, I was able to learn to be more of a leader, and now because of what I've learned from my second year of going to Yellowstone, it helped me get a promotion at my other job.

- Preparing youth for the work world

Right now, I'm in a sales position, and I have to network with people. So my livelihood, how I earn income, depends on how well I talk to complete strangers. And my first experience was with PE you know freshman year of high school. So, I've always, after doing that for two, three years, the concept of talking to someone about whatever I'm selling them isn't that difficult because I know how to talk to someone I haven't met before.

As my first real job was with PE, I would say Project Exploration also helped me shape my work ethic in a job environment, taught me how to prioritize and multi-task, taught me how to think independently while also following instructions from a supervisor, and taught me how to teach—both science and life lessons.

- Being mentored and mentoring others

In addition, some PE alumni learned the value of not only having a mentor, but also being a mentor to others, as illustrated in the following quotations:

Just to keep providing kids with such positive and admirable role models, it's vital for children and teens to have mentors that know how to guide them. I learned a lot about science through PE but I also learned how much I want to be able to helps kids down the road.

I'm always trying to get people to push their boundaries now and try new things that they're not necessarily comfortable with, because you don't really know who you are until you step out and try something that you don't really understand.

Overall, PE alumni reported feeling greater confidence and independence in pursuing their passion and future goals, as illustrated in the following quotations:

I have become more brave and independent. I have learned to speak my mind and have confidence.

Giving me that experience of digging out in the field showed me that, yes, this is something that I want to do; not just a dream, it's something that I want to do, it's something that I can do, and it's something that there are paths for me to achieve.

Also, they taught you how to be more focused … You have to be willing and want something and go after it. And don't do something because you have to, but do it because you love it and you're passionate about it.

It gave me more confidence. It made me feel like I have confidence to go out to do whatever I set my mind out to do and I always knew that I would be part of something that deals with science, but being part of Project Exploration just gave me that drive even more so to pursue that career path.

[Project Exploration experiences] never push you to a science career. They don't say, "You should major in science," they never say that. They let you make your own choices, and they root for you no matter what.

Project Exploration is all about exploring and learning new things. And take that as real life. Don't just settle for the norm or what you think you should do because that's what everyone else does, just go out on your own and just keep exploring.

I would say just try everything. If there are snail guts on the menu in Montana, and you're scared, try it because we went out there and they had us try oysters. No one told us what they were, but we tried them, we liked them, and then we found out what they were. That's kind of been the whole experience, is just try stuff. It's not about whether or not you're comfortable or whether or not you're laughing or not, it's about testing your boundaries and finding out who you are, so you just have to just be open and just have fun.

VI. Trajectories of Project Exploration Alumni

In addition to gathering feedback through surveys and interviews of how PE supported specific skills or knowledge, it became clear from the interviews that PE offered a variety of experiences and nurtured different types of development in different students, depending on what they brought to the program and what they needed to develop. Stories of how youth moved through the PE programs and community illustrate the various trajectories of their experiences and the manifold ways in which the programs support youth interest in learning and doing science.

A. Hooking uninterested students into science: Robert*

Robert first became involved in Project Exploration in 2002 during his first year of high school. He was already familiar with Project Exploration, as his brother had formerly participated in Project Exploration's pilot program. At the urging of his science teacher, Robert initially joined Project Exploration to fulfill hours for his high school community service graduation requirement. Although Robert had little interest in science before participating in PE,

* Youth names are pseudonyms.

the work at Project Exploration was so engaging that he went beyond the required hours. He went on to become involved with a variety of PE programs, including three fossil digs during high school and several opportunities to work as an intern in a paleontology lab, along the way logging over five times the number of required hours of community service.

Work with Project Exploration differed greatly from the science opportunities at Robert's charter school, he said. Robert described the differences between the two programs this way:

> *In school there weren't many [science activities]—I went to a charter school so we had really low budgets. A lot of it was textbooks and videos. We'd just be watching videos and stuff like that. What I liked about Project Exploration was that it was hands-on stuff that we were doing that really helped with grasping the ideas and stuff like that in science.*

Robert especially liked "anything that dealt with fossils directly, being in the field … looking for bones and whatnot." He learned useful science and research skills that helped him while studying anthropology and geology in college. At the paleontology lab at his university—where he worked for two years—he was able to help improve the "outdated" tools and "help them out with the tools that are being used at the bigger, better labs."

In addition to the practical, hands-on science research experience, Robert was put outside of his comfort zone when he had to speak about his work in front of hundreds of people at various PE events. Although speaking in public was intimidating at first, the experience gave him the confidence to do presentations during college and to develop his "people and personal skills."

When asked how Project Exploration might have influenced his perspectives on himself and his future, Robert reported:

> *I was borderline not knowing where I wanted to go and what career path [to take]. Being Hispanic and a minority in Chicago, usually most of the time minorities and Hispanics like that go into literature and the arts and social sciences and stuff like that, and not many of them go into the hard sciences. That was eye-opening for me because I didn't know it was a path I can take.*

Project Exploration gave Robert the confidence and guidance to choose science as a career path. As Robert considers his graduate school options, he continues to be involved in the Project Exploration network and attends events in Chicago whenever he is able. Robert believes in the power of PE so much that he even has a tattoo of the Project Exploration logo!

B. Building confidence and nurturing friendships to achieve: Lucy

Participating in Project Exploration was a challenge for Lucy. When asked why she joined Project Exploration, she writes, "My mom was really trying to get me out of the house … I wasn't really a normal kid. I loved science and stuff but I stayed in the house. But the whole

summer she made sure [that I got out of the house]." Lucy says that Project Exploration's "family-like" atmosphere was one of the main reasons that she got involved and stayed with the program. Project Exploration staff supported Lucy through all of her new experiences, which could sometimes be intimidating. In talking about her first dig experience in Montana, Lucy says that "it was more than I expected … I was kind of a little shy at first. As I said I was just basically into science and I really didn't talk so much, but it opened me up some more and it gave me more than I'd expected."

Back in Chicago, the support from Project Exploration staff continued. Lucy says that they were "really helpful, like my family. If I needed a ride to go home and my mom couldn't pick me up that evening they would drop me off and I lived all the way on the West Side. It was really cool, they made sure I got home and everything." The impact of the Project Exploration staff was so great that Lucy still travels to many of their events, even though she now lives 12 hours away from Chicago.

As an excellent student interested in science, Lucy had many options for afterschool and mentorship programs. But she found Project Exploration different from the other college prep programs in which she had participated. She calls Project Exploration a "go-getter" program, where students were encouraged to get highly involved and really connect with the other participants. Project Exploration "made sure that you [the participants] are out there, and if you want to be involve they're going to make sure you're involved in whatever it is … you won't be ignored, you won't be left out." For a shy teenager like Lucy, this personal connection really made a difference in her success in the program.

In addition, Project Exploration showed Lucy that she and her peers had options in what they wanted to study in college and graduate school. Lucy has kept in touch with the program leaders, who have inspired her to say that "okay, no matter what I chose I don't have to set myself to one set if I don't like it and I can choose something else and be happy with it and do what I love." Lucy is on track to attend graduate school and intends to apply the adventurous spirit that she gained through Project Exploration to her future studies.

C. Keeping an open mind in science and in life: Simon

Simon was one of the first participants in Project Exploration, and worked with the program in Summer Science in 2001. An avid science learner, Simon was well versed in physics but wanted to learn more about biology, chemistry, and other scientific disciplines. Simon didn't know what to expect from PE, but was impressed by the hands-on opportunities.

Although his experience with Project Exploration was many years ago, Simon still remembered being encouraged to keep "an open mind" when exploring science. One of the things that stood out in Simon's mind was studying how the environment affected geological formations millions of years ago:

> *Paul Sereno was talking to us about the importance of keeping an open mind when you're studying science. I remember him talking about paleontology and he*

was talking about how that could relate to a lot of other sciences, because you could study basically the fossil record, how species change evolves over time—that's related to biology and genetics, for example. You can study the rock structures and how the land formations change over time, how that could affect the environment. That was various things like climatology—and just various other sciences that could be affected, could be enhanced by studying something else … That was pretty eye-opening for me because I'd never really thought of it. I never really thought of the climate in such an integrated way because I'd made scientific experiments where you set up to study one thing at a time. The idea of jumping across many other things at once never really came up.

Simon took a different path than many of his Project Exploration colleagues, though his experiences with Project Exploration stayed with him. He reported, "PE to some degree cemented my interest in science so after Project Exploration, I planned on doing science after high school." He took AP science courses in high school and eventually went on to MIT, though he chose to eventually go into management consulting. Simon considered his Project Exploration experience to be the first time he realized that he could be involved in the sciences:

I think that PE definitely did make me feel more able to be a scientist so having to participate in it, I was more confident in my ability to do science and such … it kind of jump-started me to want to do science because I'd never really thought about doing it for a living. I guess before PE, I'd never really been exposed to it at a university setting where people were there studying things they'd want to do their whole life. I'd never really interacted with scientific professionals very much. When I met them I'd think, oh okay, maybe I can do this and can join their ranks and so on. So that kind of put that idea into my mind. I don't know how, without that type of exposure, I'd have been drawn toward the AP sciences in high school and MIT in the long run.

Project Exploration has changed a lot since Simon participated in 2001, but he explained how he still would encourage students in Project Exploration to keep an open mind about all of the different options in science and in life:

I'd probably just say to keep an open mind. You're probably going to find out about things that you didn't even know existed. And some of these things are going to be more interesting than others, some of them are even going to be more boring than others. But you should always give it a shot, see if you like it, and do some more research to see if it's interesting. If you do find it interesting, then don't be afraid to try your hand at it. By trying your hand at it, I don't mean just hands-on experiments, but studying it in school.

D. Unlocking the path for students in science: Tina

Tina started with Project Exploration in 1999 as a participant in Run for the Bones, where she helped stuff envelopes and fund-raise, and then again in 2000 as part of the Dinosaur Giants

program. As a student in the Chicago Public School system, Tina was unable to find science courses that would help her pursue her academic interests. She was interested in paleontology and was encouraged to become involved with Project Exploration through a science teacher. Tina felt excited about participating in Project Exploration right from the beginning:

> *I wanted to get involved in ways that could help me pursue paleontology [and] because I was really concerned with getting into a good college and I wanted to make sure I was doing … many academic programs on the side because … part of getting into college for me was also making sure that I would get a lot of financial aid … but also, [Project Exploration] was perfect because it incorporates dinosaurs too so it was kind of like the perfect opportunity for me.*

She was struck with the sense that Project Exploration was a different kind of program when one of the lead instructors remembered her after only seeing her once. Tina explained how PE differed from other programs in which she had participated: "The material difference between the docent programs I had been in other than PE was that [the other programs] are kind of using you … [Project Exploration] is trying to use the exhibit to make a better you." She described her feelings this way: "The aim [of PE] was that they wanted you there and they really cared about the experience of the participants." Tina was surprised when, after taking the Dinosaur Giants program, she was invited to participate in an Advanced Field Program. Once again, she felt that she mattered to the organization.

Tina graduated high school in 2002, and went back to do some administrative work with Project Exploration the next year. Since then, Tina has taken on several staff roles at Project Exploration—coordinating youth programs, co-leading expeditions, and working with students in the field. At the time of the interview, she also was attending graduate school in biology, with the hope of becoming a paleontologist.

Tina recalled her first time working in the field as being one of the best experiences she had with Project Exploration:

> *We were actually working on digging up dinosaur bones, and it wasn't, like, we weren't in Chicago doing a mock presentation or anything, we were actually in Wyoming digging up dinosaur bones.*

When digging up her first bone—a triceratops frill—she remembered:

> *It was at that moment that I realized that the heat disappeared and the tiredness disappeared and that when I was actually working on the bone and doing what I wanted to do, I realized at that moment that I could do this for my entire life.*

After Tina receives her doctorate in biology, she wants to be involved in high school education and allow students to have the same life-changing experiences that she had:

> *I think the most important thing that Project Exploration did for me when I was in high school was to help me along with the path of how to be a paleontologist. I*

knew that Gabe and Paul were there to talk to when I got to college about what classes I should be taking. Giving me that experience of digging out in the field showed me that, yes, this is something that I want to do and it's not just a dream, it's something that I want to do. It's something that I can do, and it's something that there are paths for me to achieve. Like, I don't have to have had geology in high school to go on and do paleontology. I'm not locked out of it. Just that knowledge that I've tried this before and I know I can do it, and I have someone to help me along that path made me a lot more confident at pursuing paleontology…Neither of my parents actually attended college, so that whole area is just kind of sketch for someone who's approaching it without any kind of assistance from anyone at all. So I think Project Exploration just kind of gave me much more confidence in pursuing it and the knowledge that someone would be there to answer questions.

In sum, envisioning PE as forming a community of practice to help youth learn and do science provides a way to understand and frame PE's focus on youth development and science as one coherent set of organizational strategies and outcomes. By fully including youth as practicing members of a community of science learners, Project Exploration successfully prepares them for future studies and careers in science as well as for life.

Recommendations

Findings from this study and feedback from PE alumni suggest several recommendations to help improve PE programming for future participants:

(1) **Provide more consistent information to all PE participants about the opportunities provided through PE.** At least five survey respondents reported that they did not continue participating in PE programs beyond their initial involvement because they did not know about additional opportunities. This finding suggests that program staff generate strategies to ensure that every PE participant be informed of the full array of PE opportunities throughout high school and college, as indicated in the following recommendation.

(2) **Offer PE programming beyond high school.** Several PE alumni reported interest in continuing to participate in PE programming beyond high school. Examples include expanding opportunities for college students to return to PE to serve as mentors to high school students, creating more alumni events or job opportunities, and identifying summer internships to support college-age students "so that they may enter that field with more experience and a better chance of success." Another participant suggested a "college send-off" similar to the high school send-off that is currently organized:

I've heard of all of the scholarships they give out, but definitely college scholarships, if they can give a scholarship. If they can give out money for scholarships that'd be great if they can have like a College Send-off. You know, they have a Senior Send-off when students graduate high school, but have a College Send-off when the students actually go to college and have like a possible fundraiser for some, for the kids to

have some kind of money. Not money, they don't necessarily have to have money, but if they have backpacks or something like that, just to go to college with.

(3) **Expand program-monitoring systems to facilitate ongoing internal program evaluation and documentation of alumni outcomes.** This should include a review and refinement of program data-collection instruments and procedures. Specifically, a fully populated database along with regular, consistent queries will provide diagnostic assessment of program implementation and participation, and will contribute to data-driven decision-making for program improvement. In other words, consistent database records would show patterns or participation in a newly implemented program that could support an inference about the program design or delivery that needs refinement or could be modeled. Thus, systematic data collection and tracking about program activities provides evidence for inferences that support decisions about program change, replication, or even cessation. Moreover, these tracking systems will provide the data indicators for long-term outcomes, such as alumni life choices influenced by participants' PE experience. (For more specific recommendations regarding the alumni database, please see Appendix A.)

(4) **Invest in further research and evaluation efforts.** The current study was guided by key questions about the influence of PE programming on participants. Based on the data analysis for this evaluation report, further study is recommended. For example, *Which PE practices expanded science capacity (broadly defined in this report to include science and youth development outcomes) in which students, and in what ways? Are there patterns to the various trajectories that PE participants follow in the short-term, mid-term, and long-term? To what extent do PE participants exhibit patterns of persistence as being consistent or episodic in nature?*

For example, through the collaborative process underlying this study, the PE program staff shared its observation of some PE participants who immerse themselves in the program, then abruptly cease their involvement, yet return to PE a year or two later. The program staff intuition or hypothesis was that the community aspects of their program contributed to this particular pattern of participation, which was referred to as "episodic." This hypothesis, based on staff anecdotal observations, provided one lens through which the evaluation data were analyzed.

The preliminary analysis revealed complex participation patterns, with differences between participant groups under and over age 18 and participant groups active in one or more PE program. (Preliminary analysis of these issues is discussed in more detail in Appendices B and C.) This issue warrants further study because, as discussed through other findings in this report, PE is a program that significantly influences its participants in various ways. A primary way that participants demonstrate their commitment to a program is through "showing up," and a powerful, far-reaching program would be one that prompts a former participant to show up after an extended absence. The participant takes a risk in returning, but by returning demonstrates that there exists a culture of safety and a community of support within the program.

Overall, findings from this study strongly suggest that Project Exploration has the capability of focusing on youth development and science together and of operating under a coherent set of organizational strategies that has led to strong, positive outcomes for participating youth. These

young adults have become engaged in a community of science learners whom they highly value and feel encouraged and supported by, with the result that they seriously consider pursuing science in their schooling, their work, and their lives.

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Appendix A

Project Exploration Past Participant Survey

Project Exploration
Alumni Survey

Dear Project Exploration Alumnus:

You may not realize it, but Project Exploration has been around for more than 10 years! We are trying to learn about what's been happening with our participants and how to improve our programs. We are getting help from researchers at the Lawrence Hall of Science at the University of California, Berkeley. They helped us develop this survey.

The survey asks questions about how participating in Project Exploration may have influenced your educational, career and life decisions, particularly in terms of your interaction with science. It should take you about 20-30 minutes to complete the questionnaire. Skip ANY question you don't want to answer. Please be honest; your answers are anonymous and confidential. We want to learn what you are up to and what you think!

If you have any questions about the survey, please ask Juna Snow via email at jsnow@berkeley.edu or by phone at 510.642.9576. You always may contact Mikki Brown at Project Exploration at 773.834.7623, at mbrown@projectexploration.org, or on Facebook.

To thank you for your time, everyone who completes the survey and/or updates his or her contact information will receive a $5 gift card. You will also be entered into a drawing to receive a $200 giftcard to Best Buy if you complete and mail in the survey by June 14! Thank you again for taking the time to check out the survey. It is really going to give us a chance to learn a lot!

Please answer the following question before starting the survey:

- O No, I do not agree with the statements above and wish to stop participation in this survey.
- O Yes, I understand the information above and agree to participate in this survey.

Project Exploration and You

Listed below are a number of statements about your experience with Project Exploration. Please respond to each statement by indicating your level of agreement. There are no right or wrong answers. Please fill in only one response that describes the way you feel about each statement. You can use pen or pencil.

Why did you FIRST get involved with Project Exploration?

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. I wanted something to do afterschool.	O	O	O	O	O
2. I wanted something to do during the summer.	O	O	O	O	O
3. My friends were doing it.	O	O	O	O	O
4. I wanted to travel.	O	O	O	O	O
5. I thought Project Exploration would help me do better at science in school.	O	O	O	O	O
6. I wanted to learn how to become a scientist.	O	O	O	O	O
7. I thought it would help me get into college.	O	O	O	O	O
8. I liked science and wanted to learn more science.	O	O	O	O	O

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9. Did someone recommend Project Exploration to you? ○ Yes ○ No

10. Who recommended Project Exploration to you? (Select all that apply)

- ○ Teacher
- ○ Counselor
- ○ Parent or Guardian
- ○ Friend
- ○ Other (Please specify)

11. If you have other reasons besides or instead of those listed above for why you FIRST got involved with Project Exploration, please list them here.

Please indicate how much you agree with each of the following statements.

During my time as a Project Exploration participant...

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
12. I was able to talk to adults about my personal interests.	○	○	○	○	○
13. I was able to talk to other young people about my personal interests.	○	○	○	○	○
14. I was able to talk to adults about my interest in science.	○	○	○	○	○
15. I was able to talk to other young people about my interest in science.	○	○	○	○	○
16. I got to know some scientists.	○	○	○	○	○
17. I got a new perspective on my options in life.	○	○	○	○	○
18. I felt part of a special community.	○	○	○	○	○
19. I felt welcome.	○	○	○	○	○
20. I traveled to new places.	○	○	○	○	○
21. I did things with science that I did not do in school.	○	○	○	○	○
22. I learned science in a different way than in school.	○	○	○	○	○
23. I helped lead or design the program.	○	○	○	○	○
24. I had a chance to hang out with people I liked.	○	○	○	○	○
25. I met other young people interested in science.	○	○	○	○	○
26. Adults showed interest my academic success.	○	○	○	○	○
27. I could go to an adult if I had a problem.	○	○	○	○	○
28. I was able to ask questions about my interests.	○	○	○	○	○

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Please indicate how much you agree with each of the following statements.

During my time as a Project Exploration participant...

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
29. Increase my self-confidence.	O	O	O	O	O
30. Feel special and important.	O	O	O	O	O
31. Feel I have more control over what happens in my life.	O	O	O	O	O
32. Feel I could do things I never thought I could do before.	O	O	O	O	O
33. Feel better about my future.	O	O	O	O	O
34. Get along better with people my age.	O	O	O	O	O
35. Learn how to listen to people even if I disagreed with them.	O	O	O	O	O
36. Learn how to work as part of a team.	O	O	O	O	O
37. Learn how to plan ahead.	O	O	O	O	O
38. Learn how to solve problems.	O	O	O	O	O
39. Increase my interest in science in school.	O	O	O	O	O
40. Increase my interest in school overall.	O	O	O	O	O
41. Increase my interest in science outside of school.	O	O	O	O	O
42. Motivate me to find other science-related opportunities.	O	O	O	O	O
43. Motivate me to seek leadership opportunities in Project Exploration.	O	O	O	O	O
44. Motivate me to seek leadership opportunities outside of Project Exploration.	O	O	O	O	O
45. Spark my sense of curiosity about science.	O	O	O	O	O
46. Introduce me to career options that I had not considered.	O	O	O	O	O
47. Introduce me to educational options that I had not considered.	O	O	O	O	O
48. Increase my understanding of how science is a way to understand the world.	O	O	O	O	O
49. Increase my understanding of how scientists approach investigations in addressing problems.	O	O	O	O	O
50. Learn how to ask scientific questions.	O	O	O	O	O
51. Learn how to tell the difference between evidence and opinion.	O	O	O	O	O
52. Develop leadership skills.	O	O	O	O	O
53. Develop verbal communication skills.	O	O	O	O	O
54. Develop written communication skills.	O	O	O	O	O
55. Learn how to use evidence when making an argument.	O	O	O	O	O

56. If you developed interests, skills, habits or knowledge not described by the options already listed, please tell us what they are here.

57. If you stayed involved with Project Exploration after your first experience, what were the main reasons you continued to participate?

58. Have you referred a friend, family member, or other person to Project Exploration in the past?

- ○ No
- ○ Yes (Please specify below)

59. Whom did you refer to Project Exploration?

60. If you chose not to continue in Project Exploration, what were the main reasons why you did not participate? (Select ALL that apply)

- ○ I preferred to do other activities instead.
- ○ I wasn't interested enough in science to want to continue.
- ○ I was bored when I attended programs.
- ○ I didn't know anyone there.
- ○ I had family obligations.
- ○ It was hard to get to the event.
- ○ I had to work.
- ○ I found out about them too late to attend.
- ○ I was planning to attend, but forgot.
- ○ I was discouraged from attending by friends.
- ○ I was discouraged from attending by my family.
- ○ I did not feel welcome.
- ○ I did not have money for transportation.
- ○ Other reasons (Please specify)

61. Would you recommend Project Exploration to a friend, family member, or someone else?

- ○ No
- ○ Yes

62. Please briefly explain your reasons why or why not.

Science and You

Listed below are a number of statements about science issues and interests. Please respond to each statement by indicating your level of agreement. There are no right or wrong answers. Please pick only one response that describes the way you feel about each statement.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. I enjoy reading about things that get me to rethink my previous ideas.	O	O	O	O	O
2. I am unwilling to change my ideas when evidence shows that the ideas are poor.	O	O	O	O	O
3. I find it interesting to hear about new discoveries in science.	O	O	O	O	O
4. Finding out about new things is unimportant.	O	O	O	O	O
5. I like to do science experiments at home.	O	O	O	O	O
6. I am curious about the world in which we live.	O	O	O	O	O
7. I dislike listening to other people's opinions.	O	O	O	O	O
8. I enjoy watching science programs on TV at home.	O	O	O	O	O
9. I like reading about science during my free time.	O	O	O	O	O
10. I find it boring to hear about new ideas.	O	O	O	O	O
11. I enjoy visiting a science museum, zoo, or aquarium when I have the chance.	O	O	O	O	O
12. I talk with my family about science.	O	O	O	O	O
13. I talk with friends about science.	O	O	O	O	O
14. I dislike reading books about science during vacation.	O	O	O	O	O
15. I dislike reading newspaper articles about science.	O	O	O	O	O
16. I feel comfortable with scientists.	O	O	O	O	O
17. I get bored when watching science programs on TV at home.	O	O	O	O	O
18. People like me have careers in science.	O	O	O	O	O
19. Science is welcoming of people from diverse backgrounds.	O	O	O	O	O
20. Listening to people talk about science on the radio is boring.	O	O	O	O	O
21. If I wanted to have a job in science I could get one. (Please explain below)	O	O	O	O	O

22. If you responded to the question "If I wanted to have a job in science I could get one" above, please explain your response.

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All About You

The following sections ask you to identify your past Project Exploration activities. Please select all that apply to you.

In which of the following Project Exploration programs did you participate during the school year? Please select "Yes" or "No" for all that apply.

1. Bones Club	O No O Yes
2. Winter Science Exploration ("Holiday Party" or "Holiday Celebration")	O No O Yes If yes, during which school years did you participate in Winter Science Exploration? O 2003-04 O 2005-06 O 2007-08 O 2009-10 O 2004-05 O 2006-07 O 2008-09 O I Don't remember
3. Girls' Health and Science Day	O No O Yes If yes, during which school years did you participate in Girls' Health and Science Day? O 2000-01 O 2003-04 O 2006-07 O 2009-10 O 2001-02 O 2004-05 O 2007-08 O I don't remember O 2002-03 O 2005-06 O 2008-09
4. Discover Your Summer	O No O Yes If yes, during which school years did you participate in Discover Your Summer? O 2007-08 O 2008-09 O I don't remember
5. Sisters4Science	O No O Yes If yes, during which school years did you participate in Sisters4Science? O 2000-01 O 2003-04 O 2006-07 O 2009-10 O 2001-02 O 2004-05 O 2007-08 O I don't remember O 2002-03 O 2005-06 O 2008-09
6. College Resource	O No O Yes If yes, during which school years did you participate in College Resource? O 2000-01 O 2003-04 O 2006-07 O 2009-10 O 2001-02 O 2004-05 O 2007-08 O I don't remember O 2002-03 O 2005-06 O 2008-09
7. Senior Celebration	O No O Yes If yes, during which school years did you participate in Senior Celebration? O 2005-06 O 2007-08 O 2009-10 O 2006-07 O 2008-09 O I don't remember
8. Any other PE program or activity	O No O Yes (Specify) [ ] If yes, during which school years did you participate in the above mentioned activity? O 2000-01 O 2003-04 O 2006-07 O 2009-10 O 2001-02 O 2004-05 O 2007-08 O I don't remember O 2002-03 O 2005-06 O 2008-09

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In what Project Exploration programs did you participate in the summer? Please select "Yes" or "No" for all that apply.

9. Summer Science	O No O Yes If yes, during which years did you participate in Summer Science? O 2001 O 2002 O I don't remember
10. Nuts and Bolts	O No O Yes
11. All Girls Expedition	O No O Yes If yes, during which years did you participate in All Girls Expedition? O 2003 O 2005 O 2008 O I don't remember O 2004 O 2007 O 2009
12. Jr. Paleontologists	O No O Yes If yes, during which years did you participate in Jr. Paleontologists? O 1999 O 2003 O 2007 O I don't remember O 2000 O 2004 O 2008 O 2001 O 2005 O 2009 O 2002 O 2006 O 2010
13. Advanced Paleo	O No O Yes If yes, during which years did you participate in Advanced Paleo? O 2001 O 2002 O I don't remember
14. Any other PE program or activity	O No O Yes (Specify) _____ If yes, during which years did you participate in the above mentioned activity? O 1999 O 2003 O 2007 O I don't remember O 2000 O 2004 O 2008 O 2001 O 2005 O 2009 O 2002 O 2006 O 2010

15. If you were involved with extra-curricular or out-of-school activities in addition to Project Exploration, what were they? (Please check all that apply.)

- O Performing arts or visual arts activities
- O Volunteer activities
- O School or outside clubs
- O Student government
- O Competed on sports teams
- O Active in school spirit/booster clubs
- O Had a job
- O Other (Please describe)

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16. I identify myself as:

- ○ Male
- ○ Female
- ○ Other

17. Are you 18 years old, or older?

○ Yes ○ No

18. What is your ethnicity? Please choose one of the following options:

- ○ African-American / Black
- ○ American-Indian / Alaska Native
- ○ Asian
- ○ Hispanic / Latino
- ○ Pacific Islander (includes Micronesian, Polynesian, other Pacific Islanders)
- ○ White / Caucasian
- ○ Other (Please specify below)
- ○ More than one (Please specify below)
- ○ Decline to State

19. If you selected "Other", please describe.

20. If you selected "More than one", please describe.

21. What is the primary language spoken or used in your home?

- ○ English
- ○ Spanish
- ○ Arabic
- ○ Polish
- ○ Other (Please specify) [ ]

8

The following sections ask you about your experience in high school.

22. Did you graduate from high school?

- ○ No *(Skip Questions 23 through 26)*
- ○ Yes *(Answer Questions 23 through 26 and skip Questions 27 through 31)*

23. I have:

- ○ a High School Diploma
- ○ a GED

24. What is the name of the high school from which you graduated?

25. What year did you graduate or earn your GED?

26. Which BEST describes the high school from which you graduated?

- ○ Public
- ○ Private
- ○ Public Charter
- ○ Catholic / Religious
- ○ Other (Please describe)

27. Are you currently attending high school?

○ No ○ Yes

28. Did you earn a GED?

○ No ○ Yes

29. What is the name of the high school that you currently attend?

30. What year do you plan to graduate?

31. Which BEST describes the high school you currently attend?

- ○ Public
- ○ Private
- ○ Public Charter
- ○ Catholic / Religious
- ○ Other (Please specify)

The following sections ask you about your experience in a two-year (or community) college.

32. Did you graduate from a two-year (or community) college?

- ○ No *(Skip Questions 33 through 36)*
- ○ Yes *(Answer Questions 33 through 36 and skip Questions 37through 42)*

33. What is the name of the two-year college from which you graduated?

34. What was your major or field of study?

35. What year did you graduate?

36. Did you transfer from this two-year college?

○ No ○ Yes

37. Are you currently attending a two-year college?

○ No ○ Yes

38. What is the name of the two-year college that you currently attend?

39. I am a:

- ○ Part-time student
- ○ Full-time student

40. What is your current major or field of study?

41. Do you plan to transfer?

○ No ○ Yes

42. What year do you plan to graduate or transfer?

The following sections ask you about your experience in a four-year college.

43. Did you graduate from a four-year college?

- ○ No *(Skip Questions 44 through 46)*
- ○ Yes *(Answer Questions 44 through 46 and skip Questions 47 through 51)*

44. What is the name of the four-year college from which you graduated?

45. What was your major or field of study?

46. What year did you graduate?

47. Are you currently attending a four-year college?

○ No ○ Yes

48. What is the name of the four-year college that you currently attend?

49. I am a…

- ○ Part-time student
- ○ Full-time student

50. What is your current major or field of study?

51. What year do you plan to graduate?

The following sections ask you about your experience in a Master's Program.

52. Did you graduate from a Master's program?

- ○ No *(Skip Questions 53 through 55)*
- ○ Yes *(Answer Questions 53 through 55 and skip Questions 56 through 60)*

53. What is the name of the Master's program institution from which you graduated?

54. What was your major or field of study?

55. What year did you graduate?

56. Are you currently enrolled in a Master's program?

○ No ○ Yes

57. What is the name of the Master's program institution that you currently attend?

58. I am a…

- ○ Part-time student
- ○ Full-time student

59. What is your current major or field of study?

60. What year do you plan to graduate?

The following sections ask you about your experience in an Advanced Degree Program.

61. Did you graduate from an advanced degree program (law, business, Ph.D.)?

- ○ No *(Skip Questions 62 through 64)*
- ○ Yes *(Answer Questions 62 through 64 and skip Questions 65 through 69)*

62. What is the name of the advanced degree program institution from which you graduated?

63. What was the type of degree you received and field of study? (e.g. Ph.D. in Mathematics)

64. What year did you graduate?

65. Are you currently enrolled in an advanced degree program?

○ No ○ Yes

66. What is the name of the advanced degree program institution that you currently attend?

67. I am a…

- ○ Part-time student
- ○ Full-time student

68. What is the type of degree you are currently enrolled in and field of interest? (e.g. Ph.D. in Mathematics)

69. What year do you plan to graduate?

13

The following sections ask you about your experience in any other academic programs.

70. Did you graduate from any other programs not previously mentioned? (e.g. any certifications)

- O No *(Skip Questions 71 through 73)*
- O Yes *(Answer Questions 71 through 73 and skip Questions 74 through 78)*

71. What is the name of the other program institution from which you graduated?

72. What was the type of degree you received? (e.g. Elementary Teaching Certificate)

73. What year did you graduate?

74. Are you currently enrolled in any other programs not previously mentioned?

O No O Yes

75. What is the name of the other program institution that you currently attend?

76. I am a…

- O Part-time student
- O Full-time student

77. What is the degree or certification you will receive upon graduation? (e.g. Elementary Teaching Certificate)

78. What year do you plan to graduate?

14

79. Do you have sisters or brothers who attend (or attended) college or higher education?

- ○ No
- ○ Yes

80. What is the highest level of education completed by your father/male guardian?

- ○ Did not attend high school
- ○ Attended some high school, but did not graduate
- ○ High school graduate
- ○ Attended some college/university, but did not complete a degree
- ○ Associate's degree (two-year college)
- ○ Bachelor's degree (four-year college)
- ○ Master's degree
- ○ Professional degree (e.g., teaching, accounting, law, medicine, veterinary science)
- ○ Ph.D. or other Doctoral degree
- ○ Other (e.g., certificate) (Please Specify) [ ]
- ○ Not Applicable

81. What is the highest level of education completed by your mother/female guardian?

- ○ Did not attend high school
- ○ Attended some high school, but did not graduate
- ○ High school graduate
- ○ Attended some college/university, but did not complete a degree
- ○ Associate's degree (two-year college)
- ○ Bachelor's degree (four-year college)
- ○ Master's degree
- ○ Professional degree (e.g., teaching, accounting, law, medicine, veterinary science)
- ○ Ph.D. or other Doctoral degree
- ○ Other (e.g., certificate) (Please Specify) [ ]
- ○ Not Applicable

82. Do you plan to return to school in the future?

- ○ No *(Skip Question 83)*
- ○ Yes

83. If yes, please indicate the following:

Name of School:	
Major or Field of Study:	
Expected Year of Graduation:	

84. Since high school, have you held any science-related jobs?

- ○ No
- ○ Yes

85. Indicate what kind of work you have done below (check all that apply):

- ○ Health Sciences (i.e. medical, nursing, or dental)
- ○ Engineering
- ○ Agricultural or Plant Sciences
- ○ Technology or Computer-Related
- ○ Laboratory or Biological Sciences
- ○ Physical Sciences
- ○ Pharmacy
- ○ Home Health Care
- ○ Museum Docent or Museum Guide
- ○ Science Teaching or Science Teaching Assistant
- ○ Project Exploration PAID Position in a Lab, the Field, or as a Teaching Assistant
- ○ Other (Please describe):

86. Thinking back on your Project Exploration experience, in what ways has PE influenced decisions you have made in your life?

87. What advice do you have for Project Exploration?

88. Is there anything else you would like to share?

Thank you for your time! Please return your survey in the self-addressed envelope by June 14, 2010!

Appendix B

Interview Protocol For Project Exploration Participants

Hello,
My name is _____ and I am calling from the University of California, Berkeley. We are working with Project Exploration in Chicago to learn more about the effect that Project Exploration has had in your life and the lives of other past participants like you who have participated in their programs during the past ten years.

Did you realize that Project Exploration has been operating for 10 years? [Pause for response/affirmation.] We are conducting a study to understand what past participants, or alumni, felt about and learned from their PE experiences.

Did you receive the Web or paper questionnaire that we sent a few weeks ago? [Pause for response.] Great! Thank you for your help in completing the survey. Today, we'd like to talk to you for about 20-30 minutes, and ask you some follow-up questions. Are you willing to take a few moments and share your thoughts with me?

You may decline to answer any question you don't want to answer during this interview. Just tell me you'd prefer not to answer, and we will move on. When you do answer the questions, *please be honest. We really want to know what you think.* We will report on what we learn through your answers*, but they are anonymous and confidential.* We will not report anything that identifies you personally.

If you have any questions about this study you can ask Dr. Juna Snow via email or by phone. You can also contact Mikki Brown at Project Exploration or on Facebook.
Is it okay if I record this interview? This is only for my accurate note-keeping, and no one at Project Exploration will have access to this tape or to any transcript that links back to you. [Pause for affirmation.] Let's get started.

I realize it has been a while since you first started PE, and so if you can't recall details about things I ask, just tell me you don't remember.

1. First, try to think back to when you first heard of PE.
    a. How did you find out about it?
    b. What was the first PE meeting or event you went to?
    c. What motivated you to go?
    d. What were your expectations?
2. Which of the following PE programs were you involved in? If you could list them in the order you participated in the programs, that would be really helpful.
    a. List of PE programs:

i. Sisters 4 Science

ii. Dinosaur Giants

iii. Jr. Paleontologists

iv. All Girls Expedition

v. Girls Health & Science Days

vi. College Resource

vii. Senior Celebration

viii. Any other PE program or activity?

b. For each of the PE programs and activities that you mentioned:

i. what were your reasons for participating in that activity or program?

ii. what did you learn or gain from that program/activity?

- Do you recall why this one appealed to you (friends, topics, adults, place to be after school, etc)?

3. If you regularly attended PE programs, what made you want to continue to participate?

If the person does not respond, probe with the following possible responses for affirmation/negation/explanation:

a. Having a safe place to spend time after school? (*safety*)

b. Preparing for college? (*academic support*)

c. Hanging out with other friends? (*social orientation*)

d. Being able to talk to adults who knew me? (*seeking guidance, support from caring adults*)

e. Meeting scientists? (*interest in science as a discipline*)

f. The chance to see that I could do science like the people who came to PE and told us about their careers? (*access to mentors*)

4. When you think about your PE experience, in what ways, if any, has PE influenced your educational decisions?

a. Have you found yourself particularly interested in science as a field or subject? In what ways?

b. In what ways, if any, did PE help you be a better student?

c. What life or school skills do you feel you have developed as a result of your time with PE?

5. In what ways has your involvement in PE influenced your work or career decisions?

    a. What kinds of work have you done, or jobs have you had, since you were involved in PE?

    b. Probe for interest in science as a possible career choice (if not science, then why not?)

6. In what other ways has your involvement in PE influenced your life/personal decisions *Probe for the way you relate to people, friends and family, hobbies, skills gained, self-awareness, perspectives about science and society, relevance of science to real life, etc.*

7. **(If they have not discussed nature of science in particular)**
   Can you remember particular topics from your time with PE? For instance, what did you learn *about science* through your involvement in PE?

    a. In what ways, if any, did PE change or confirm your idea of science?

8. Do you continue to stay in contact with PE:

    a. Friends?

    b. Staff member/adults?

    c. Current participants?

9. Do you attend PE events in the community when you learn about them?

    a. If yes, what are your reasons for going?

    b. Can you recall any recent PE events you attended? List, probe about why they went

    c. If no, what are your reasons for not going?

10. Have you recommended Project Exploration to friends, children or teens you know today?

11. Think about some important life decisions that you have made since leaving Project Exploration. What are the <u>lasting lessons</u> that come to mind from your Project Exploration experience?

    a. What are some examples?

12. Do you have any recommendations or suggestions that you'd like us to share with the Project Exploration team about how to improve what they do?

13. What words of wisdom would you want to pass on to future PE students?

14. Anything else you'd like to share with us about your experience with Project Exploration that I didn't ask you about?

15. Do you have any questions for me?

Thank you for talking with me!

Appendix C

Suggestions for Improving the Youth-Services Database

The Project Exploration Youth-Services Database is an extensive collection of information regarding various aspects of the PE participation pool. In its current state, it can be easily queried to answer some descriptive questions about general program participation. However, the writers of this report did notice that the database was not currently adequate to answer some of the more complex questions with confidence. Hence, this paper does not implement a comparison between responses from the PE alumni survey and the database. The current section will address some of the research questions that were relevant to this report, the issues that come up in trying to answer the research question using the database, and suggestions on how to adapt the current Youth-Services database to better address these questions in the near future.

Issues in the Youth-Services Database

I. Educational Accomplishments and Aspirations

High School Status

The current report addressed participant educational achievements and aspirations using the results of items from the PE alumni survey. For high school, items addressed enrollment status by the response choices of "graduated," "currently attending," "GED recipient," or "no response." The database can be used to addresses this question in a similar fashion, using items that track alumni status (Y/N), graduation status ("unknown," "no diploma," or "HS graduate"), and high school expected and actual graduation dates. While the items function well, an issue arises from the fact that a large majority of participants have missing data in any or all of these items, making their high school status ambiguous. For instance, some participants only have an expected graduation date, often a date that have already passed by the time of the construction of this report, but have data missing from the other available items (e.g. "graduation status") that would enable researchers to confirm their status. Simply ignoring the ambiguous participants and using percentage statistics with such large numbers of missing data would be inadvisable, since doing so could misrepresent the actual participant pool.

College Status and Aspirations

The PE alumni survey addresses college status, asking specific questions regarding two-year college status and major, four-year college status and major, master's program status and major, advanced degree program status and major, and other degree program status and major. This question could be addressed using three sections that are available in the Youth-Services database: "Current College," "Past College 1," and "Past College 2." In the current college section, items address college name, college type, anticipated major, and anticipated degree. In the past college sections, available items are college name, reason for leaving, graduation status, degree received, and major of degree.

Several issues arise when using the current section and item format to address this research question. The most pressing issue is that college aspirations are not addressed at all by the current item list. While there are ways to work around this problem (e.g., using a "future plans" designation and placing the anticipated college in one of the college sections), we suggest that a separate section for college aspirations to prevent future confusion and overall ease-of-use during future work with the database.

Another issue was encountered when trying to determine which college program (bachelor's, master's, etc.) the participant is currently (or was) enrolled in. As the database now stands, the only way to determine (without guessing) which college program the participant has completed or is presently enrolled in is to observe the "degree received" item, which specifies the degree type. Unfortunately, the data for this particular item are often missing, even though the data for the other items (e.g., college name, college type, major, year of receiving degree, etc.) are available. These other items were not particularly useful in determining program type, including the item "college type," which only addresses whether the school the participant attends is a four-year or two-year college and does not differentiate between the master's and advanced degree programs within a four-year college.

II. Motivations to Join Project Exploration

This particular research question was not addressed in the Youth-Services database, though the inclusion of items similar to the ones used in the PE alumni survey could be included for future analysis.

III. Program characteristics of Project Exploration provided a myriad of opportunities and practices that followed a youth development framework and nurtured a community of practice to build participants' capacity for science and for future success.

Among the many components of this particular research question, the aspect of career options (subsection F) can be supplemented by the data available in the database, particularly in what careers the participant is engaged in and any future career plans. The database presently only addresses the participant's current place and title of employment and its relevance to science and does not adequately keep track of past jobs or future plans for careers. For the purposes of research, it may be useful to take note of progressive careers and the gradual change in career plans during the course of their experience with PE.

Items pertaining to the other portions of the research question (e.g., "PE created a community of support, high expectations and sense of 'family' for its participants," "In particular, PE nurtured youth relationships with adults who helped them with science, education, and other issues or challenges," etc.) could feasibly be added to allow future analyses in the topic to be done without the use of a supplemental survey (e.g., PE Alumni Survey) if that can be achieved logistically.

IV. Project Exploration expanded participants' capacity for science in a wide variety of ways, including outcomes typically considered more youth development-focused in nature, but all of these outcomes are important in preparing youth to participate in a larger scientific community and in life.

This research question is also not directly assessed by the Youth-Services database, though survey items can be added in future iterations.

V. Trajectories of Project Exploration Alumni

The Youth-Services Database could provide data to supplement the qualitative findings from this section of the current paper, though the current database lacks a significant amount of data, especially in regard to high school and college attendance data, making this unfeasible at the time this paper was written. In future studies, the database's attendance data could track the types of PE programs a particular individual was involved in and also include the educational and career achievements highlighted in the above sections, in addition to the free-response items already being used.

VI. Project Exploration Program Participation (Appendix D)

The Youth-Services database keeps an extremely thorough log of which events a participant was involved with and the actual dates of involvement. This may be particularly useful in determining more accurate statistics for episodic involvement and skipped participation (using days of involvement rather than years, as was done in this current report). Unfortunately, this section is made problematic by missing data. While a handful of participants have day-to-day attendance data (attended or not attended; "A" or "N," respectively), a large majority of participants have only registration dates (labeled as unknown, or "U") that do not specify whether the participant actually attended the event. Future research can benefit markedly from a more accurate set of attendance data, especially when engaging complex topics such as episodic involvement.

Possible Solutions

Updating the Database More Frequently

A prevailing issue in the current research question, and in the Youth-Services database in general, is the procedure by which the data is collected and not the items within the database themselves. The prevalence of missing data for many of the categorical variables leaves a significant amount of ambiguity in the analysis that can weaken many of the findings made in the database. In particular, the college degree-type item ("Bachelor's Degree," "Master's Degree," etc.) was particularly problematic, because the lack of data made a comparison to the PE alumni survey virtually impossible.

The root of this issue is in regard to the fact that much of the data are collected as PE staff members contact the individual participants, whether through events, simple phone conversations, or even face-to-face interviews. This leaves a significant portion of the database

outdated and/or missing. The suggested change is logistic in nature. In particular, we suggest updating the survey data according a system-wide survey, for it may be unfeasible to ask all the mentioned questions to each participant during the often-brief moments of contact with staff. A system-wide survey, perhaps conducted once a year, could possibly address stagnant data and improve the accuracy of future analyses. The method is also exhaustive and expensive, meaning it would likely require a significant commitment from the PE staff.

Access to Backup Data

Data backup may also be very useful in future studies. As more recent data is replaced by new data in the database, the old data are often lost. If information is needed that was replaced on the database, it is difficult (or impossible) to retrieve the lost data.

A periodic backup of data, perhaps once every six months, would allow researchers to track changes that occurred for each participant throughout the years of their participation, without having to add new items to the database (e.g., college major at time point 1 and college major at time point 2 only needs one item, if staff have access to the dataset at both time points). In addition, a backup would allow for any mistakes in data entry to be tracked and fixed with no significant loss of data. The backup process may already be taking place, but for future research it would still be beneficial to have access to these backup datasets for download in the query system.

Adding New Items

With the addition of new items, several sections could better collect data that might be relevant to future analyses. These might include (but are not limited to) college aspirations, career aspirations, and specific motivations for involvement in Project Exploration.

Appendix D

Project Exploration Program Participation

The following section on PE program participation combines the data taken from the PE Alumni survey and the PE Youth-Services Database. The data represented in the PE database were taken in September 2010 and include the most up-to-date attendance information, but gathered only the program types, program events, and participants that were consistent with the time frame of the PE Alumni survey (done in May 2010), for comparative purposes. The program events and their corresponding program types can be found in Appendix E. At the time this report was prepared, the attendance data were collected from registration data, rather than actual attendance, since exact attendance data were mostly missing.

Single Program Participation

Table D1. Single Program-Type Participation Rate (as of May 3, 2010)

		Whole Sample (N=559)			
Program-Type	**#**	**# of Times Participated in Program-Type**			
	N	**1**	**2**	**3**	**4**
Advanced Paleo	6	6	-	-	-
Advanced Science Field	0	-	-	-	-
All Girls Expedition	18	16	2	-	-
BioBlitz	0	-	-	-	-
Dinner with a Dinosaur	0	-	-	-	-
Dinosaur Giants	241	220	18	3	-
Discover Your Summer	9	9	-	-	-
EDI AGE Fundraiser	0	-	-	-	-
Fossil Lab	0	-	-	-	-
Green Sahara Lecture	0	-	-	-	-
House Party	0	-	-	-	-
Jane Goodall Lecture	0	-	-	-	-
Junior Paleontologists	38	37	1	-	-
Mammoths and Mastodons	0	-	-	-	-
Mythbusters Lecture	0	-	-	-	-
Nigersaurus Delegation	0	-	-	-	-
Nuts and Bolts	0	-	-	-	-
Old Trail Museum Intern	0	-	-	-	-
PaleoPark Ranch	0	-	-	-	-
PE Office Intern	2	2	-	-	-
Reptile Fest	0	-	-	-	-
Science Chicago Lab Tour	0	-	-	-	-
Senior Celebration	0	-	-	-	-
Sereno Dinosaur Expedition	0	-	-	-	-
Sisters4Science	226	166	46	10	4
Stones and Bones	0	-	-	-	-
Student Blogger	0	-	-	-	-
Summer Science	17	17	-	-	-
SuperCroc Delegation	1	1	-	-	-
Tiktaali Presentation	1	1	-	-	-
When Crocs Ate Dinosaurs	0	-	-	-	-
Winter Science Exploration	0	-	-	-	-
Total	*559*	*475*	*67*	*13*	*4*

Analysis of the database yielded the following patterns of participation among all PE alumni (N=797 as of May 2010) who had been involved with a single program-type from 1999 to 2010. In Table D1, the N represents persons participating in the named program-type exclusively. The number of times they were involved in that single program-type is indicated in the columns to the right of column "N." The bottom row of Table D1 displays the total single-program participation rates.

Table D1 reveals several interesting findings. First, the total participation rates at the bottom show that a fairly large proportion of PE participants took part in one particular program-type (559 of 797, or 70.1%). Of the 559, a total of 475 (or about 85%) took the particular program-type only once. From this, it can be deduced that about 59.6% (475/797) of the total participation in PE was composed of a single event in a single program-type. Second, the table shows that a much smaller proportion of participants who only participated in a single program-type repeated the same program more than once. In total, 84 participants (or about 15% of single program-type participants, or 10.5% of all PE participants) took a single program-type repeatedly. Of all the program-types available (as of May 3, 2010), Sisters4Science proportionately drew the most repeat participants who exclusively stuck with that particular program-type.

Table D1 also shows that there are many program-types that participants did not participate in exclusively (represented by an "N" of zero). Some examples include BioBlitz, Dinner with a Dinosaur, and Holiday Celebration. This suggests that participants in these programs have a high likelihood of participating in multiple program-types during their time with PE.

Tables D2 and D3 break down the single program-type participation rates in Table D1 between age group and alumni survey participation, respectively. Examining Table D2 reveals some small proportional differences in single program-type attendance for Junior Paleontologists (14/408 compared to 24/151) and Sisters4Science (201/408 compared to 25/151). The statistical likelihood of these results was not explored in detail, particularly due to issues in statistical analysis (e.g., both chi-squared and independent means t-tests are questionable here). The exact nature of these differences in proportion should be explored in greater detail in future research.

In examining Table D3, the analysis revealed that the number of single program-type participants who also took the alumni survey is proportionately lower (20 of 78, or about 25.6%) when compared to the number of single program-type participants in the total PE sample (559 of 797, or about 70.1%). This suggests that participants who took the alumni survey have a higher likelihood of having taken multiple program-types, though further research will be necessary before any claims can be made.

Further examination of Table D3 also revealed a large proportional difference between alumni survey takers and non-takers in Sisters4Science (201/408 compared to 2/20). This suggests that PE alumni survey takers are less likely to have been involved in Sisters4Science than their non-taker counterparts. However, the small sample size of the survey takers warrants a more-detailed analysis.

Table D2: Single Program-Type Participation by Age Group (As of May 3, 2010)

Program-Type	#	Under 18 (N=408) # of Times Participated in Program-Type				#	18 or Over (N=151) # of Times Participated in Program-Type			
	N	1	2	3	4	N	1	2	3	4
Advanced Paleo	2	2	-	-	-	4	4	-	-	-
Advanced Science Field	0	-	-	-	-	0	-	-	-	-
All Girls Expedition	11	11	-	-	-	7	5	2	-	-
BioBlitz	0	-	-	-	-	0	-	-	-	-
Dinner with a Dinosaur	0	-	-	-	-	0	-	-	-	-
Dinosaur Giants	170	154	15	1	-	71	66	3	2	-
Discover Your Summer	1	1	-	-	-	8	8	-	-	-
EDI AGE Fundraiser	0	-	-	-	-	0	-	-	-	-
Fossil Lab	0	-	-	-	-	0	-	-	-	-
Green Sahara Lecture	0	-	-	-	-	0	-	-	-	-
House Party	0	-	-	-	-	0	-	-	-	-
Jane Goodall Lecture	0	-	-	-	-	0	-	-	-	-
Junior Paleontologists	14	14	-	-	-	24	23	1	-	-
Mammoths and Mastodons	0	-	-	-	-	0	-	-	-	-
Mythbusters Lecture	0	-	-	-	-	0	-	-	-	-
Nigersaurus Delegation	0	-	-	-	-	0	-	-	-	-
Nuts and Bolts	0	-	-	-	-	0	-	-	-	-
Old Trail Museum Intern	0	-	-	-	-	0	-	-	-	-
PaleoPark Ranch	0	-	-	-	-	0	-	-	-	-
PE Office Intern	1	1	-	-	-	1	1	-	-	-
Reptile Fest	0	-	-	-	-	0	-	-	-	-
Science Chicago Lab Tour	0	-	-	-	-	0	-	-	-	-
Senior Celebration	0	-	-	-	-	0	-	-	-	-
Sereno Dinosaur Expedition	0	-	-	-	-	0	-	-	-	-
Sisters4Science	201	152	38	7	4	25	14	8	3	-
Stones and Bones	0	-	-	-	-	0	-	-	-	-
Student Blogger	0	-	-	-	-	0	-	-	-	-
Summer Science	7	7	-	-	-	10	10	-	-	-
SuperCroc Delegation	0	-	-	-	-	1	1	-	-	-
Tiktaali Presentation	1	1	-	-	-	0	-	-	-	-
When Crocs Ate Dinosaurs	0	-	-	-	-	0	-	-	-	-
Winter Science Exploration	0	-	-	-	-	0	-	-	-	-
Total	*408*	*343*	*53*	*8*	*4*	*151*	*132*	*14*	*5*	*0*

Table D3: Single Program-Type Participation by Alumni Survey Participation

		Alumni Survey Non-Takers (N=539)					Alumni Survey Takers (N=20)			
Program-Type	**#**	**# of Times Participated in Program-Type**				**#**	**# of Times Participated in Program-Type**			
	N	**1**	**2**	**3**	**4**	**N**	**1**	**2**	**3**	**4**
Advanced Paleo	5	5	-	-	-	1	1	-	-	-
Advanced Science Field	0	-	-	-	-	0	-	-	-	-
All Girls Expedition	17	15	2	-	-	1	1	-	-	-
BioBlitz	0	-	-	-	-	0	-	-	-	-
Dinner with a Dinosaur	0	-	-	-	-	0	-	-	-	-
Dinosaur Giants	230	210	18	2	-	11	10	-	1	-
Discover Your Summer	9	9	-	-	-	0	-	-	-	-
EDI AGE Fundraiser	0	-	-	-	-	0	-	-	-	-
Fossil Lab	0	-	-	-	-	0	-	-	-	-
Green Sahara Lecture	0	-	-	-	-	0	-	-	-	-
House Party	0	-	-	-	-	0	-	-	-	-
Jane Goodall Lecture	0	-	-	-	-	0	-	-	-	-
Junior Paleontologists	36	35	1	-	-	2	2	-	-	-
Mammoths and Mastodons	0	-	-	-	-	0	-	-	-	-
Mythbusters Lecture	0	-	-	-	-	0	-	-	-	-
Nigersaurus Delegation	0	-	-	-	-	0	-	-	-	-
Nuts and Bolts	0	-	-	-	-	0	-	-	-	-
Old Trail Museum Intern	0	-	-	-	-	0	-	-	-	-
PaleoPark Ranch	0	-	-	-	-	0	-	-	-	-
PE Office Intern	2	2	-	-	-	0	-	-	-	-
Reptile Fest	0	-	-	-	-	0	-	-	-	-
Science Chicago Lab Tour	0	-	-	-	-	0	-	-	-	-
Senior Celebration	0	-	-	-	-	0	-	-	-	-
Sereno Dinosaur Expedition	0	-	-	-	-	0	-	-	-	-
Sisters4Science	224	165	45	10	4	2	1	1	-	-
Stones and Bones	0	-	-	-	-	0	-	-	-	-
Student Blogger	0	-	-	-	-	0	-	-	-	-
Summer Science	14	14	-	-	-	3	3	-	-	-
SuperCroc Delegation	1	1	-	-	-	0	-	-	-	-
Tiktaali Presentation	1	1	-	-	-	0	-	-	-	-
When Crocs Ate Dinosaurs	0	-	-	-	-	0	-	-	-	-
Winter Science Exploration	0	-	-	-	-	0	-	-	-	-
Total	*539*	*457*	*66*	*12*	*4*	*20*	*18*	*1*	*1*	*0*

Multiple Program Participation

Of the 797 total participants, 238 (or 29.9%) were involved in two or more PE programs. Of the 238, 96 (or 40.3%) who took two or more program-types, 60 (or 25.2%) took three different program types, while 82 (or 34.5%) took four or more.

The way Table D4 is interpreted is much like that of the tables representing single program-type participation, with one major difference: In Table D1, only participants who took a single program-type (once or multiple times) were included, so the numbers in the "total" row were effectively represented people. In Table D4, participants may have taken up to 13 different program-types, so the number of participants in a given program-type is inflated. So, the 238 total people who participated in multiple program-types were engaged in a total of 838 total program-types. This averages out to about 3.52 program-types per person in the current sub-sample.

Table D4. Multiple Program-Type Participation Rate (As of May 3, 2010)

		Whole Sample (N=238)					
Program-Type	**#**	**# of Times Participated in Program-Type**					
	N	**1**	**2**	**3**	**4**	**5**	**6**
Advanced Paleo	15	15	-	-	-	-	-
Advanced Science Field	3	3	-	-	-	-	-
All Girls Expedition	33	26	5	2	-	-	-
BioBlitz	4	4	-	-	-	-	-
Dinner with a Dinosaur	54	50	4	-	-	-	-
Dinosaur Giants	136	93	28	10	4	1	-
Discover Your Summer	40	31	9	-	-	-	-
EDI AGE Fundraiser	3	3	-	-	-	-	-
Fossil Lab	19	17	2	-	-	-	-
Green Sahara Lecture	7	7	-	-	-	-	-
House Party	2	2	-	-	-	-	-
Jane Goodall Lecture	10	10	-	-	-	-	-
Junior Paleontologists	79	64	14	1	-	-	-
Mammoths and Mastodons	15	15	-	-	-	-	-
Mythbusters Lecture	6	6	-	-	-	-	-
Nigersaurus Delegation	10	10	-	-	-	-	-
Nuts and Bolts	1	1	-	-	-	-	-
Old Trail Museum Intern	6	5	1	-	-	-	-
PaleoPark Ranch	3	3	-	-	-	-	-
PE Office Intern	3	3	-	-	-	-	-
Reptile Fest	30	22	7	1	-	-	-
Science Chicago Lab Tour	1	1	-	-	-	-	-
Senior Celebration	35	29	6	-	-	-	-
Sereno Dinosaur Expedition	4	4	-	-	-	-	-
Sisters4Science	99	45	34	13	6	0	1
Stones and Bones	1	1	-	-	-	-	-
Student Blogger	2	2	-	-	-	-	-
Summer Science	14	14	-	-	-	-	-
SuperCroc Delegation	11	11	-	-	-	-	-
Tiktaali Presentation	12	12	-	-	-	-	-
When Crocs Ate Dinosaurs	20	20	-	-	-	-	-
Winter Science Exploration	160	124	29	6	1	-	-
Total	*838*	*653*	*139*	*33*	*11*	*1*	*1*

Table D4 reveals some interesting characteristics of the multiple program-type sub-sample. The most notable is that 77.9% (or 653 of 838) or program-type participations involve single events. This suggests that among the participants who engaged in more than one program-type, participation usually consists of a single event spread across different program-types. Further, Table D4 shows a more even distribution of participation of program-types compared to t Table D1, which showed a lack of participation in a majority of the program-types. The most dramatic change in participation between Tables D1 and D4 can be observed with Winter Science Exploration. In the single program-type sub-sample on Table D1, the number of participants for Winter Science Exploration was zero, a sharp contrast to the 160 that it represents with the multiple program-type sub-sample. These were expected results, especially since many of these program-types were offered by invitation to previous PE participants.

Tables D5 and D6 show the same data depicted in Table D4, broken down by age group and alumni survey participation. Several interesting pieces of information can be deduced from these two tables. First, Table D5 shows that the number of multiple program-type participants is the same between the two age groups (N=119 each). In comparison, the number of participants in

single program-types in Table D2 were far less equivalent (N=408 and N=151). Further, Table D5 shows that the older sub-sample also had larger total program-type participation, despite the equal number of participants in each age group. This suggests that the older PE participants are more likely to have participated in multiple program-types and also more likely to participate in additional program-types than are their younger counterparts.

Table D5. Multiple Program-Type Participation by Age Group (As of May 3, 2010)

		Under 18 (N=119)							18 or Over (N=119)					
Program-Type	**#**	**# of Times Participated in Program-Type**						**#**	**# of Times Participated in Program-Type**					
	N	**1**	**2**	**3**	**4**	**5**	**6**	**N**	**1**	**2**	**3**	**4**	**5**	**6**
Advanced Paleo	0	-	-	-	-	-	-	15	15	-	-	-	-	-
Advanced Science Field	2	2	-	-	-	-	-	1	1	-	-	-	-	-
All Girls Expedition	14	12	2	-	-	-	-	19	14	3	2	-	-	-
BioBlitz	3	3	-	-	-	-	-	1	1	-	-	-	-	-
Dinner with a Dinosaur	18	17	1	-	-	-	-	36	33	3	-	-	-	-
Dinosaur Giants	62	46	14	2	-	-	-	74	47	14	8	4	1	-
Discover Your Summer	15	13	2	-	-	-	-	25	18	7	-	-	-	-
EDI AGE Fundraiser	3	3	-	-	-	-	-	0	-	-	-	-	-	-
Fossil Lab	2	2	-	-	-	-	-	17	15	2	-	-	-	-
Green Sahara Lecture	2	2	-	-	-	-	-	5	5	-	-	-	-	-
House Party	0	-	-	-	-	-	-	2	2	-	-	-	-	-
Jane Goodall Lecture	6	6	-	-	-	-	-	4	4	-	-	-	-	-
Junior Paleontologists	24	22	2	-	-	-	-	55	42	12	1	-	-	-
Mammoths and Mastodons	13	13	-	-	-	-	-	2	2	-	-	-	-	-
Mythbusters Lecture	3	3	-	-	-	-	-	3	3	-	-	-	-	-
Nigersaurus Delegation	2	2	-	-	-	-	-	8	8	-	-	-	-	-
Nuts and Bolts	0	-	-	-	-	-	-	1	1	-	-	-	-	-
Old Trail Museum Intern	0	-	-	-	-	-	-	6	5	1	-	-	-	-
PaleoPark Ranch	0	-	-	-	-	-	-	3	3	-	-	-	-	-
PE Office Intern	1	1	-	-	-	-	-	2	2	-	-	-	-	-
Reptile Fest	13	10	3	-	-	-	-	17	12	4	1	-	-	-
Science Chicago Lab Tour	0	-	-	-	-	-	-	1	1	-	-	-	-	-
Senior Celebration	10	8	2	-	-	-	-	25	21	4	-	-	-	-
Sereno Dinosaur Expedition	0	-	-	-	-	-	-	4	4	-	-	-	-	-
Sisters4Science	76	33	28	9	5	0	1	23	12	6	4	1	-	-
Stones and Bones	0	-	-	-	-	-	-	1	1	-	-	-	-	-
Student Blogger	1	1	-	-	-	-	-	1	1	-	-	-	-	-
Summer Science	0	-	-	-	-	-	-	14	14	-	-	-	-	-
SuperCroc Delegation	0	-	-	-	-	-	-	11	11	-	-	-	-	-
Tiktaali Presentation	7	7	-	-	-	-	-	5	5	-	-	-	-	-
When Crocs Ate Dinosaurs	14	14	-	-	-	-	-	6	6	-	-	-	-	-
Winter Science Exploration	72	64	8	-	-	-	-	88	60	21	6	1	-	-
Total	363	284	62	11	5	0	1	475	369	77	22	6	1	0

Examining Table D6 showed similar results. A similar proportional difference was also found in PE alumni survey-takers (183 and 55, compared to 539 and 20 in Table D3). Further, non-takers of the PE alumni survey averaged around 3.23 (592/183) program-types per person, compared to the 4.47 (246/55) of the alumni survey-takers. The larger overall participation in PE in older populations was supported in Table D6 as well.

As a cautionary note, it is evident that many of the program-types were available only for older participants, while others were available for only younger participants, due to the timing of the various events. This may account for some (if not a majority) of the variation in program-type participation in both single and multiple program-type comparisons (which is partly why program-type level comparisons were made with caution in this paper). For example, some program-types were discontinued after the first few years of implementation, making them unavailable for all but the first PE participants who are now considered "18 or over" or "Alumni Survey-Taker." The same might also be true for program-events that were implemented more recently, which makes them unavailable for those who just graduated high school. A future study

should take the program implementation time frame into account when comparing participation rates.

Table D6. Multiple Program-Type Participation by Alumni Survey Participation

		Alumni Survey Non-Takers (N=183)							Alumni Survey Takers (N=55)					
Program-Type	**#**	**# of Times Participated in Program-Type**						**#**	**# of Times Participated in Program-Type**					
	N	**1**	**2**	**3**	**4**	**5**	**6**	**N**	**1**	**2**	**3**	**4**	**5**	**6**
Advanced Paleo	5	5	-	-	-	-	-	10	10	-	-	-	-	-
Advanced Science Field	2	2	-	-	-	-	-	1	1	-	-	-	-	-
All Girls Expedition	27	21	4	2	-	-	-	6	5	1	-	-	-	-
BioBlitz	3	3	-	-	-	-	-	1	1	-	-	-	-	-
Dinner with a Dinosaur	34	33	1	-	-	-	-	20	17	3	-	-	-	-
Dinosaur Giants	97	70	20	7	-	-	-	39	23	8	3	4	1	-
Discover Your Summer	28	22	6	-	-	-	-	12	9	3	-	-	-	-
EDI AGE Fundraiser	3	3	-	-	-	-	-	0	-	-	-	-	-	-
Fossil Lab	11	10	1	-	-	-	-	8	7	1	-	-	-	-
Green Sahara Lecture	3	3	-	-	-	-	-	4	4	-	-	-	-	-
House Party	0	-	-	-	-	-	-	2	2	-	-	-	-	-
Jane Goodall Lecture	10	10	-	-	-	-	-	0	-	-	-	-	-	-
Junior Paleontologists	53	47	6	-	-	-	-	26	17	8	1	-	-	-
Mammoths and Mastodons	14	14	-	-	-	-	-	1	1	-	-	-	-	-
Mythbusters Lecture	4	4	-	-	-	-	-	2	2	-	-	-	-	-
Nigersaurus Delegation	6	6	-	-	-	-	-	4	4	-	-	-	-	-
Nuts and Bolts	0	-	-	-	-	-	-	1	1	-	-	-	-	-
Old Trail Museum Intern	2	2	-	-	-	-	-	4	3	1	-	-	-	-
PaleoPark Ranch	1	1	-	-	-	-	-	2	2	-	-	-	-	-
PE Office Intern	1	1	-	-	-	-	-	2	2	-	-	-	-	-
Reptile Fest	22	18	4	-	-	-	-	8	4	3	1	-	-	-
Science Chicago Lab Tour	1	1	-	-	-	-	-	0	-	-	-	-	-	-
Senior Celebration	20	17	3	-	-	-	-	15	12	3	-	-	-	-
Sereno Dinosaur Expedition	2	2	-	-	-	-	-	2	2	-	-	-	-	-
Sisters4Science	92	41	33	11	6	0	1	7	4	1	2	-	-	-
Stones and Bones	1	1	-	-	-	-	-	0	-	-	-	-	-	-
Student Blogger	1	1	-	-	-	-	-	1	1	-	-	-	-	-
Summer Science	8	8	-	-	-	-	-	6	6	-	-	-	-	-
SuperCroc Delegation	6	6	-	-	-	-	-	5	5	-	-	-	-	-
Tiktaali Presentation	10	10	-	-	-	-	-	2	2	-	-	-	-	-
When Crocs Ate Dinosaurs	14	14	-	-	-	-	-	6	6	-	-	-	-	-
Winter Science Exploration	111	91	16	4	-	-	-	49	33	13	2	1	-	-
Total	592	467	94	24	6	0	1	246	186	45	9	5	1	0

Program Affinity

The previous set of tables examined overall participation of the various program-types. This section introduces the element of the behavior of individual participants. The process in which the data is presented in Table D7 is methodologically simple: The number of times a participant attended one particular PE program or event (e.g., Dinosaur Giants) was summed up according to each PE program or event (e.g., Dinosaur Giants in years 2000, 2002, and 2004 would be summed as a total of 3 for the Dinosaur Giants program). These sums were then divided by the total number of attended programs or events for each of the participants, thus forming a percentage involvement for each program or event. The end result is a column of percentage involvement for each program-type for each participant (797 participants x 32 program-types, or 797 columns x 32 rows). Since such a large matrix would be inefficient to present in a paper, the numbers presented in the "Whole Sample" column of Table D7 is a simple mean of each row, only including incidents of actual participation (as noted by "N"). The mean percent for each program-type is an "affinity factor" that shows the likelihood of a participant's sticking with a particular program-type. For example, a participant who engaged in 10 different program-types, with one event in each, will contribute 10% to each program-type in his or her column. The 10% will lower the mean percent score displayed in the "Whole Sample" column. In contrast, a

participant who participated in 10 events in a single program-type will contribute 100% to that single program-type, increasing its average. In short, a larger mean percent for a particular program-type suggests a higher likelihood that a participant will stick to that particular program-type and avoid other PE program-types. This analysis was broken down between age group and PE alumni survey takers.

Table D7. Mean Percentages of Participation

			Age Group				PE Alumni Survey			
	Whole Sample		Under 18		18 or Over		Not-Taken		Taken	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Advanced Paleo (2)	21	46.47	2	100	19	40.83	10	63.74	11	30.76
Advanced Science Field (1)	3	17.85	2	22.22	1	9.09	2	22.22	1	9.09
All Girls Expedition (19)	51	54.88	26	60.02	25	49.52	44	57.03	7	41.32
BioBlitz (1)	4	16.51	3	18.98	1	9.09	3	18.98	1	9.09
Dinner with a Dinosaur (4)	54	20.53	19	22.82	35	19.29	34	22.49	20	17.2
Dinosaur Giants (10)	377	75.82	234	81.99	143	65.73	329	80.16	48	46.13
Discover Your Summer (2)	49	36.2	16	24.97	33	41.65	37	42	12	18.32
EDI AGE Fundraiser (1)	3	19.53	3	19.53	0	0	3	19.53	0	0
Fossil Lab (6)	19	20	2	14.55	17	20.64	11	22.88	8	16.04
Green Sahara Lecture (1)	7	27.03	2	50	5	17.84	3	44.44	4	13.97
House Party (1)	2	19.64	0	0	2	19.64	0	0	2	19.64
Jane Goodall Lecture (1)	10	15.68	6	16.29	4	14.77	10	15.68	0	0
Junior Paleontologists (21)	117	52.8	42	58.68	75	49.51	92	57.4	25	35.89
Mammoths and Mastodons (1)	15	26.8	13	25.8	2	33.33	14	26.34	1	33.33
Mythbusters Lecture (1)	6	13.37	3	17.63	3	9.12	4	15.72	2	8.68
Nigersaurus Delegation (1)	10	20.5	2	20	8	20.63	6	17.51	4	25
Nuts and Bolts (1)	1	12.5	0	0	1	12.5	0	0	1	12.5
Old Trail Museum Intern (4)	6	20.42	0	0	6	20.42	2	29.55	4	15.86
PaleoPark Ranch (2)	3	26.98	0	0	3	26.98	1	50	2	15.48
PE Office Intern (3)	5	53.64	2	75	3	39.39	3	83.33	2	9.09
Reptile Fest (8)	30	18.63	13	19.1	17	18.26	22	19.52	8	16.17
Science Chicago Lab Tour (1)	1	16.67	0	0	1	16.67	1	16.67	0	0
Senior Celebration (2)	35	20.12	12	21.11	23	19.6	22	19.91	13	20.47
Sereno Dinosaur Expedition (4)	4	16.29	0	0	4	16.29	2	22.5	2	10.08
Sisters4Science (29)	298	81.96	247	84.12	51	71.5	286	83.21	12	52.13
Stones and Bones (1)	1	33.33	0	0	1	33.33	1	33.33	0	0
Student Blogger (1)	2	10.1	1	11.11	1	9.09	1	11.11	1	9.09
Summer Science (2)	31	67.09	7	100	24	57.49	22	76.17	9	44.9
SuperCroc Delegation (1)	12	31.87	0	0	12	31.87	7	39.99	5	20.49
Tiktaali Presentation (1)	13	30.51	8	39.38	5	16.33	11	34.01	2	11.27
When Crocs Ate Dinosaurs (2)	20	18.08	14	20.62	6	12.17	14	20.62	6	12.17
Winter Science Exploration (6)	160	26.91	74	30.34	86	23.96	113	29.37	47	21.01

Examining Table D7 reveals several interesting findings. In the "Whole Sample" column, Dinosaur Giants, Sisters4Science, and Summer Science garnered the largest average percentages, which suggest that participants who engaged in these program-types were extremely likely to continue in that particular program-type rather than move to a new program-type. In contrast, participants of Student Blogger, Nuts and Bolts, and the Mythbusters Lecture were extremely unlikely to continue with that particular program-type.

Opportunities of repetition clearly influence the numbers in Table D7. For example, the Mythbusters Lecture was a public event that had a single possible event in the program-type (as indicated in the parentheses on Table D7). As such, there was no possible opportunity for repeating that particular program-type. In contrast, a program-type such as Sisters4Science had a very large number of possible events, facilitating repetition. By contrast, a low mean percentage with a low number of events suggests that the participant has engaged other activities and has not stopped participating in PE in general (such stopping would make the mean percent close to 100).

In the comparison groups, several notable differences resulted from the analysis. Statistically significant[2] differences were found between the under-18 and 18-and-over age groups for Dinosaur Giants, Sisters4Science, Summer Science, and Winter Science Exploration. In all cases, the younger age group (under 18) showed signs of greater tendency to stick to a single program than their older counterparts (18 and over).

In the comparison between the alumni survey takers and non-takers, a similar pattern resulted. Statistically significant[3] differences were found for Dinosaur Giants, Junior Paleontologists, Sisters4Science, and Winter Science Exploration. Percentages were generally higher for those who did not take the alumni survey, as opposed to those who did.

Skip Participation

Alumni participation in PE programs was also analyzed to examine those participants who showed a "skip" or break between their years of participation (e.g., 2002, 2005). As such, this particular section dealt only with 322 (of the 797) PE participants who participated in at least two events (not program-types). Of these 322 PE participants, 69 of 322 (or 21.4%) displayed a year or more hiatus before re-engaging in PE at some point during their time with the organization. Of the 69, a total of 59 participants who displayed a hiatus returned to participate in a different PE program-type. Of the 69, only 17 participants took a break and returned to participate in the same PE program-type. (Take note that a person could have multiple skips in participation because they showed both skips to the same programs and also skips to different programs. Hence, these statistics are not mutually exclusive.)

[2] Statistically significant with both the independent means t-test and the non-parametric Mann-Whitney U-test (all $p < .05$).
[3] Statistically significant with both the independent means t-test and the non-parametric Mann-Whitney U-test (all $p < .05$).

Appendix E

Table E1: Program-Type to Event

Program-Type	Event
Advanced Paleo	Advanced_Paleontology_FY01, Advanced_Paleontology_FY02
Advanced Science Field	Advanced_Science_Field_Program_FY09
All Girls Expedition	AGE_Teaching_Asst_FY03, AGE_Team_Leader_FY04, AGE_Team_Leader_FY07, AGE_Team_Leader_FY08, AGE_Team_Leader_FY09, AGE_Team_Leader_FY10, AGE=AGE_Teaching_Asst_FY03, GE_Team_Leader_FY04, AGE_Team_Leader_FY07, AGE_Team_Leader_FY08, AGE_Team_Leader_FY09, AGE_Team_Leader_FY10, All_Girls_Expedition_FY03, All_Girls_Expedition_FY04, All_Girls_Expedition_FY05, All_Girls_Expedition_FY07, All_Girls_Expedition_FY08, All_Girls_Expedition_FY09, All_Girls_Expedition_FY10
BioBlitz	BioBlitz_FY09
Dinner with a Dinosaur	Dinner_with_a_Dinosaur_IV_FY04, Dinner_with_a_Dinosaur_IX_FY09, Dinner_with_a_Dinosaur_VIII_FY08, Dinner_with_a_Dinosaur_X_FY10
Dinosaur Giants	DG_OnSite_Coordinator_FY07, DG_OnSite_Coordinator_FY09, DG_OnSite_Coordinator_FY10, Dinosaur_Giants_FY02, Dinosaur_Giants_FY04, Dinosaur_Giants_FY06, Dinosaur_Giants_FY07, Dinosaur_Giants_FY08, Dinosaur_Giants_FY09, Dinosaur_Giants_FY10
Discover Your Summer	Discover_Your_mer_FY07, Discover_Your_mer_FY08
EDI AGE Fundraiser	EDI_AGE_Fundraiser_FY07
Fossil Lab	Fossil_Fest_FY02, Fossil_Lab_Intern_FY05, Fossil_Lab_Intern_FY06, Fossil_Lab_Intern_FY07, Fossil_Lab_Intern_FY08, Fossil_Lab_Intern_FY09
Green Sahara Lecture	Green_Sahara_Lecture_FY09
House Party	House_Party_Mike_Hettwer_FY04
Jane Goodall Lecture	Jane_Goodall_Lecture_FY07
Junior Paleontologists	JP_Teaching_Asst_FY07, JP_Team_Leader_FY00, JP_Team_Leader_FY02, JP_Team_Leader_FY03, JP_Team_Leader_FY04, JP_Team_Leader_FY05, JP_Team_Leader_FY06, JP_Team_Leader_FY07, JP_Team_Leader_FY08, JP_Team_Leader_FY09, JP_Team_Leader_FY10, Junior_Paleontologists_FY00, Junior_Paleontologists_FY02, Junior_Paleontologists_FY03, Junior_Paleontologists_FY04, Junior_Paleontologists_FY05, Junior_Paleontologists_FY06, Junior_Paleontologists_FY07, Junior_Paleontologists_FY08, Junior_Paleontologists_FY09, Junior_Paleontologists_FY10
Mammoths and Mastodons	Mammoths_and_Mastadons_FY10
Mythbusters Lecture	Mythbusters_Lecture_FY09
Nigersaurus Delegation	Nigersaurus_Delegation_FY08
Nuts and Bolts	Nuts_and_Bolts_FY03
Old Trail Museum Intern	Old_Trail_Museum_Intern_FY00, Old_Trail_Museum_Intern_FY01, Old_Trail_Museum_Intern_FY03, Old_Trail_Museum_Intern_FY04
PaleoPark Ranch	PaleoPark_Ranch_Hand_FY02, PaleoPark_Ranch_Hand_FY03
PE Office Intern	PE_Office_Intern_FY03, PE_Office_Intern_FY08, PE_Office_Intern_FY09
Reptile Fest	ReptileFest_FY07__Sat, ReptileFest_FY07__Sun, ReptileFest_FY08__Sat, ReptileFest_FY08__Sun, ReptileFest_FY09__Sat, ReptileFest_FY09__Sun, ReptileFest_FY10__Sat, ReptileFest_FY10__Sun
Science Chicago Lab Tour	Science_Chicago_Lab_Tour_FY09
Senior Celebration	Senior_Celebration_FY09_GPC, Senior_Celebration_FY10_GPC
Sereno Dinosaur Expedition	Sereno_Dinosaur_Expedition_Field_Asst_FY05, Sereno_Dinosaur_Expedition_Field_Asst_FY06, Sereno_Dinosaur_Expedition_Field_Asst_FY07, Sereno_Dinosaur_Expedition_Field_Asst_FY08
Sisters4Science	S4S_Leadership_Retreat_FY08, S4S_Leadership_Retreat_FY09, S4S_Leadership_Retreat_FY10, Sisters4Science_FY01_Triumphant, Sisters4Science_FY03_Triumphant, Sisters4Science_FY03_YWLCS, Sisters4Science_FY04_Triumphant, Sisters4Science_FY04_YWLCS, Sisters4Science_FY05_Triumphant, Sisters4Science_FY05_YWLCS, Sisters4Science_FY06_BASA, Sisters4Science_FY06_PCSSouth_Loop, Sisters4Science_FY06_YWLCS, Sisters4Science_FY07_BASA, Sisters4Science_FY07_PCSSouth_Loop, Sisters4Science_FY07_YWLCS, Sisters4Science_FY08_BASA, Sisters4Science_FY08_PCSCalumet, Sisters4Science_FY08_YWLCS, Sisters4Science_FY09_BASA, Sisters4Science_FY09_PCSCalumet, Sisters4Science_FY09_PCSJoslin, Sisters4Science_FY09_Reavis, Sisters4Science_FY09_YWLCS, Sisters4Science_FY10_PCSCalumet, Sisters4Science_FY10_PCSJoslin, Sisters4Science_FY10_Reavis, Sisters4Science_FY10_YWLCS, Sisters4Science_FY10Spring_Reavis
Stones and Bones	Stones_and_Bones_U_of_C_FY03
Student Blogger	Student_Blogger_FY09
Summer Science	Summer_Science_FY01, Summer_Science_FY02
SuperCroc Delegation	SuperCroc_Delegation_FY02
Tiktaali Presentation	Tiktaalik_Presentation_FY06
When Crocs Ate Dinosaurs	When_Crocs_Ate_Dinosaurs_Film_Docent_FY10, When_Crocs_Ate_Dinosaurs_Film_FY10
Winter Science Exploration	Holiday_Celebration_FY05_MSI__Film, Holiday_Celebration_FY06_Conor_GoodBye, Holiday_Celebration_FY07_MSI__Under_the_Sea, Holiday_Celebration_FY08_Morton_Arboretum, Winter_Science_Exploration_FY09_Shedd, Winter_Science_Exploration_FY10_MSI