INSTITUTE FOR
Learning Innovation

FEST
Families Exploring Science Together
Summative Evaluation Report

New Jersey State Aquarium
The Academy of Natural Sciences
The Franklin Institute Science Museum
The Philadelphia Zoo

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August 2004
(revised December 2004; final revisions June 2005)

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Executive Summary

BACKGROUND

With funding from the National Science Foundation (NSF), four Philadelphia area museums—New Jersey State Aquarium, The Academy of Natural Sciences, The Franklin Institute Science Museum, and the Philadelphia Zoo—collaborated to develop *Families Exploring Science Together* (FEST), a four-year program designed to provide science experiences that stimulate, encourage, and enrich families' interest, involvement, and learning in science. The museums partnered with community-based organizations in culturally diverse neighborhoods in the Philadelphia/Camden region to offer families a variety of science activities designed to increase their levels of involvement and participation in science and science museums. FEST activities ranged from introductory museum experiences to in-depth science inquiry activities, including four different types of programs: *Orientations* (events that were hosted by a community partner and were meant to introduce community partner families to the four museums and the FEST program itself); *Family Science Events* (structured, roughly four-hour-long open houses, offered exclusively to participating FEST families to introduce them to the museums and their resources for family science learning at one of the four area museums); *Family Workshops* (one- to two-hour-long workshops on a specific science topic); and *Special Projects* (all-day workshops that enabled families to explore a specific science topic in great depth).

The Institute for Learning Innovation (the Institute), an Annapolis, MD-based, not-for-profit learning research and development organization, provided comprehensive evaluation support for FEST, coordinating both formative and summative evaluations over the first three years of the project and conducting additional research in Year 4. This report summarizes the summative evaluation findings for this project, drawing on data collected during Years 2, 3, and 4 of the project.

PROJECT GOALS

The FEST program was guided by the following four goals:

- To develop and offer programs and activities which promote the use of science museums and their programs by communities underrepresented in current museum audiences
- To increase parental involvement in science education through hands-on science activities and resources
- To stimulate and engage families in science inquiry and learning
- To demonstrate that long-lasting and effective relationships can be built between informal science education institutions and community-based partners that stimulate, encourage and enrich families' interest, learning, and involvement in science

PROJECT ACTIVITIES

FEST staff at each of the participating institutions developed a menu of informal science programming at various levels of intensity and involvement ranging from introductions to the program, Science Events held at each museum, to more in-depth workshop projects. These programs were then offered to families recruited through a variety of community-based partners serving diverse urban communities.

All of the partners had an extensive constituency and existing family program structure; most had also worked with FEST partners in the previous *Community Connections* project, suggesting that they would make ideal partners for FEST. Research focused on partnerships with community-based organizations has found that the best community partners are those organizations that share the partnering organization's goal or goals (in this case, improving the quality of life for families) and have a desire to collaborate in meaningful ways with others in their community to accomplish that goal. Such organizations already understand what might motivate the particular audience and have an infrastructure for doing so.

Direct mailings from the four area museums and notifications by the community partners were used to get the word out about the program. In addition, the FEST newsletter, *FESTivities*, served as a major means of informing FEST families about upcoming events and provided its readers with background articles on topics that ranged from science-related activities that families could do on their own at home to feature articles about the participating museums.

METHODOLOGY

In order to document the effectiveness and impact of FEST, summative evaluation data were collected using a comprehensive, mixed-methods approach, combining quantitative and qualitative data sources. Seven complementary data collection strategies were employed.

QUANTITATIVE DATA

Database tracking participation in FEST

Throughout the project, Institute researchers and the FEST project team documented participants' visitation patterns and demographic and psychographic data, which FEST staff entered into an ACCESS database. The database was used to document the frequency of attendance by individuals and family groups[1] across the program as a whole and for each of the four event types, to track patterns in participation in these activities and to better understand sustained FEST participation.

Event feedback forms

FEST program participants were asked to complete a written feedback form at the end of each event in Year 3 to assess FEST program impacts. Although close-ended, the feedback form was developed from effective feedback forms used in previous years and from coded open-ended data collected during face-to-face interviews at FEST events in Year 2 to assure validity. Data gathered focused on why families chose to attend various components of the FEST program (events, workshops, and *Special Projects*) and the level of children's and adults' interest and attitudes towards science.

QUALITATIVE DATA

Structured observations during FEST events

Structured observations were conducted by Institute researchers at a subset of events, providing the evaluation team with first-hand insights into the FEST program experience and its impact on

[1] Participants were able to self-define "family" and each self-identified family group was assigned a unique identification number that connected a set of individuals with that particular "family," registered under one person (the main family contact). Families included parents and children, but also grandparents, other relatives, friends, and neighbors. Anyone attending an event was entered as an individual but also assigned to a "family" group. It is acknowledged that this classification procedure introduced possible error because individuals who completed a feedback form were not necessarily involved with FEST at the same level (i.e. infrequent, moderate, or frequent participation) as the family unit with which they participated during that event.

participants. During these visits, Institute researchers observed the events as participant-observers and also informally talked with participants. This method of participatory-observation allowed researchers to understand the participants' experience in an organic and holistic manner.

Interviews

Interviews with families at Events

Face-to-face interviews were conducted with FEST program participants during Family Science Events, as well as at some workshops, to gain a deeper understanding of what motivated families to participate in FEST generally and the different types of FEST programming specifically. In Year 3 telephone interviews with participants who attended Family Workshops and Special Projects utilizing an identical protocol replaced the face-to-face interviews so as not to interfere with participants' experience. These interviews also assessed families' attitudes toward museums, their awareness of museums as resources for family learning generally, and their level of museum literacy—that is, knowledge of how to use museums to satisfy their families' learning interests/needs.

Telephone interviews with a stratified sample of FEST participants

Telephone interviews with a stratified sample of FEST participants, were conducted during Year 3 and Year 4 to develop a more detailed, personalized account of FEST's impact on participating families and to address their perceptions of the various FEST program options, including the effectiveness, frequency, and kind of use of the FEST newsletter (particularly with regard to home-based science learning), and FEST's role in promoting families' interest in visiting museums. These interviews also assessed the extent of participation in program activities at home, in school, through FEST and/or at museums in general, whether families were visiting FEST museums or other informal science learning sites in their leisure time or doing science-related activities at home, e.g. conducting basic experiments or engaging in conversations about science. These data were also used to categorize participants into those who participated "infrequently," "moderately," and "frequently" allowing researchers to understand how these differing users made choices about FEST events and the benefits they derived based on their level of participation. One set of interviews, conducted during Year 3 of the FEST program, was stratified by the event type attended (Family Science Event or workshop/special project); the second set of interviews, conducted in Year 4 after programming was discontinued, was stratified by individual attendance rates, or participation level (i.e., whether they were frequent, moderate, or infrequent participants in FEST as determined by the distribution of attendance by individuals).

Interviews with staff participants

Institute researchers conducted telephone interviews with a FEST project team member from each of the four institutions and a representative from all but four of the community partners. These interviews documented project organization and assessed the efficacy of the FEST model as an exemplary model for museum-community partnerships. The research in Year 4 extended this effort to identify a variety of effective museum-community partnership models.

Focus Group

During the supplemental research in Year 4, Institute researchers conducted a focus group to explore in more detail the characteristics of families that participated in FEST activities frequently. Frequent FEST participants were invited to a FEST Appreciation Day at the Franklin Institute Science Museum, and one adult from each family was then asked to volunteer to participate in a focus group

(seven "frequent" participants attended). Focus group data supported and elaborated on individual interviews conducted with those who participated in FEST frequently. The focus group data were qualitatively analyzed for trends and common themes among participants.

RESULTS & DISCUSSION

Overall FEST was a very successful project, providing many participants with engaging, family-friendly experiences, thus enriching the lives of those who participated in the program.

Goal One: Develop and offer programs and activities which promote the use of science museums and their programs by communities underrepresented in current museum audiences

FINDING #1: FEST institutions successfully developed and offered a variety of programs and activities.

FEST staff at each of the participating institutions developed a menu of informal science programming at various levels of intensity and involvement. Four different types of programs were developed:

A) *Orientations*: Hosted by a community partner and attended by representatives of all four museums, were designed to introduce families to the four museums generally and the FEST program specifically.

B) *Family Science Events*: These structured, roughly four-hour-long open houses at one of the four area museums were exclusively for participating FEST families and designed to introduce them to the science learning resources of each institution.

C) *Family Workshops*: Roughly one- to two-hour-long sessions at one of the four museums were designed for up to 50 participants (approximately 10 families) and focused on a specific science topic related to the content of the participating museums.

D) *Special Projects*: Originally designed as a series of four to six two-hour sessions offered over consecutive or alternating weeks, were changed at the beginning of the second project year into all-day workshops for up to 50 participants (approximately 10 families).

A total of 104 FEST events were held during the three-year research period, and data from all of these events were recorded in the database; most FEST events took place on weekends.

FINDING #2: Significant numbers of individuals and families, traditionally underserved by science museums, participated in FEST programs and activities.

Almost 12,000 primarily African American, Asian and Latino families participated in FEST programs held at the four museums. Each participant took part in at least one structured, hands-on family-oriented science learning experience and almost 80% of those who attended said they would "definitely" return. Almost one third of the FEST participants tracked (32%) returned for at least one additional FEST event. Those visitors who attended more than one event were most likely to attend three, four, or even more events over the course of the three-year effort. Compared to other

comparable community-based programs that the Institute is aware of, these levels of participation are extremely high; in other related projects, participants were more likely to be significantly influenced by the program when only returning to a *second* event in a series.

FINDING #3: Families attended FEST programs for a variety of reasons and word-of-mouth was an effective tool for encouraging participation.

Families participated in FEST for a variety of reasons, including doing something together as a family, to learn, have fun, and explore the participating museums. In the first years, most families who attended FEST events were invited through their affiliated CBOs. Increasingly, families who attended FEST invited family and friends, a hoped-for outcome, suggesting that word-of-mouth can operate over time to reach and engage audiences traditionally underserved by science museums.

Goal Two: Increase parental involvement in science education through hands-on science activities and resources

FINDING #4: The FEST program was appealing to both adults and children with all levels of science interest.

A large percentage of FEST members, even those individuals who did not have high interest in science, indicated that exploring FEST museums was a major benefit of their involvement in FEST, providing their families with multi-generational experiences designed to foster interest and involvement in each other's science exploration.

FINDING #5: FEST families valued the opportunity to explore hands-on science together at the participating museums.

Participants felt that the FEST program was valuable because it gave families the chance to spend "quality family time" together engaged in active experiences. Many also valued the opportunity to learn about science. Museum visits were an ideal mechanism for parents—as well as grandparents, aunts, uncles, and family friends—to learn more about their children's science-related interests, knowledge, and attitudes, and to bring families together around the topics of science.

FINDING #6: Participation in FEST increased parental awareness and involvement in their children's learning generally, and science learning in particular.

Participation in FEST fostered parental awareness and involvement in their children's (and their own) learning generally, and science education in particular. These outcomes were expressed at a variety of levels: for the adults themselves, their children, and the family as a whole.

Goal Three: Stimulate and engage families in science inquiry and learning

FINDING # 7: FEST families developed comfort, interest, and a skill set with which to visit museums and engage in hands-on science effectively together as a family.

Evidence gathered through observations, questionnaires and interviews suggests a growing interest, comfort, and understanding among FEST families about attending FEST institutions and engaging in family-based science learning. Adults in families also discovered that learning is not just for their

children but for them also, and that learning together as a family can be enjoyable and rewarding.

FINDING #8: Many families engaged in a wide range of science learning experiences at home and in the community that built on their in-museum FEST experiences.

Many families, particularly those that participated frequently in FEST, engaged in a variety of science learning experiences that built on their FEST activities, including related conversations back at home, family visits to other science-oriented destinations, conducting home experiments, and assisting children with school and science fair projects. A host of factors probably contributed to this finding including that subsequent reinforcing experiences such as conversations at home might more likely occur after repeated visits, that these families may have been more involved in learning together and conversing about their activities generally, that they may specifically have been more interested and engaged in science, and thus more strongly identified with FEST or some combination of these factors. However, even if these families were predisposed toward science and learning, FEST clearly provided an effective context in which to explore their common interests.

Goal Four: Demonstrate that long-lasting and effective relationships can be built between informal science education institutions and community-based partners that stimulate, encourage and enrich families' interest, learning and involvement in science

Finding# 9: The museums and CBOs that made up FEST were able to work together effectively over four years to create mutually beneficial programs and opportunities for "member" families to engage in meaningful science exploration together.

The challenge of any partnership between museums and community-based organizations is to develop and sustain a strong, collaborative relationship over time. In this respect, the partnership between the FEST museums and the community-based organizations was a success. Partners were all very optimistic about the nature of the collaboration, describing the partnership between the museums and the community-based organizations as a strong relationship based on trust and good communication.

CONCLUSIONS & RECOMMENDATIONS

Findings in this report support the conclusion that FEST contributed to participants' understanding of science and increased their involvement in science, both at the museum and in their homes and leisure time. In particular, FEST attracted families with strong predispositions for science, museums, and family learning, providing them with supportive contexts and experiences in which to explore these common interests. Because of socioeconomic constraints, many of these families would not otherwise have had access to such unique, memorable experiences.

- Families that appreciate meaningful, science experiences will seek out opportunities to attend events that provide such experiences. In fact, interested participants will find a project like FEST through word of mouth. By participating in FEST new families were able to affiliate with participating families, extending FEST's reach into the community.

- The FEST program was based on the assumption that once exposed to museums, people interested in science and learning, but not a part of the traditional visitation, would identify

their value and potential and become visitors. Almost a third of all first-time FEST participants returned to attend at least one more FEST event, and the rate of return increased with every additional event attended.

- FEST enriched the lives of many families by providing adults and children alike with engaging free-choice learning experiences. However, it remains to be seen whether the population will continue to visit local science museums once the program has ended.

Recommendations for Building Strong Museum/Community Relationships

Museum partners named the following elements as important to community partnerships:

- Communication
- Honesty
- Establishing expectations early on
- A willingness to provide programming for the community-based partners
- Knowing about the broad range of community-based organizations
- Having a common goal of wanting to serve the community

The community-based organizations thought the following elements were important for successful partnerships:

- Sharing information and knowledge
- Commitment from all levels of an organization
- Supporting the other partners and learning about each other's roles
- Building on the organization's strengths
- Bringing together diverse ethnic groups
- Flexibility
- Diverse programming
- Continuing community support even after the program ends (sustainability)

Recommendations for Programs Serving New Audiences

Staff members in both museums and community-based organizations were asked to elaborate on important elements in programs that served audiences that do not traditionally visit museums. Specific elements named by museum staff as important in programs serving non-traditional audiences included:

- A clear understanding of what museums can offer and what communities need
- Listening to the needs of the community partners
- Including community members in the creation of programs to foster ownership
- Finding a community liaison
- Providing high quality programming
- Flexibility on the part of museum staff
- Providing easy access to the museum
- Receiving audience feedback

According to a number of the community organization staff that were interviewed, an essential aspect of programs that reach out to underserved families is to treat them with respect and follow through on promises. For programs that serve audiences, which have not traditionally visited museums, the community organizations working with these families suggested that museum partners need to make an effort to understand the new audience and make a long-term commitment before they can begin to serve the community successfully through their programs. The museum staff interviewed largely recognized the long-term nature of the partnership, and at least one staff member emphasized the need for more learning about the community.

At least some of those interviewed were limited either by their role in their organization or the nature of their organization. When asked what they would do differently next time they are involved in a similar collaboration, many partners expressed a desire to accomplish more with the program: raise attendance, devote more time to the program, and work more on relationships with the partners. Community partner liaisons felt that they did not have the resources to devote enough time and attention to the program. For many of these partners, increased time and additional staff would have been necessary to change how they participated in the collaborative.

Some museum staff felt that for programs such as FEST to be truly successful in the long run, ongoing commitment and support was needed from their own museum. This finding suggests that the *long-term* sustainability of a partnership between four museums and more than ten community-based organizations depends on establishing appropriate formal mechanisms to manage and sustain the partnership, institutional memory and trust, and a culture of cooperation that outlasts the involvement of individuals. On the other hand, *short-term* success depends on *individuals* within the organizations rather than on the organization. It is these individuals who need material and organizational support to do their work and do it well. The partnership, at its most basic working level, is comprised of the relationships between individuals within organizations. However, it became apparent over the three-year course of the FEST project that partners who received more support from their organizations were also, on average, more active.

Next Steps

Based upon the overall success of FEST, PISEC is continuing its work in engaging non-traditional families in hands-on science learning. *Community Ambassadors in Science Exploration* (CASE), an NSF-funded program that began in May 2004, will continue the relationship with FEST CBOs and families. CASE will train community members to present science workshops to families at the community sites in one of nine different languages. CASE is the fourth in the series of PISEC partnership grants, each of which has increased the scope and intensity of community involvement in hands-on science learning for families.

Table of Contents

List of Tables

Families Exploring Science Together
Summative Evaluation Report

New Jersey State Aquarium
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The Franklin Institute Science Museum
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Institute for Learning Innovation
Annapolis, MD

August 2004
(revised December 2004; final revisions June 2005)

INTRODUCTION

Four major informal science education institutions in the Philadelphia region—New Jersey State Aquarium, The Academy of Natural Sciences, The Franklin Institute Science Museum, and the Philadelphia Zoo—collaborated on *Families Exploring Science Together* (FEST), originally a three-year program, which was extended for one year of additional research and programming. FEST was designed to provide science experiences that stimulate, encourage, and enrich families' interest, learning, and involvement in science. With funding from the National Science Foundation, William Penn Foundation, the Hearst Foundation, the Fund for New Jersey, and the Hasbro Children's Foundation, these museums partnered with community-based organizations in culturally diverse neighborhoods in the Philadelphia/Camden region to offer families a wide range of science activities, from introductory museum experiences to more in-depth, science-inquiry experiences.

The Institute for Learning Innovation (the Institute), a not-for-profit learning research and development organization, provided comprehensive evaluation support for FEST, coordinating

both formative and summative evaluation over the three years of the project and conducting additional research in Year 4. This report summarizes the summative evaluation findings for this project, drawing on data collected during Years 2, 3 and 4 of the project.

BACKGROUND & DESCRIPTION OF FEST

In 1993, four Philadelphia area informal science education institutions – New Jersey State Aquarium, Academy of Natural Sciences, Franklin Institute Science Museum, and the Philadelphia Zoo – collaborated to form the Philadelphia/Camden Informal Science Education Collaborative (PISEC). The four PISEC institutions share a common mission to increase public interest, learning and involvement in science through interactive exhibitions, programs, web-based outreach and other activities. Between 1993 and 1999, the PISEC group led two initiatives: the *Family Science Learning Project*, a research and exhibition development project aimed at enhancing family learning in informal science settings, and *Community Connections*, a program funded by The Pew Charitable Trusts, that promoted museum-based learning for families from traditionally under-represented populations.

In 2000, PISEC developed their third initiative, *Families Exploring Science Together* (FEST). Building on museum-community partnerships established during *Community Connections*, FEST provided informal science education opportunities for families from culturally diverse neighborhoods in the Philadelphia/Camden region, traditionally underserved by cultural institutions such as museums.[2]

PROJECT GOALS

The FEST program was guided by the following four goals:

- To develop and offer programs and activities which promote the use of science museums and their programs by communities underrepresented in current museum audiences
- To increase parental involvement in science education through hands-on science activities and resources
- To stimulate and engage families in science inquiry and learning
- To demonstrate that long-lasting and effective relationships can be built between informal science education institutions and community-based partners that stimulate, encourage and enrich families' interest, learning, and involvement in science

FEST staff at each of the participating institutions developed a menu of informal science programming at various levels of intensity and involvement ranging from introductions to the program, Science Events held at each museum, to more in-depth workshop projects. These programs were then offered to families recruited through eleven community partners (see their names and acronyms below).

[2] Throughout the report, we will refer collectively to the four Philadelphia area FEST institutions as museums. These four museums have collaborated for more than ten years as part of the Philadelphia/Camden Informal Science Education Collaborative (PISEC).

Key to Community Partner acronyms

Acronym	Community Partner
AAU	Asian-Americans United
CHA	Housing Authority of the City of Camden
FGM	Frankford Group Ministries
IAC	Indo-Chinese American Council
IL	Ivy Leaf School
IMANI	Imani Education Circle Charter School
LEAP	LEAP Academy Charter School
NSNP	Norris Square Neighborhood Project
ST	African Episcopal Church of St. Thomas
WPP*	West Philadelphia Partnership
YSI	Youth Service, Inc.

* WPP discontinued its partnership with FEST as of June 30, 2002.

All of the partners had an extensive constituency and existing family program structure; most had also worked with FEST partners in the previous *Community Connections* project, suggesting that they would make ideal partners for FEST. Research focused on partnerships with community-based organizations has found that the best community partners are those organizations that share the partnering organization's goal or goals (in this case, improving the quality of life for families) and have a desire to collaborate in meaningful ways with others in their community to accomplish that goal. Such organizations already understand what might motivate the particular audience and have an infrastructure for doing so. Thus the usual challenges that arise in such efforts related to recruitment and the continued engagement of the audience, have at least been discussed if not solved (Dierking, Luke, Foat & Adelman, 2002).

Direct mailings from the four area museums and notifications by the community partners were used to get the word out about the program. In addition, the FEST newsletter, *FESTivities*, served as a major means of informing FEST families about upcoming events and provided its readers with background articles on topics that ranged from science-related activities that families could do on their own at home to feature articles about the participating museums.

METHODOLOGY

In order to document the effectiveness and impact of FEST, summative evaluation data were collected using a comprehensive, mixed-methods approach, combining quantitative and qualitative data sources. Seven complementary data collection strategies were employed.

QUANTITATIVE DATA

Database tracking participation in FEST

Throughout the project, Institute researchers and the FEST project team documented participants' visitation patterns and demographic and psychographic data, which FEST staff entered into an ACCESS database. The database was used to document the frequency of

attendance by individuals and family groups[3] across the program as a whole and for each of the four event types, to track patterns in participation in these activities and to better understand sustained FEST participation.

Event feedback forms

FEST program participants were asked to complete a written feedback form at the end of each event in Year 3 to assess FEST program impacts. Although close-ended, the feedback form was developed from effective feedback forms used in previous years and from coded open-ended data collected during face-to-face interviews at FEST events in Year 2 to assure validity (Appendix A). Data gathered focused on why families chose to attend various components of the FEST program (events, workshops and *Special Projects*), and the level of children's and adults' interest and attitudes towards science. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead.

QUALITATIVE DATA

Structured Observations during FEST events

Structured observations were conducted by Institute researchers at a subset of events, providing the evaluation team with first-hand insights into the FEST program experience and its impact on participants. During these visits, Institute researchers observed the events as participant-observers and also informally talked with participants. This method of participatory-observation allowed researchers to understand the participants' experience in an organic and holistic manner.

Interviews

Interviews with Families at Events

Face-to-face interviews were conducted with FEST program participants during *Family Science Events*, as well as at some workshops, to gain a deeper understanding of what motivated families to participate in FEST generally and the different types of FEST programming specifically. In Year 3 telephone interviews with participants who attended *Family Workshops* and *Special Projects* utilizing an identical protocol replaced the face-to-face interviews so as not to interfere with participants' experience. These interviews also assessed families' attitudes toward museums, their awareness of museums as resources for family learning generally and their level of museum literacy—that is, knowledge of how to use museums to satisfy their families' learning interests and needs (See Appendix B).

[3] Participants were able to self-define "family" and each self-identified family group was assigned a unique identification number that connected a set of individuals with that particular "family," registered under one person (the main family contact). Families included parents and children, but also grandparents, other relatives, friends, and neighbors. Anyone attending an event was entered as an individual but also assigned to a "family" group. It is acknowledged that this classification procedure introduced possible error because individuals who completed a feedback form were not necessarily involved with FEST at the same level (i.e. infrequent, moderate, or frequent participation) as the family unit with which they participated during that event.

Telephone Interviews with a Stratified Sample of FEST Participants

Telephone interviews with a stratified sample of FEST participants were conducted during Year 3 and Year 4 to develop a more detailed, personalized account of FEST's impact on participating families and to address their perceptions of the various FEST program options, including the effectiveness, frequency, and kind of use of the FEST newsletter (particularly with regard to home-based science learning), and FEST's role in promoting families' interest in visiting museums. These interviews also assessed the extent of participation in program activities at home, in school, through FEST and/or at museums in general, whether families were visiting FEST museums or other informal science learning sites in their leisure time or doing science-related activities at home, e.g. conducting basic experiments or engaging in conversations about science. These data were also used to categorize participants into those who participated "infrequently," "moderately" and "frequently" allowing researchers to understand how these differing users made choices about FEST events and the benefits they derived based on their level of participation. One set of interviews, conducted during Year 3 of the FEST program, was stratified by the event type attended (Family Science Event or workshop/special project); the second set of interviews, conducted in Year 4 after programming was discontinued, was stratified by individual attendance rates, or participation level (i.e., whether they were frequent, moderate or infrequent participants in FEST as determined by the distribution of attendance by individuals). The interview guides for these three sets of interviews are in Appendix C.

Interviews with Staff Participants

Institute researchers conducted telephone interviews with a FEST project team member from each of the four institutions and a representative from all but four of the community partners (Appendix D). These interviews documented project organization and assessed the efficacy of the FEST model as an exemplary model for museum-community partnerships. The research in Year 4 extended this effort to identify a variety of effective museum-community partnership models.

Focus Group

During the supplemental research in Year 4, Institute researchers conducted a focus group to explore in more detail the characteristics of families that participated in FEST activities frequently. Frequent FEST participants were invited to a FEST Appreciation Day at the Franklin Institute Science Museum, and one adult from each family was then asked to volunteer to participate in a focus group (seven "frequent" participants attended). Focus group data supported and elaborated on individual interviews conducted with those who participated in FEST frequently. The focus group data were qualitatively analyzed for trends and common themes among participants. The protocol is in Appendix E.

RESULTS & DISCUSSION

Goal One: Develop and offer programs and activities which promote the use of science museums and their programs by communities underrepresented in current museum audiences

FINDING #1: FEST institutions successfully developed and offered a variety of programs and activities.

FEST staff at each of the participating institutions developed a menu of informal science programming at various levels of intensity and involvement. Four different types of programs were developed:

A) *Orientations*: Hosted by a community partner and attended by representatives of all four museums, were designed to introduce families to the four museums generally and the FEST program specifically. *Orientations* were discontinued during Year 2 of FEST.

B) *Family Science Events*: These structured, roughly four-hour-long open houses at one of the four area museums were exclusively for participating FEST families and designed to introduce them to the science learning resources of each institution.

C) *Family Workshops*: One- to two-hour-long sessions at one of the four museums were designed for up to 50 participants (approximately 10 families) and focused on a specific science topic related to the content of the participating museums. They were designed to immerse families in a group science learning experience.

D) *Special Projects*: Originally designed as a series of four to six two-hour sessions offered over consecutive or alternating weeks, were changed at the beginning of the second project year into all-day workshops for up to 50 participants (approximately 10 families). These projects enabled families to explore a specific science topic in an in-depth manner.

A total of 104 FEST events were held during the three-year research period, and data from all of these events were recorded in the database (134 events were scheduled; 30 were cancelled due to poor weather or insufficient pre-registration). Most FEST events took place on weekends. At the time of data analysis (Summer 2003), an additional four events with a total of approximately 200 participants took place, one at each of the four museums.

The frequency of programming was fairly consistent over the three years of the project: 35 events were held in the first year, 31 during the second year, and 38 (42, including four extra summer workshops) during the third year. Few Orientation events occurred in Year 2, while the number of *Family Workshops* more than doubled in Year 2. Both the frequency and format of the *Special Projects* changed between Years 1 and 2. Initially a series of workshops, *Special Projects* were condensed into all-day events in Year 2 because data showed that the majority of active FEST members preferred this format. More *Family Workshops* were held than any other type of program (n=51), followed by *Special Projects* (n=31), *Family Science Events* (n=12, one at each institution per year), and *Orientations* (n=10), discontinued during the second year of the project since they primarily served to introduce the four area science museums to potential FEST participants (Table 1).

Table 1: Frequency of event types held

Type of Event	Year 1	Year 2	Year 3	Total
Family Science Event	4	4	4	12
Orientation	9	1	n/a	10
Special Project	14	9	8	31
Family Workshop	8	17	26	51
Total	35	31	38	104

Source: FEST Database

Researchers also documented the frequency of events and attendance numbers for each of the four FEST sites. Over the course of the three years, the New Jersey State Aquarium held a total of 38 FEST events (37% of total FEST events accounting for 29% of all visits)—the most of any of the FEST museums. The Academy of Natural Sciences held 22% of the FEST events, accounting for 18% of visits, followed by the Zoo (19% of events; 29% of visits) and the Franklin (13% of events; 19% of visits). The *Orientations*, which occurred at the community partner sites rather than at one of the four FEST museums, accounted for 10% of total FEST events and 4% of all FEST visits.

FINDING #2: Significant numbers of individuals and families, traditionally underserved by science museums, participated in FEST programs and activities.

Almost 12,000 primarily African American, Asian and Latino families participated in FEST programs held at the four museums. Each participant took part in at least one structured, hands-on family-oriented science learning experience and almost 80% of those who attended said they would "definitely" return. Almost one third of the FEST participants tracked (32%) returned for at least one additional FEST event. Those visitors who attended more than one event were most likely to attend three, four, or even more events over the course of the three-year effort.

WHO PARTICIPATED IN FEST?

Overall FEST Participation by Individuals

Over the course of the three years, researchers recorded 11,900 FEST visits by individuals, 83% of which were to *Family Science Events*, 9% to *Special Projects*, and 4% each to *Family Workshops* and *Orientations* (Table 2). More than 18,000 individuals pre-registered for FEST events over the course of the project and one-third were "no-shows" (33%), despite free entrance, food, parking, and other benefits. An effort to interview a subset of "no-shows" in Year 2 suggested that reasons for not attending had much more to do with people's busy schedules, last minute changes, weather, illness, or transportation problems, than any factor related to the program.

Table 2: Individual visits to different types of FEST events per year

Event Type	Year 1 (n=2,925)	Year 2 (n=3,289)	Year 3 (n=5,686)	All three years (n=11,900)
Family Science Event	63%	86%	91%	83%
Orientation	17%	1%	0%	4%
Family Workshop	8%	5%	2%	4%
Special Project	12%	8%	7%	9%

Source: FEST Database

More people attended *Family Science Events* than the other three event types (Table 3). *Orientations* had the next highest average attendance. The least number of individuals attended *Special Projects* and Workshops, as would be expected due to the in-depth nature of these programs and the fact they were specifically designed for a smaller number of families).

Table 3: Average number of people attending each event

Type of Event	Average # of Individuals Attending
Family Science Event	821
Orientation	53
Special Project	17
Workshop	20

Source: FEST Database

An analysis of the number of visits per year by individual FEST members revealed that the number of one-time visits per year increased from 68% in Year 1 to 75% in Year 2 and 78% in Year 3. Overall, 68% of all individual FEST members (8,092) visited one FEST event, 16% (1,904) came to two FEST events, 8% (952) came three times, 4% (476) four times, and 2% attended five FEST events (238) and more than five (238) respectively.

Residence of FEST Participants

The majority of FEST participants came from Pennsylvania, with a significant minority from New Jersey (Table 4). Most came from the large metropolitan areas of Philadelphia and Camden.

Table 4: Residence of FEST participants

Location	States/Cities	%	Cities as % of State Attendance
Pennsylvania	2628	87%	
Philadelphia	2538	84%	97%
New Jersey	373	12%	
Camden	309	10%	83%
Other states	7	0.2%	
Total	3008	100.0%	

Source: FEST Database

Age Distribution of FEST Participants

Families came with children of diverse ages, ranging from toddlers to teenagers. Most adults accompanying children were in their 30s, followed by those in their 20s and 40s (refer to Table 5). Because of the range of diverse ages, it was a considerable challenge to design targeted, yet age-appropriate, programs that all ages could enjoy.

Table 5: Age distribution of FEST participants

Individuals by Age	Year 1-3	
	Number	Percentage
Less than 5 years	499	11%
5-10 years	1323	30%
11-15 years	811	18%
16-19 years	154	4%
20s	332	8%
30s	585	13%
40s	418	9%
50s	166	4%
60+	149	3%
Total	4437	100.0%

Source: FEST Database

Race/Ethnicity of FEST Participants

Table 6 presents the race/ethnicity findings of FEST participants. The racial/ethnic composition of participants to all FEST programs reflected that of Family Science Event participants because three-quarters of all visits by individuals were to those events. Less frequent participation by Asian Americans in *Special Projects* and Workshops can be attributed to language barriers. The percentage of Caucasians attending workshops and special projects increased, however, the data collected did not reveal why this was the case.

Table 6: Participation by individuals in FEST as a function of ethnicity/race

Ethnicity/ Race	*All FEST events*		*Family Science Events*		*Orientations*		*Workshops*		*Special Projects*	
	N	%	N	%	N	%	N	%	N	%
African-American	4821	55%	3830	54%	349	68%	483	58%	159	38%
Asian-American	1339	15%	1248	18%	61	12%	15	2%	15	4%
Latino	1606	18%	1331	19%	38	7%	176	21%	61	14%
Multiracial/other	228	3%	160	2%	30	6%	23	3%	15	4%
Native American	15	0	4	0	8	2%	3	0	0	0%
Caucasian	813	9%	478	7%	28	5%	136	16%	171	40%
Total	8822	100%	7051	100%	514	100%	836	100%	421	100%

Source: FEST Database.

Individuals' Participation in FEST Tracked by Community Partner Affiliation

Table 7 presents the yearly and total participation of individuals tracked by each community partner. In the first year of FEST, 2,935 individual visits were registered). The number of individual visits increased slightly in Year 2. However, in Year 3, the number of individual visits rose dramatically to 5,686—an increase of 78% over Year 2.

Table 7: Individuals' participation in FEST tracked by community partner affiliation

Community Partner Affiliation	Contribution to Year 1 Participation (n=2,935)	Contribution to Year 2 Participation (n= 3,156)	Contribution to Year 3 Participation (n=5,686)	Contribution to Total Participation (n= 11,777*)
Asian Americans United (AAU)	18%	17%	17%	17%
Frankford Group Ministries (FGM)	20%	17%	15%	17%
Youth Services Inc. (YSI)	10%	11%	11%	11%
African Episcopal Church of St. Thomas (ST)	9%	11%	12%	10%
IMANI (Charter School)	11%	10%	10%	10%
Indo-Chinese American Council (IAC)	9%	6%	10%	9%
Ivy Leaf (School)	9%	8%	7%	8%
Norris Square Neighborhood Project (NSNP)	6%	8%	8%	8%
LEAP Academy (Charter School)	5%	9%	4%	6%
West Philadelphia Partnership (WPP)**	3%	2%	2%	2%
Housing Authority of the City of Camden (CHA)	0.0%	1%	2%	1%
Unknown	0.4%	0.1%	2%	1%

Source: FEST Database.

(*) Missing data since not all recorded visits could be assigned to a partner or year. The total number of individual visits was n=11,900.

(**) WPP discontinued its partnership with FEST as of June 30, 2002

Participation rates over the three years of the project for individuals affiliated with the Asian American United (AAU) and the Frankford Group Ministries (FGM) were considerably higher than the average rate for all CBOs (18% and 17%, respectively); while Youth Services Inc. (YSI; 11%), St. Thomas Church (STI; 11%), and IMANI Charter School (10%) all showed slightly above-average relative individual participation rates. There was fairly stable participation by individuals for each community group with the exception of FGM, whose rate declined from

20% to 15% (although as indicated, participation rates over the three years of the project for individuals connected to FGM were considerably higher than the average rate for all CBOs).

These individuals, tracked by their community partner affiliation and referred to as community partner members, had different preferences for the four FEST program options. For instance, AAU members preferred *Family Science Events*: 19% of all visits to *Family Science Events* were made by their members. However, this group did not attend *Special Projects* or *Family Workshops* in high numbers: 13% of *Special Projects* and just 5% of all *Family Workshops* attendees were AAU members. FGM members accounted for the second highest overall attendance by individuals, comprising 16% of all such visits, and also attended *Family Workshops* and the *Special Projects* most frequently. Twenty-five (25%) of the attendance at *Family Workshops* and more than half of those attending *Special Projects* were FGM community members. Community members of the Indo-American Council and Ivy Leaf School also demonstrated a preference for the more intimate, one-to two-hour-long *Family Workshops* (though not the all-day *Special Projects*), accounting for 23% and 18% of attendance at these events, respectively.

Levels of FEST participation by individuals

The distribution of the number of visits to FEST programs by individuals was used to derive levels of participation by individuals per year; participants who attended just one event were classified as "infrequent" participants; those who attended 2-5 events were classified as attending "moderately;" and those who came to more than 5 FEST events were termed "frequent" participants (Table 8).

Table 8: Levels of participation by individuals per year

Number of Events Attended	Individuals who attended a given number of events			
	Year 1 (n=1,867)	Year 2 (n=2,400)	Year 3 (n=4,256)	All 3 years (n=6,950)*
"Infrequent" = 1 visit	68%	75%	77%	68%
"Moderate" = 2-5 visits	30%	24%	22%	29%
"Frequent" = 6-12 visits	2%	1%	1%	3%
Total number of visits	2,925	3,289	5,686	11,900
Average number of visits	1.57	1.37	1.34	1.71

Source: FEST Database
(*) The database did not include community partner affiliation for some (referred to as unknown in Table 9), accounting for the discrepancy in n between Tables 8 & 9.

Compared to other comparable community-based programs that the Institute is aware of, the levels of participation for FEST are extremely high; in other related projects, participants were more likely to be significantly influenced by the program when only returning to a *second* event in a series (Adelman, Dierking & Adams, 2000). Based on the finding that almost a third of the participants (32%) attended two or more FEST events with half of those (16%) attending more than three events, one could surmise that FEST was an extremely engaging program for participants.

These levels of participation were then analyzed as a function of a number of independent variables, including community-based organization (CBO) membership, venue preferences, age,

race/ethnicity, gender, household composition, annual income, and level of education. In terms of community-based organization affiliation, researchers found that 9% of the Frankford Group Ministries' (FGM) members were considered "frequent" participants (three times the average of the other organizations combined). Not surprisingly, the highest percentage of participants who frequently attended FEST also was recruited through FGM: 35% of all frequent participants registered as members of FGM. Asian American United and St. Thomas also contributed relatively high percentages to the overall FEST frequent participant sample (12% and 11%, respectively). Otherwise, the distribution of frequent, moderate, and infrequent participants among the partnering community-based organizations was relatively uniform (Table 9).

Table 9: Levels of participation by individuals tracked by community partner affiliation

Community Partner Affiliation	Infrequent Users (n=4,722)	Moderate Users (n=2,013)	Frequent Users (n=203)**
Asian Americans United (AAU)	19%	18%	12%
Housing Authority of the City of Camden (CHA)	2%	2%	0%
Frankford Group Ministries (FGM)	9%	14%	35%
Indo-Chinese American Council (IAC)	10%	9%	5%
IMANI (Charter School)	11%	11%	7%
Ivy Leaf (School)	7%	9%	7%
LEAP Academy (Charter School)	6%	6%	6%
Norris Square Neighborhood Project (NSNP)	8%	8%	7%
African Episcopal Church of St. Thomas (ST)	12%	10%	11%
Unknown	2%	0%	2%
West Philadelphia Partnership (WPP)*	1%	3%	0%
Youth Services Inc. (YSI)	14%	10%	6%

Source: FEST Database

(*) WPP discontinued its partnership with FEST as of June 30, 2002

(**) The database did not include community partner affiliation for some participants (referred to as unknown above), accounting for the discrepancy in n between Tables 8 & 9.

Researchers also assessed the relationship between CBO membership and FEST participation among participants—that is, to what extent did FEST participants join a CBO *because* of FEST programming? Almost a third (32%) of the frequent participants in the interview sample had been members of the CBO before FEST. Interestingly, more than a third (36%) were not a member of a CBO before FEST, but became a member of a CBO because of their involvement in FEST. The remaining 32% of those who participated frequently who were interviewed reported that they were never a member of a partnering CBO, although they did hear about FEST programming through the CBO. Interestingly, moderate and infrequent participants both were more likely to be members of a CBO (64% and 53%, respectively).

To analyze the venue preferences of infrequent, moderate, and frequent participants, researchers divided the four FEST institutions into two groups: institutions with live animals (the Zoo and the Aquarium) and those without (the Academy and the Franklin). Those who participated infrequently showed a preference for the Zoo and the Aquarium, while frequent participants exhibited a preference for the Academy and the Franklin. Quantitative data shows that the Academy and the Franklin attracted relatively fewer infrequent participants than did the Aquarium or the Zoo: approximately 30% of FEST visits to the Academy and the Franklin were by infrequent FEST users, while 43% of the visits to the Aquarium and 47% of the visits to the

Zoo were by infrequent FEST users. Conversely, moderate and frequent participants visited the Academy and the Franklin more often than the Aquarium or the Zoo (30% of the 4,551 individual visits made by infrequent participants went to the Academy and the Franklin; 70% of visits made by infrequent participants went to the Zoo and the Aquarium, which is 2.4 times as many). These data again support the notion that the Zoo and the Aquarium (the live animal destinations) were more attractive destinations than the Academy and the Franklin for those who participated in FEST infrequently. Location of the museum may have had an influence also. The Franklin and Academy are in Center City and infrequent visitors might have found it difficult to get there. It is also possible that the fact that there were more program offerings (58 for the AQ and ZOO; 36 for FI and ANS) was a factor also. Interestingly, the Academy has live animals, so it might just have been a perception of which museums have live collections or not.

Information on race/ethnicity was available for only 67% of the individuals (not uncommon for these kind of data), and there was no marked difference in terms of the ethnic composition between those who participated in FEST infrequently and moderately, though the highest percentage of those who participated frequently were African American. The ethnic composition of frequent FEST participants differed from that of infrequent and moderate participants. The frequent-user group consisted of more Caucasians and fewer African- and Asian-Americans than did the infrequent and moderate users (see Table 10).

Table 10: Levels of participation by individuals tracked by race/ethnicity

Ethnicity	User Level*			
	Infrequent User (n=2,819)	Moderate User (n=1,623)	Frequent User (n=183)	Total (n=4,625)
Caucasian	2.9%	6.2%	25.7%	4.9%
Latino/Hispanic	18.8%	16.6%	21.3%	18.1%
African American	56.3%	57.5%	43.2%	56.2%
Asian American	19.9%	16.2%	6.6%	18.1%
Multiracial/Other	2.2%	3.5%	3.3%	2.7%

Note: Data from FEST Database; * P<.0001.

Gender information was available for 94% of individuals in the database and languages spoken at home for 74%; there were no significant differences between levels of participation for either of these independent variables.

Interview data suggested that frequent participants were more likely than moderate or infrequent participants to live in two-adult households. More than two-thirds (70%) of frequent participants who were interviewed by telephone reported having two adults in their household, compared to 50% of moderate and 54% of infrequent users. Those who participated moderately were the most likely to live in a one-adult household (46% of all moderate users), compared to 29% of infrequent and 17% of frequent users. In addition, those who participated frequently were more likely to live in two-child households (50%), than were moderate (27%) or infrequent users (25%); while moderate and infrequent users were much more likely than frequent users to have no children in their household. More than one-fifth (23%) of those who participated moderately and 13% of those who participated infrequently reported having no children in their household. Some of these adults commonly took their grandchildren or other relatives who did not live with them to FEST events; others took children in their neighborhoods to the events, even though they had no children of their own. In such cases, it is likely that these users came to FEST events less

often than did frequent participants because they did not have a "ready-made" audience of children living with them.

Researchers also found though phone interviews that levels of participation did seem to vary as a function of household income; participants who attended frequently and moderately were more likely to report incomes above $35,000 (59% and 61% respectively), than were those attending infrequently (47%). In terms of education level, those attending frequently were more likely than moderate and infrequent participants to hold at least a bachelor's degree (50% of frequent participants, compared to 38% of moderate and 13% of infrequent participants). Participants attending infrequently were also much more likely to have completed "some college," with 41% of infrequent participants in this category, compared to 18% of those attending frequently and 24% of those attending moderately.

Institute researchers also sought information through the telephone interviews on the type of education the children participating in FEST were receiving, as well as the parents' attitudes toward their children's education (Because a few parents had multiple children attending different types of schools, these responses do not total 100 %.) For example, in one family, the six-year-old daughter attended a public school, while the eight-year-old son was enrolled at a Catholic elementary school.) For all three levels of participation, about half of the parents had at least one child attending a traditional public school, with 47% of the frequent participants, 45% of the moderate participants, and 55% of those attending infrequently having a child in public school. Approximately half of all the parents at each level of participation had a child in either a charter or private school (47% of the frequent participants, 55% of the moderate ones, and 50% of the infrequent). Frequent users were much more likely to home school their children (19%), than moderate (5%) or infrequent (0%) users.

Researchers also collected data on FEST members' prior visitation to the four FEST institutions through phone interviews. Those attending frequently were more likely than moderate and infrequent participants to have visited the Academy of Natural Sciences prior to their involvement with FEST ($p<.0001$). Almost two-thirds of infrequent participants and 61% of those attending moderately, but only 52% of frequent participants, had never been to the Academy. Conversely, frequent users of FEST were more likely to have visited the Academy four or more times: 10% versus 4% of moderate and 2% of infrequent participants.

There was no significant effect of prior visits to the Franklin Institute as a function of the three levels of participation, partially because frequent participants exhibited a higher percentage of no prior visits (63%) than those attending moderately and infrequently (55%). There were no significant effects of prior visits to the New Jersey Aquarium ($p=.062$) and to the Philadelphia Zoo between infrequent, moderate and frequent participants, where moderate and frequent users were only slightly more likely than infrequent users ($p=.02$) to have visited the Zoo prior to participating in FEST. Prior participation in the *Community Connections* project may have been a slight influence but it was not significant.

FEST Participation by Families

FEST attendance was also recorded at the family level by tracking the main family contact who filled out the feedback form initially, providing basic information about the family, their museum-going habits, museum membership, and experience with the four FEST museums. This strategy was necessary because participants were able to self-define "family;" each self-identified family group was assigned a unique identification number that

connected a set of individuals with that particular "family," registered under one person (the main family contact) and when an individual who was registered under a specific family ID visited an event, the whole "family" was recorded as attending. Thus, these participation figures represent "the total number of visits by individuals in the family group," rather than "total visits per family group," which is why it was necessary to focus on the main family contact. This classification procedure may have introduced some possible error into the data because the main family contact who completed a feedback form was not necessarily involved with FEST at the same level (i.e. infrequently, moderately, or frequently participating) as all members of the family unit. However, it was possible to analyze and discuss some of these participation findings and families serve as the unit of analysis for findings later in the report. Family attendance was stable between Year 1 and 2 with about 500 families, but increased almost 50% in Year 3. At the same time, average attendance per event increased from 15 families per event in Year 1 to 16 in Year 2 and 19 in Year 3. Ultimately 1,025 family groups participated in FEST activities, comprising 1,755 visits. On average families were composed of 4-5 members.

Prior Experience with the Four FEST Institutions of Families Participating in FEST

When families pre-registered for the first time to attend a FEST event, the main family contact was asked to complete a survey that provided basic information about the family, their museum-going habits, museum membership, and experience with the four FEST museums. As part of these surveys, he/she was asked to state whether—and if yes, how often—they had previously visited the Philadelphia Zoo, the Franklin Institute Science Museum, the Academy of Natural Sciences, and the New Jersey State Aquarium. A total of 570 of the 1,025 families (56%) completed the survey. The Zoo was the most visited of the four area museums prior to FEST: 50% of the families had visited the Zoo at least once before their involvement with FEST, compared to 41% for the Franklin, 37% for the Aquarium and 32% for the Academy of Natural Sciences. The Zoo not only had been visited most by FEST families prior to FEST, it also had the highest frequency of repeat visitation: 17% of the families had already visited the Zoo at least three times, compared to 10% for the Franklin and 6% each for the Academy and the Aquarium. Such high prior visitation rates may have been in part a result of prior PISEC efforts since former participants of *Community Connections* were invited to join FEST.

Thirteen percent of those completing feedback forms in Year 3 stated that they were currently a member of a museum; of those who were not, 20% had been members of a museum at one time in the past. Thus, almost 30% of those who returned feedback forms during a Year 3 FEST event were current or former museum members (though not necessarily members of the four FEST museums).

Researchers also sought information about prior museum attendance. Eighty-six percent (n=77) of families interviewed face-to-face had previously visited the museum that was hosting the event or program. Of these, almost half (49%) had previously visited the hosting museum on a family visit, 31% as part of a childhood field trip, and 23% for another FEST and/or PISEC program.

Participants in the face-to-face interviews were also asked whether they had visited other science-related institutions in the previous year, including the other FEST museums not hosting that particular event. The vast majority of those who answered this question (90%, n=77) stated that they had in fact visited other science-related institutions during the previous year. Not surprisingly, people most often mentioned one of the other four area science museums. Fifty-eight percent of all visits to science-related places in the previous year were to the Aquarium. People had also frequently visited the Franklin Institute (48%), the Academy of Natural Science

(46%), and the Philadelphia Zoo (43%) during the previous year. Sixteen percent had visited the Please Touch Museum, a children's museum located across the street from the Franklin Institute. Overall, the 77 people interviewed reported a total of 209 total visits to science-related institutions the previous year.

Families' Participation in FEST Tracked by Community Partner Affiliation

The average size of the families participating in FEST varied among community partners but ranged from a low of 2 for Ivy Leaf School to a high of 6 for the West Philadelphia Partnership (as previously mentioned, participants were able to self-define family). Average family size of those participating as community partner members remained relatively stable over the three years of the project. Family attendance averages varied between community partners, ranging from a low of only one visit per family over the course of the three years for the Indo-Chinese American Council to a high of almost 3 for the Housing Authority of the City of Camden.

Table 11 presents families' participation in FEST tracked by community partner. More families from the Asian American United (AAU) participated in FEST than any other community partner. Over the course of the project's three years, families from AAU comprised almost a fourth (21%) of all the families who took part in FEST events. Other community partners with a high frequency of families participating included IMANI (12%), FGM (12%), and St. Thomas (10%).

Table 11: Families' participation in FEST tracked by community partner affiliation

Community Partner Affiliation	Year 1 Participation (# of family visits) 35 events		Year 2 Participation (# of family visits) 31 events		Year 3 Participation (# of family visits) 38 events		Total (# of family visits) 104 events	
	N	%	N	%	N	%	N	%
AAU	109	21	83	17	184	25	376	21
IMANI	72	14	72	14	63	9	207	12
FGM	66	12	63	13	77	10	206	12
ST	34	6	63	13	81	11	178	10
YSI	48	9	37	7	73	10	158	9
IAC	51	10	29	6	64	9	144	8
Ivy Leaf	51	10	37	7	53	7	141	8
NSNP	49	9	32	7	55	8	136	8
LEAP	25	5	59	12	39	5	123	7
WPP	19	4	8	2	5	0.7	32	2
CHA	0	0.0	10	2	19	3	29	2
Unknown	3	0.6	1	0.2	21	3	25	1
TOTAL	527	100.00	494	100.00	734	100.00	1755	100.00
Per-Event Participation	15.1		16.1		19.3		16.9	

Source: FEST Database.

Most of the families were originally targeted as potential FEST members simply because they had participated in similar projects before, were considered "members" of one of the community partners or were reported to the FEST project team as members of a CBO. Interestingly, the number of individuals who attended a FEST event at least once increased between Year 1 and 2 by 29%, but then increased even more (77%) between Year 2 and 3 suggesting that Project staff needed the first two years to establish a relationship with targeted families and once that goal

was accomplished, were then able to expand their reach into the CBO communities considerably. The participation numbers also suggest a trend over the three years of FEST towards larger groups or "families" with more individual members attending any one FEST event. Each registered group included an average of 8 members in Year 3, up from 6 in Year 1 and Year 2. Thus FEST also increased its reach into the community by allowing member families to bring relatives, neighbors or friends to FEST events, and register them under their own family ID.

Families, tracked by their community partner affiliation and referred to as community partner members, had different preferences for the four FEST program options. Members of the Frankford Group Ministries, the Indochinese-American Council, and Ivy Leaf School demonstrated a strong preference for workshop-type events. High participation in these types of programs were in part driven by a small number of committed families who made particularly strong use of workshops and were known to program staff at all four institutions. The strong attendance by some of these families and their members was due in part to that fact that they were home schooling, which allowed for—and even necessitated—more frequent use of informal learning experiences.

As with FEST attendance by individuals, family group attendance was also analyzed to determine levels of participation (infrequent, moderate & frequent), but because participation figures for families represent the total number of visits *by individuals in that family group*, not total visits *per family group*, the frequency and levels of participation are less easily interpreted. These findings are presented and discussed in Appendix F.

FINDING #3: Families attended FEST programs for a variety of reasons, and word-of-mouth was an effective tool for encouraging participation.

Families participated in FEST for a variety of reasons, including doing something together as a family, to learn, have fun, and explore the participating museums. In the first years, most families who attended FEST events were invited through their affiliated CBOs. Increasingly, families who attended FEST invited family and friends, a hoped-for outcome, suggesting that word-of-mouth can operate over time to reach and engage audiences traditionally underserved by science museums.

WHY DID FAMILIES ATTEND FEST EVENTS?

Institute researchers attended a sample of 28 of the 104 FEST events (27%) over the course of the project to gather feedback from families via feedback forms, interviews and structured observations. Overall, 627 feedback forms were returned in Year 2 and 1,079 forms in Year 3. Institute researchers conducted 10-15 minute face-to-face interviews with 108 families during nine *Family Science Events*, as well as some workshops. However, interviews conducted during the more involved *Family Workshops* and *Special Projects* were discontinued during Year 3 because of their potential to interfere with a participants' workshop experience. The face-to-face interviews during workshops were replaced by informal conversations and 31 follow-up telephone interviews were conducted with Family Workshop and Special Project participants.

Table 12 outlines the reasons families gave for attending a FEST program during Years 2 and 3. In both years the reason most often cited was "to do something together as a family" (71% in Year 2 and 76% in Year 3); followed by "we want to learn" (69% in both years), "we came to

have fun," (63% in Year 2 and 67% in Year 3), and "we wanted to explore the museum" (64% in Year 2 and 60% in Year 3). In Year 3, 54% of the families responding suggested "because we enjoyed a previous FEST activity" as a reason to attend, an increase of 6% over Year 2—an encouraging sign that successful FEST experiences motivated FEST families to return. More than a quarter of the families responding in each year indicated that they attended primarily because the program was free. (The term "primarily" was highlighted on the feedback form.)

Table 12: Why did your family come to this event?*

Reasons for attending	Percent of those responding in Year 2 (n=450)	Percent of those responding in Year 3 (n=837***)
We wanted to do something together as a family	71%	77%
We want to learn	69%	69%
We came here to have fun	63%	67%
We wanted to explore the "museum"	64%	60%
Because we enjoyed a previous FEST activity	48%	54%
We came **primarily** because it is free today	26%	28%
Because someone recommended it	10%	19%
Part of home schooling	8%	15%
Other	9%**	4%
Not Applicable		1%

Source: Feedback Forms. The home schooling question was added to the feedback form later in Year 2 after it became apparent during interviews and focus group discussions that FEST programs seemed to attract some families who home-schooled at least one child.

(*) Percentages may not total 100% because multiple responses were accepted.

(**) Includes 6% (n=28) who checked the answer option "to find out more about FEST."

(***) Includes counts of individuals who did not indicate whether they were members of a FEST family in Year 3.

Reasons for attending FEST by levels of participation ("infrequent," "moderate," "frequent")

There were small but significant differences in terms of reasons for attending FEST events as a function of levels of participation across the two program years (Table 13). In both years the most frequently given reason was a desire to do something together as a family. More than two-thirds of frequent participants in Year 2, but 82% in Year 3, chose this option—significantly higher percentages than for moderate (72%) and infrequent (68%) participants. Those participating moderately and frequently in Year 3 were more likely to state that they attended a FEST event "to learn" (74% for frequent, 70% for moderate, and 60% for infrequent participants). Interestingly, learning *and* having fun as a motivation for those attending FEST moderately and frequently significantly increased from Years 2 to 3, but not for those attending infrequently. These findings support the literature suggesting that many visitors do not distinguish between having fun and learning, but see these as very related activities (Falk, Moussouri & Coulson, 1998) As might also be expected based on the definitions of the three levels of participation, frequent participants were more likely than those attending moderately or infrequently to reply that enjoying a previous FEST event was one of the reasons for their attendance. In Year 2, 51% of those attending frequently cited enjoyment of their previous FEST experience as a reason for their current visit and 68% of these participants did in Year 3, while only 20% of infrequent participants in Year 2 and 24% in Year 3 said they came because they had enjoyed a previous FEST event.

Table 13: Reasons for attending a FEST event by levels of participation*

Reasons for coming	User Level Year 2**			User Level Year 3**		
	Frequent (n=312)	Moderate (n=107)	Infrequent (n=120)	Frequent (n=405)	Moderate (n=123)	Infrequent (n=93)
We wanted to do something together as a family	69%	57%	61%	82%	72%	68%
We want to learn	61%	58%	57%	74%	70%	60%
We came here to have fun	55%	51%	53%	71%	72%	59%
We wanted to explore the "museum"	61%	64%	54%	64%	64%	59%
Because we enjoyed a previous FEST activity	51%	35%	20%	68%	49%	24%
Because someone recommended it	24%	18%	25%	28%	30%	24%
We came here to have fun	6%	6%	14%	17%	16%	22%
We wanted to explore the "museum"	6%	4%	4%	17%	11%	10%
To find out more about FEST	6%	4%	4%	n/a	n/a	n/a
Other	4%	7%	6%	5%	6%	2%
Not Applicable	0%	0%	0%	1%	2%	0%

Source: Feedback Forms. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. .Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

(*)Percentages may not total 100% because multiple responses were accepted.

(**) Chi Square: p< .001 for Year 2 and 3.

In the first years, most families who attended FEST events were invited through their affiliated CBOs. In Year 2 only 10% of the families stated that their participation was due to a recommendation, but almost twice as many (19%) stated so in Year 3, a sign that word-of-mouth was influencing participation in FEST. One surprising finding was the high incidence of "home schooling" as a reason for attending a FEST event. Fifteen percent of the families responding in Year 3 chose this option as a partial reason for attending the FEST event, while 8% did so in Year 2. (The home-schooling option was added to the feedback form halfway through the year since researchers encountered so many home-schoolers during face-to-face interviews.) Although some responding may have misunderstood the term, believing that it involved supporting children in their homework, observations and discussions by researchers and informal conversations with FEST staff, indicated that home-schooling was in fact noticeable amongst FEST families. For example, the contact person for a home-schooling organization in Philadelphia (a group representing approximately 300 children and 100 adults) regularly invited her group members to attend FEST events. This was a hoped-for outcome, suggesting that word-

of-mouth can operate over time to reach and engage audiences traditionally underserved by science museums.

FEST program participants' identification of themselves as FEST members

The question "Are you a member of a FEST family?" was included on the feedback form for three reasons: First, researchers began noticing that an increasing number of community members who were not affiliated with any of the community partners participated in FEST events. These FEST participants were introduced to FEST by active members of community partners, or became aware of FEST through another means (e.g., announcements in the neighborhood). While the FEST project team encouraged participation of community members who were not necessarily affiliated with the community partners, it was assumed that awareness about FEST itself may have been infrequent amongst this group. Second, the percentage of individual FEST participants who were not aware of the FEST program itself or that the event they attended was part of a larger community outreach effort called FEST could serve as a rough gauge of FEST's reach beyond the original target population of active members of the community partners. Third, those FEST participants who did not self-identify as members of FEST families were used here as a quasi-control group to help determine the impact of FEST on its members. It was assumed that those who said they were not members of a FEST family or those who were not sure (or even did not seem to know what FEST was) were only occasional attendees of FEST and less strongly affiliated with the program (although all who attended even just one FEST event were considered FEST members by project staff).

Two-thirds (67%) of the FEST attendees who completed feedback forms self-identified as a member of a FEST family; 12% clearly stated that they were not members of a FEST family; 10% were not sure whether they were; and 6% were not sure what the acronym FEST stood for.

Not surprisingly, those attending frequently were much more likely than moderate or infrequent participants to identify themselves as a FEST member. Four-fifths (82%) of the frequent participants, but only 61% of those attending moderately and 33% of those attending infrequently, identified themselves as FEST members. This may demonstrate that frequent participants were more aware of FEST as part of a larger organizational structure, presumably because frequent exposure made them aware that the events were not isolated but part of a larger program. While the data do not allow us to conclude this with certainty, awareness of the larger context (i.e. FEST events not as isolated events but as part of the FEST program as a whole) may have led to higher attendance rates. Telephone and face-to-face interviews with participants attending frequently indicate that they were aware of the diversity of FEST program offerings and understood that attending another event would provide them with a different experience; insights that may contribute to their interest and willingness to attend more frequently.

Familiarity with FEST and its purpose

As another way of gauging participants' identity within the program, one of the interview questions conducted with a stratified sample representing frequent, moderate and infrequent participants, asked about their familiarity with FEST and its purpose. Eighty-three percent of those responding in the small, stratified sample of infrequent and moderate FEST participants (n=46) accurately identified at least one FEST objective: 37% thought that FEST introduces people to museums, 26% thought the program introduces people to science, and 26% thought FEST was largely about families doing activities together (Table 14). However, almost three-

quarters (72%) of those responding in the stratified sample (n=33) could not correctly identify the meaning of the acronym FEST (i.e., Families Exploring Science Together). Only 20% of those responding (n=9) could correctly identify the acronym's meaning and another 6% (n=3) came close to correctly identifying what the acronym means. Thus, while only a quarter of those responding had an understanding of the meaning of the acronym FEST, 83% knew at least one of its functions.

Table 14: Participants' understanding of FEST*

Category	Percent of those responding (n=46)	Example
Introduce museums	37%	• *I look at it for families who may not get to museums that often - Hispanic, Asian, African Americans - who may not get to the museums as often as they should.* • *Introduce minorities to programs at science museums and aquarium to see what they offer.* • *The purpose is to familiarize families with the institutions - show them how to use them. Fun activities for them to do.*
Introduce science	26%	• *Well I thought it was a community project between museums and school districts to get them more experience in science and more exposure in general.*
Families do things together	26%	• *It was like a family day for kids, family and friends - good program.* • *It's family oriented and it gives families the opportunity to go to museums.*
Families do science together	13%	• *A day for family to get together, education to do with science. Whenever they have it families trying to get together.* • *Opportunity for families to experience and learn about science and have fun together.*
Children learn	9%	• *Science program for school-age children*
Other	4%	
Don't know	17%	

Source: Phone interviews with a stratified sample.

(*) Percentages may total more than 100% because multiple responses were accepted.

Goal Two: Increase parental involvement in science education through hands-on science activities and resources

FINDING #4: The FEST program was appealing to both adults and children with all levels of science interest.

A large percentage of FEST members, even those individuals who did not have high interest in science, indicated that exploring FEST museums was a major benefit of their involvement in FEST, providing their families with multi-generational experiences designed to foster interest and involvement in each other's science exploration.

HOW INTERESTED IN AND CONNECTED TO SCIENCE WERE FEST PARTICIPANTS?

FEST participants' interest, background, and/or training in science

FEST was designed to be both a family-oriented program and a science program. In order to gauge the relative importance of science to FEST participants, researchers asked those attending events about their personal interest, background, and/or training in science. A fifth of those interviewed (21%) reported having a background in science that involved some type of formal education or training. An additional 4% reported an "indirect background" in science—e.g., having a person close to him or her involved in some way in science-related pursuits. More than a third of those interviewed (37%) reported a general interest in science, and a similar number (38%) indicated that they had no prior background or interest in science (Table 15).

Table 15: Participants' science interest/background/training in science

Background or interest in science	Percent of respondents (n=136)
No background or interest	38%
Yes, general interest	37%
Yes, direct background	21%
Yes, indirect background	4%

Source: Interviews with participants.

More than half (58%) of those attending frequently and attending moderately (53%) had some background or training in science; only 20% of the infrequent participants had such backgrounds. These backgrounds ranged from having taken high school and/or college physics and chemistry courses to having a degree in nursing or dental hygiene. A larger percentage of frequent participants (87%) were interested in science than were those attending moderately (71%) or infrequently (64%).

Because FEST offered meaningful leisure-time, science-related activities to families and gave families an opportunity to experience local science-related museum resources, the feedback forms also included questions designed to distinguish between FEST participants' degree of interest in science, museums, and museum-like institutions. Interestingly, during face-to-face interviews some of those interviewed mentioned that including art museums might be a possible improvement to FEST, an indication that not everyone who participated did so because of an interest in science, whether their own or that of another family member. Overall, 62% of all respondents reported that they liked science "a lot" and almost 78% of all those responding stated that they liked visiting science-related museums "a lot."

FEST participants' understanding of science

FEST provided families with science-related experiences, and it was one of the program's stated goals to instill, strengthen, or sustain a positive attitude towards—and possibly a better understanding of—science among participants. Based on answers to open-ended questions about the nature of science (asked in face-to-face interviews during the second project year), researchers developed a closed-ended feedback form with eight answer options and received a total of 838 completed forms. Ninety-two percent of those responding (n=770) answered the

question, "What do you think science is?" (Table 16). Those responding were allowed to select multiple responses.

Nearly two-thirds (65%) of all those responding thought that science was observing things in everyday life, and 58% each believed that science is "everything" or "finding out how things work." Fifty-six percent checked the answer, "Science is doing experiments." More than half of those responding (57%) thought that science was "fun." More than half of the participants who responded included answers that conveyed a highly positive and popular understanding of science—a perspective that most science centers and science museums are trying to promote with their visitors. Similarly, this group tried to link science to everyday life and portrayed science as an interesting, fascinating, and satisfying human endeavor, rather than as a dry and incomprehensible textbook subject. Slightly less than half of those responding chose options that were more in line with the technical or epistemological definitions of science—e.g., the systematic investigation of a problem by studying a question or problem (49%) and the testing of hypotheses (45%).

Table 16: Participants' understanding of science (Year 3 data only; multiple responses accepted)*

What do you think science is?	Percent of respondents (n=770)
Science is observing things in everyday life	65%
Science is everything	58%
Science is finding out how things work	58%
Science is fun	57%
Science is doing experiments	56%
Science is studying a question or problem in a systematic way	49%
Science is asking questions	49%
Science is testing hypotheses	45%
All of the Above	0.3%
Other	5%
Not Applicable	0.8%

Source: Feedback Forms.

(*) Percentages may not total 100% because multiple responses were accepted.

Those attending frequently and moderately were more likely than infrequent participants to state that science is "observing things," "finding out how things work," or that "science is everything" (see Table 17). Frequent and moderate participants were also more likely than those attending infrequently to link science with "testing hypotheses" (50% of moderate and frequent participants selected this answer option, compared to only 37% of those attending infrequently).

Table 17: FEST participants' understanding of science by levels of participation*

Science is…	Frequent (n=380)	Moderate (n=129)	Infrequent (n=93)
Observing things	71%	68%	58%
Finding out how things work	64%	57%	52%
Doing experiments	59%	66%	50%
Fun	60%	59%	53%
Everything	62%	52%	48%
Asking Questions	53%	51%	45%
Studying a problem in a systematic way	52%	59%	45%
Testing hypotheses	50%	51%	37%
Other	5%	4%	9%
Not Applicable	1%	0%	1%

Source: Feedback Forms. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

(*)Percentages may not total 100% because multiple responses were accepted.
(**) Chi Square: p< .001

FINDING #5: FEST families valued the opportunity to explore hands-on science together at the participating museums.

Participants felt that the FEST program was valuable because it gave families the chance to spend "quality family time" together engaged in active experiences. Many also valued the opportunity to learn about science. Museum visits were an ideal mechanism for parents—as well as grandparents, aunts, uncles, and family friends—to learn more about their children's science-related interests, knowledge, and attitudes, and to bring families together around the topics of science.

WHAT DID FEST PARTICIPANTS ENJOY MOST ABOUT THE FEST PROGRAM?

Overall Appreciation of FEST by Participants

About three-quarters (76%) of those responding in Year 3 and 60% in Year 2 reported that "having fun" was what they most enjoyed about attending a FEST event (Table 18). Learning was also highly valued. Almost two-thirds (63%) of the participants responding in both Years 2 and 3 reported that "learning something new" was what they liked best about the FEST event they attended. More specifically, learning as a group was also highly ranked in both years; about 60% of those responding reported that learning together was what they liked best about the FEST event they attended. Almost half (46%) of the participants responding simply enjoyed having quality time together as a group, but did not mention learning.

Exposing children to science (48% in Year 3 and 39% in Year 2), and the perception that the program offered something "hands-on" (45% in Year 3 and 24% in Year 2) were responses that increased significantly in frequency between the two years—an indication that those attending more readily identified FEST events as science-related activities ("exposing children to science") and that programming quality probably improved over the two years (particularly the increase in "hands-on" response almost doubling suggested this).

Table 18: What FEST participants liked best about the FEST program in Years 2 and 3*

Liked Best	Year 3 % of those responding who stated (total number; n=829)	Year 2 % of those responding who stated (total number; n=450)
We had fun	76%	60%
We learned something new	63%	63%
We learned together as a group	58%	62%
Everything was great!	53%	52%
We did something together as a group	51%	51%
It was geared towards children	49%	39%
It exposed the children to science	48%	n/a
It was free	47%	n/a
We spent quality time together as a group	46%	n/a
The "museum" (venue) itself	46%	46%
It was hands-on	45%	24%
We received special attention here	28%	n/a
We learned something new about each other	26%	14%
We were introduced to the "museum"	24%	21%
Other	4%	4%

Source: Feedback Forms.

(*) Percentages may total more than 100% because multiple responses were accepted.

Twenty-four percent of the participants chose the option "we were introduced to the venue" as what was "best" about the program in Year 3, a positive sign for two reasons. First, a quarter of those responding not only felt that the program gave them a chance to be introduced to the venue, but they also felt that this introduction was one of the best things about their visit. FEST was thus able to successfully introduce FEST families to the area museums. Just under half of those responding noted the fact that the event was free of charge as what the family liked best about the event. Thus this response was only at the median, with six specific other reasons ranked higher. Even though free admission was important to many FEST participants, families clearly valued other aspects even more—such as learning, socializing, etc.

In order to gain a deeper understanding of FEST participants' appreciation for FEST, researchers asked participants during face-to-face interviews at FEST events what it was they enjoyed about the FEST event (or were looking forward to, in case they were interviewed early in the event; refer to Table 19. Almost half (49%) mentioned either a specific exhibit at the museum (43%) or a specific activity during the program (6%), and 25% mentioned the visit to the museum in general. Fourteen percent of the participants mentioned the hands-on aspects of FEST events as what they enjoyed most (or were looking forward to); 13% mentioned learning in general or an interest in the subject of a program; and 10% noted spending time together as a family.

Nearly half (n=42) of those responding elaborated on their answers and provided some insights into what it was that made the event or workshop participation enjoyable. More than a third (36%, n=15) stated it was enjoyable because it offered participants the opportunity to learn or provided a new experience ("Seeing the actual sizes of the reptiles, couldn't believe how big they are. I never had a chance to do that; (touch the animals) before.").

A quarter (26%, n=11) of those responding enjoyed the fact that FEST enabled families to spend time together ("like to do stuff together, family bonding"), and 19% (n=8) enjoyed the fact that

FEST activities added to the interest or excitement of children ("that the kids enjoyed it, watching my son be happy"). Those responding also mentioned hands-on experiences (12%, n=5; "Because they can touch and play with sand," "lots of hands-on and demos to watch"), staff interactions (7%, n=3; "The staff were very polite," "Staff told us that the rockfish disguises itself and is poisonous to defend itself"), and the fact that it was free of charge (5%, n=2).

Table 19: Enjoyable aspects of FEST programs*

Tell me about something you enjoyed doing with your family here today	Examples	Percent of those responding (n=83)
A specific exhibit at the museum	*"the 3D show" "Seeing the sharks…" - "Polar bears and deer in the animal hall"*	43%*
Visiting the museum in general	*"seeing what the museum has to offer" - "Just being here"*	25%
"Hands-on" aspects including touching animals	*"lots of hands-on activities for the kids." - "like the crafts, hands-on." - "kids had opportunity to touch stuff" - "Petting the snake during the show."*	14%
Learning in general or being interested in the program subject	*"Seeing how much he [son] was interested in dinosaurs and asking questions like 'How did they die? Where did they live?'" - "the kids being interested"*	13%
Spending time together as a family	*"always family related-could bring the whole family" - "it is great way to spend time with family and friends"*	10%
Everything was enjoyable		8%
Having fun	*"Science in a fun way" - "Fun to try different things"*	7%
A specific activity at the program	*"at dinosaur daze building the dinosaurs" - "making the shark necklaces"*	6%
Program activities in general		2%
No expectations		1%
Didn't enjoy it		1%

Source: Participant interviews.

(*) Percentages may not total 100% because multiple responses were accepted.

Notes: Coding categories, created from the entire set of answers, were defined in Year 2 and were used in this report for continuity. Multiple researchers agreed on coding categories before coding continued.

Appreciation of FEST by levels of participation

Particularly in Year 3, data from a matching sample of feedback forms (which excluded children and teenagers) showed a strong increase in overall ratings for FEST, and also major differences in these ratings between frequent, moderate and infrequent FEST participants (Table 20). More participants in Year 3 than in Year 2 stated that they had fun, learned something new, learned together as a group, learned about each other or felt the experience was hands-on. Comparing levels of participation, a higher percentage of frequent participants than those attending moderately or infrequently, stated that the best aspect of FEST events was that they were fun, allowed for new learning, were geared towards children, exposed children to science, allowed for quality time together or were hands-on. Those who attended infrequently were less likely than moderate and frequent participants to have most valued learning together in a group, experiencing the museum itself, receiving special attention from museum staff, or learning something new about each other.

Table 20: What participants liked best about FEST programs by levels of participation*

What Was Liked Best	User Level Year 2*			User Level Year 3*		
	Frequent (n=351)	Moderate (n=118)	Infrequent (n=132)	Frequent (n=402)	Moderate (n=121)	Infrequent (n=91)
We had fun	48%	44%	39%	84%	76%	66%
We learned something new	49%	50%	46%	69%	62%	56%
We learned together as a group	50%	44%	47%	62%	60%	52%
Everything was great!	43%	40%	36%	59%	48%	46%
We did something together as a group	39%	31%	41%	60%	50%	39%
It was geared towards children	33%	24%	25%	58%	46%	39%
It exposed the children to science	n/a	n/a	n/a	54%	42%	48%
It was free	n/a	n/a	n/a	52%	50%	42%
We spent quality time together as a group	n/a	n/a	n/a	53%	42%	39%
The museum/venue itself	43%	38%	42%	48%	52%	39%
It was hands-on	21%	14%	14%	55%	36%	41%
We received special attention here	n/a	n/a	n/a	32%	25%	19%
We learned something new about each other	11%	7%	15%	26%	24%	18%
We were introduced to the museum	14%	20%	14%	24%	26%	24%
Other	5%	5%	2%	5%	3%	0%

Source: Feedback Forms. Only the feedback forms of adults were analyzed analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

(*) Percentages may total more than 100% because multiple responses were accepted.
(**) Chi Square: p< .001 for Year 2 and 3.

Participants' rating of FEST events

Feedback forms asked those participants who attended to rate the event between "not very interesting--boring" and "interesting" on a 5-point scale. Seventy-one percent (71%) of those responding in Year 2 and 77% of those responding in Year 3 thought the event they attended was "interesting," or gave the event a score of 5 (Table 21), and 15% of participants in Year 2 and 12% in Year 3 thought the event was "a bit interesting" (a score of 4).

The ratings of events seemed to be influenced by attitudes towards science and towards science museums, zoos, and aquaria. Eighty-seven percent (87%) of those who stated that they liked science "a lot" felt that the event was interesting, compared to 77% of those who liked science "a little" and 52% who thought of science as "okay" or less than okay. Eighty-five percent (85%) of those who stated that they liked visiting museums "a lot" thought the event they attended was interesting, compared to 61% who liked visiting museums "a little" and 44% who expressed a

neutral or negative opinion about science museums. The overall ratings of events were generally high and the vast majority of participants perceived the events as interesting.

Table 21: Participants' ratings of events for Years 2 and 3 and by types of events in Year 3

Event Ratings	Year 2	Year 3			
	Total (n=367)	Total (n=1,004)	Family Science Event (n=928)	Family Workshop (n=43)	Special Project (n=31)
Was interesting (5)	71%	77%	76%	91%	90%
Was a bit interesting (4)	15%	12%	12%	7%	7%
Was okay (3)	12%	8%	8%	2%	3%
Was a bit boring (2)	1%	1%	1%	0%	0%
Was boring (1)	1%	1%	1%	0%	0%
Not Applicable	n/a	1%	2%	0%	0%

Source: Feedback Forms

Participants' Expectations for FEST

In addition to rating each event, there was another measure of participant satisfaction collected at events—whether the event met participants' expectations. Researchers asked all participants to rate their experience in relation to their expectations; this strategy provided those responding with a framework for evaluating their experiences and allowed for participants' diverse agendas. Overall, most people attending FEST events reported that the program met their expectations. In Year 3, roughly half of those responding reported that the FEST event they had just attended met their expectations "totally" (Table 22); in Year 2, 61% of those responding stated that their expectations were totally met by the event and 35% responded that their expectations were "mostly" met. In Year 3, 89% did so. The slight decline in the positive ratings between Years 2 and 3 can partially be explained by an additional neutral answer category, "I did not expect anything," added to the feedback form in Year 3 because it was a common open-ended response in Year 2 (4% of those responding in Year 3 opted for this response). Only 2% of those responding in Year 2 and 4% in Year 3 stated that their expectations were "not really" or "not at all" met.

For those who attended *Family Workshops* and *Special Projects*, the percentage of those responding who felt their expectations were "totally" met increased from Year 2 to Year 3. In Year 2, 48% of those responding to feedback forms at *Family Workshops* rated the event as "totally met expectations," a number that increased a total of 15% (to 63%) in Year 3. Those who attended *Special Projects* were also more likely to check the "Yes, totally" category in Year 3, although the increase of 5% (from 77% to 82%) was less dramatic (and not significant). The high degree to which expectations for the *Special Projects* were met might have to do with the high rate of repeat participation in *Special Projects*; or, conversely, the high level of satisfaction that was expressed in expectation ratings might explain why those attending *Special Projects* exhibited the highest return rates in FEST on the whole. None of those attending *Special Projects* or *Family Workshops* stated in Year 3 that their expectations were not met. These data suggest that *Family Workshops* and *Special Projects* have matured over the course of the FEST project and were increasingly geared to the specific needs and expectations of FEST families. The

reverse conclusion might also hold true, at least partially—that is, participants at *Family Workshops* and *Special Projects* were more likely than participants at *Family Science Events* to have attended previous FEST events and thus they knew what to expect.

Table 22: Participants' expectations for the FEST event

Met Expectations	Year 2 (n=436*)*	Year 3 (n=1,013)*
Yes, totally	61%	51%
Yes, mostly	35%	38%
I did not expect anything	n/a	5%
No, not really	2%	3%
No, not at all	n/a	1%
Not Applicable/Don't know	2%	2%

Source: Feedback Forms. Note (*): Represents 70% of total.

Not surprisingly, when analyzed together, these two participant satisfaction measures were not independent. The more interesting FEST participants perceived the event to be, the more likely they were to feel their expectations had been met. Almost all participants (95%) who stated that the event "totally" met their expectations also stated that the event was "interesting." In contrast, only 66% of those participants who felt that the event "mostly" met their expectations, 36% of those who had no prior expectations, and the 22% of those few who stated that their expectations were not met, gave the event the highest rating of "interesting."

Meeting expectations as a function of interest in/attitudes toward science and museums

Whether or not FEST events met participants' expectations was influenced greatly by their attitudes towards and opinions about science, as well as their appreciation for science museums, zoos, and aquaria in general. Participants who liked science "a lot" were far more likely than those who liked science "a little" or had neutral to negative opinions about science to feel their expectations for FEST events were "totally" met (64%, 44% and 25%, respectively). Sixty percent of those who liked visiting museums and museum-like institutions a lot stated that their expectations were totally met. In contrast, only about 25% of those who stated that they liked visiting museums less than "a lot" felt that their expectations were totally met. The vast majority of those responding that they liked visiting science museums "a little," or held even less favorable opinions about science museums, still felt their expectations were at least "mostly" met or did not have expectations (presumably due to a lack of experience).

Meeting expectations as a function of levels of participation ("infrequent," "moderate," and "frequent")

Expectations for a FEST event were not influenced by the degree to which participants attended events in Year 2 (Table 23). However, in Year 3 significantly more frequent than moderate or infrequent participants stated that their expectations were "totally met" (57%, 46% and 43%, respectively).

Table 23: Meeting expectations as a function of levels of participation ("infrequent," "moderate," and "frequent")

Met Expectations	Level of Participation Year 2			Level of Participation Year 3		
	Frequent (n=241)	Moderate (n=84)	Infrequent (n=102)*	Frequent (n=486)	Moderate (n=160)	Infrequent (n=117)*
Yes, totally	64%	60%	57%	57%	46%	43%
Yes, mostly	33%	37%	38%	35%	42%	42%
I did not expect anything	N/A	N/A	N/A	5%	6%	9%
No, not really	2%	1%	2%	2%	4%	1%
No, not at all	0%	0%	0%	0%	1%	3%
Don't know	1%	2%	2%	N/A	N/A	N/A
Not Applicable	0%	0%	1%	1%	1%	3%

Source: Feedback Forms. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

Behavioral intentions: Willingness to return to another FEST event

Another mechanism for assessing whether FEST families valued the opportunity to explore hands-on science together at the participating museums was to analyze *intended* behavior, a perspective based on two specific theories of human behavior. The Theory of Planned Behavior (Ajzen & Fishbein, 1980) and another model built on it, the Model of Responsible Environmental Behavior (Hines, Hungerford, & Tomera, 1986-87), argue that behavioral intentions are often strong predictors of actual future behavior. However, though found to be statistically significant and the strongest measurable predictor of behavior in the future, the shift from intentions to actualized behavior is complex, influenced by a range of other factors, many of which can prevent the individual from actually following through on their intentions so such findings must be weighed carefully (Fliegenschnee & Schelakovsky, 1998). Nonetheless, behavioral intentions, primarily interest and willingness to take part in another FEST event, still represent one strong measure for the immediate success of the program.

Overall willingness to return

A large number (80%) of those responding in Years 2 and 3, "definitely" planned to return to another FEST event (Table 24). This rate differed only slightly between event types (*Family Science Events* = 79%; *Family Workshops* = 82%; *Special Projects* = 92%), and interestingly was in part dependent upon the degree to which FEST events met participants' expectations. Almost all of those who stated that the event met their expectations "totally" (94%) , also stated that they would "definitely" return for another FEST event, while only 32% of those who said that the event had not met their expectations stated that they would "definitely" come back for another FEST event.

Willingness to return as a function of level of participation in FEST (infrequent, moderate & frequent)

Overall, attendees of FEST events in both years in all levels of participation were interested in attending another event. However, it was only in Year 3 that researchers found significant differences in willingness to return to a FEST event based on a person's level of participation (Table 24). Frequent participants were more likely than both moderate and infrequent participants to reply that they would "definitely" come to another event, with 89% of them replying in that way, compared to 77% of those attending a moderate number of sessions and 66% of those infrequently doing so.

Table 24: Willingness to return to a FEST event as a function of level of participation (frequent, moderate & infrequent)

Return to another FEST event	Level of Participation Year 2			Level of Participation Year 3*		
	Frequent (n=242)	Moderate (n=86)	Infrequent (n=103)	Frequent (n=491)	Moderate (n=163)	Infrequent (n=119)
Definitely	91%	80%	69%	89%	77%	66%
We'll try	6%	15%	18%	7%	13%	22%
Don't know yet	0%	1%	2%	1%	1%	3%
Maybe	3%	4%	10%	2%	7%	6%
No	0%	0%	1%	1%	1%	1%
Not Applicable	0%	0%	0%	0%	1%	2%

Source: Feedback Forms. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

(*) Chi Square: p< .001 for Year 3.

Willingness to return to FEST as a function of how much an event was appreciated

Feedback forms asked participants to rate how interesting or boring an event was on a 5-point scale and, not surprisingly, the perceived quality of FEST programs influenced participants' intentions to return for another FEST program activity. The more favorably an event was rated, the more likely the participant was to report that they were definitely willing to return. Seventy-seven percent of those responding stated that the event was interesting; of those, almost 90% also expressed a definite desire to return for another FEST event. On the other hand, about half of those responding who stated that they perceived the event as "okay" or "a bit interesting" expressed a desire to return.

Willingness to return as a function of science and science-museum appreciation

Participants' willingness to attend additional FEST events was also influenced by their attitude towards science and science-related museums. Eighty-seven percent (87%) of those who stated that they liked science "a lot" expressed a definite willingness to return to another FEST event; 82% who reported liking science "a little" would definitely return; and only 63% of those who indicated that science was "okay" or held even less favorable opinions about science expressed a strong desire to attend additional FEST events. Similarly, 87% of those who liked visits to

science-related museums "a lot" expressed a strong desire to attend another FEST event. In contrast, 67% of those who liked such visits "a little" said they would definitely return, and only half of those who responded who felt that visiting science museums, zoos and aquaria was at most "okay," expressed a strong desire to return to another FEST event.

The strong relationship between attitudes towards science or science-related museums and willingness to return for further FEST programming shows that while FEST events appealed even to those who did not specifically like science, they were even more appealing to families that had a high prior interest in science or science-oriented museums. On the other hand, some participants who expressed little or no interest in science stated that they would like to attend another FEST event. FEST was thus appealing even to participants with little interest in science or science-related venues.

FINDING #6: Participation in FEST increased parental awareness and involvement in their children's learning generally, and science learning in particular.

Participation in FEST fostered parental awareness and involvement in their children's (and their own) learning generally, and science education in particular. These outcomes were expressed at a variety of levels: for the adults themselves, their children, and the family as a whole.

WHAT DID FEST MEMBERS PERCEIVE AS THE MAIN BENEFITS OF FEST?

During interviews with a stratified sample of participants (frequent, moderate & infrequent), researchers asked them to elaborate on their sense of the value of participating in FEST programs (Table 25). More than half (56%) of the 18 participants interviewed thought the value of the FEST program was that it allowed for general learning and exploration. About a third of the sample said they valued the exposure to the four area science museums. Twenty-two percent of all those interviewed thought that the FEST program was valuable because it gave families the chance to spend time engaged in activities together ("quality family time"), and 22% also valued the opportunity to learn about science (though only 7% stated learning about science as a reason to attend a FEST event).

Table 25: Participants' assessment of the value of the FEST program*

Perceived value	Percent of those responding (n=18)	Examples
To learn and explore	56%	• *Because the children know what activity the places are doing. For the children to come to these places - to get together with different groups of people.*
Exposure to museums, zoos, etc.	33%	• *Well some kids aren't privileged enough to go to these places - they get to learn about the animals and Science Events that they may not have been able to experience.* • *So that you could see the facilities and see what you offer - see how it's set up, advertising.*
Spend time together as a family engaged in activities	22%	• *It is great to come to places like this as a family. It is hard to find that quality time and this helps us make the time.*
To learn about science	22%	• *Because to give the children the opportunity for a variety to learn about science. Different events offered different things. It helps the kids in school to see these things in real life. It makes science come alive.* • *Very educational for my son. He learns about science - it fit in with school (one of the workshops we went to).*
Social aspects/meet people	22%	• *Fun and educational. I guess getting people together. We met a lot of new people, exposing the kids to something they might not have been to, spark interest in the kids.*
Other	6%	

Source: Phone interviews with a stratified sample of participants.

(*) Percentages may not total 100% because multiple responses were accepted.

While those in the stratified sample who responded to an interview felt that they benefited from FEST in a variety of ways, they most frequently mentioned free museum visits and events, and exposure to the four area museums as reasons. Additional benefits noted were that children in the families saw and learned new things and that the program allowed families to spend time together. Some of those interviewed (22%) also cited the social aspect of FEST, particularly the opportunity to meet new people. A small number of those interviewed mentioned that they (as opposed to their children) learned or experienced new things. Only a few mentioned learning about science as a benefit for themselves. Appendix G contains a complete compilation of answers.

Table 26: Participants' perceived benefits from participating in FEST*

Perceived benefits	Percent of respondents (n=46)
Free program	33
Exposure to museum	33
Children saw/ learned new things	26
Spend time together	26
Social aspect/ meet new people	17
Parents saw/learned new things	11
Learn about science	9
Other	9
No benefit	2

Source: Phone Interviews with a stratified sample of participants.

(*) Percentages may not total 100% because multiple responses were accepted.

Some representative participant comments include:

First of all, I enjoyed that they allowed the family to come for free. We met people and interacted with other people and kids. They make it convenient by providing a bus for transportation. My son benefited because he loves animals.

It provides exposure to different museums and exhibits that I probably wouldn't have seen. Not having to pay made a real difference.

Now I know that the zoo has a different exhibit.

It gave my children the opportunity to participate. Our family was able to stay together and do things together, we found inexpensive ways to enjoy each other and built trust that we didn't have before.

Financially it's a good benefit because I didn't have to pay. We got to spend more time as a family doing something fun.

I always knew what was going on at the institutions. The museums invited you to exhibits and the zoo had big stuff. Whenever they had something going on, you could see behind the scenes. It made my daughter feel special that she got to see what others didn't.

It kept my son away from TV. He applied what he learned at school and shared his experience with his teacher and classmates. We found FEST extremely educational.

We didn't have a membership to many of the places. I went because it was a venue for families and a chance to experience things that I wouldn't have thought of myself. The biggest benefit was to make the kids aware of all the different resources available to them. FEST gave us things to talk about and gave us the opportunity to participate in something that helped so many people.

Just by having this it gets the children away from the norm and exposing them to different aspects of science. The information provided was beneficial and presented in a way the kids could grasp.

Those who attended frequently were also asked what the benefits of FEST were for themselves (only adults were interviewed), their children, and their family as a whole. They mentioned a variety of benefits, but tended to focus on learning and family time. These participants cited a number of benefits for themselves personally. These included seeing their children (or grandchildren) enjoy and/or benefit from the event (61%), the opportunity for family time (36%), learning new things themselves (23%), attending an event for free (19%), and getting the opportunity to parent differently by, for instance, jointly exploring new topics and venues (16%). Those who participated moderately reported similar benefits, but were more likely to name family time as a benefit for themselves (80% compared to 36% of frequent participants).

Those who attended frequently also mentioned benefits for their children, which included learning-related aspects (77%), the opportunity for fun and exploration (29%), the social aspect of events (23%), and the experience of engaging in hands-on activities (19%). Researchers found no significant difference between frequent and moderate participants in terms of how they viewed FEST's benefits for children (those attending infrequently were not asked this question).

Frequent and moderate participants reported FEST benefits for the entire family including: family time together (84% of frequent participants and 79% of those attending moderately), science or fact-based learning (31% of frequent participants; 47% of those participating moderately), family learning (22% of those attending frequently; 5% of moderate participants), and having fun (16% of frequent participants; 21% of those attending moderately). Participants attending frequently tended to focus more on aspects of family learning than did moderate participants, while those attending moderately were more likely than frequent participants to focus on science-related learning.

WHAT DID FEST PARTICIPANTS THINK ABOUT INDIVIDUAL FEST PROGRAM ELEMENTS?

Those participants who completed feedback forms at *Family Workshops* or *Special Projects* held more favorable opinions about those events than those who attended *Family Science Events*. Seventy-six percent (76%) of Family Science Event attendees thought the event was "interesting" (the highest possible rating), while more than 90% of attendees at *Family Workshops* and *Special Projects* gave the event the highest rating. Less than 2% of those responding in Years 2 or 3 felt that the event they attended was "boring" or even "a bit boring" and none of those responding who attended *Family Workshops* or *Special Projects* rated the event at these levels. Participants' ratings of events were largely the same regardless of their level of participation however, 83% of those attending frequently indicated a FEST event as "interesting" while only 72% of those attending moderately and 70% of those attending infrequently did so.

Another way to determine the effectiveness of individual FEST program elements is to assess the impact of attending a particular type of FEST program on future participation in FEST. Institute researchers conducted individual path analyses for each of the four FEST program types: *Orientations*, *Family Science Events*, Family Science Workshops, and *Special Projects*. The goal of this analysis was to gain insights into what kind of programming was most conducive to

further participation in FEST and, by extension, more likely to attract families who do not traditionally attend museums to visit science museums, zoos and aquaria. This analysis was conducted on the level of the individual only.

Eighty-five percent (85%) of all first-time FEST visits were to *Family Science Events*, 8% to *Family Workshops*, 7% to *Orientations*, and 1% to *Special Projects* (Table 27 & Figure 1). Those who visited *Family Science Events* as their first FEST program were least likely to return to attend another event; only a third (29%) attended another FEST event. Forty-one percent (41%) of those who went to an Orientation as their first FEST program visited another FEST event. More than half of those who first went to a Family Workshop (53%) returned to another FEST event and 70% who first attended a Special Project returned for another FEST event. Thus, the smaller and more intimate, as well as intense and personal workshop events (*Family Workshops* and *Special Projects*), generated the highest return rates. It is not entirely clear from the data, though, whether the differences in return rates are based on the experience during the event or to self-selection by those attending. It is possible that participants who chose to attend the smaller and more intimate workshops, rather than the larger, open-house type events, were already familiar with museums and might have been more inclined to use museums in this more intensive way.

Table 27: Sustained participation by individuals FEST as a function of first program attended

FEST event type	First Event	Attended a 2nd Event (continuation rate)	Attended a 3rd Event (continuation rate)	Fourth Event (continuation rate)
Family Science Event	5,876 $(85\%)_1$	1,697 $(29\%)_2$	765 $(45\%)_2$	391 $(51\%)_2$
Orientation	474 $(7\%)_1$	194 $(41\%)_2$	115 $(59\%)_2$	80 $(70\%)_2$
Family Workshop	531 $(8\%)_1$	279 $(53\%)_2$	180 $(65\%)_2$	119 $(66\%)_2$
Special Project	66 $(1\%)_1$	46 $(70\%)_2$	37 $(80\%)_2$	32 $(86\%)_2$
Total	6,947 $(100\%)_1$	2,216 $(32\%)_2$	1,097 $(50\%)_2$	622 $(57\%)_2$

Source: FEST Database. [1] Column percentage. [2] Percent of visitors who continued on to this stage.

One can see that overall return rates increased with each new repeat visit also, from 32% overall after the first visit, to 50% after the second and 57% after the third visit, an indication that the more FEST members visited FEST programs, the more likely they were to continue being involved with FEST. The continuation rates increased for repeat visitors for all four event types between the first and the third visit: from 29% to 51% for *Family Science Events*, 41% to 70% for *Orientations*, 53% to 66% for *Family Workshops*, and 70% to 86% for *Special Projects*. These increasing return rates for repeat attendance serve as evidence of FEST's success with most of its target audience.

The situation is more complex, though. First, these data reflect the path analyses of *individuals*; at the level of the individual the return rates for *Family Science Events* seem low but that statistic is deceiving. Another member of that same family may have returned or a "new" member attended as a result which is not reflected in that rate. Also, individuals who completed a feedback form were not necessarily involved with FEST at the same level (i.e. infrequent, moderate or frequent participants) as the family unit with which they participated during that

event. And, though initial attendance at *Family Science Events* resulted in the lowest return rates, such events also reached far more people than any other kind of FEST event. This meant that despite the low return rate, these events still generated the highest absolute number of repeat FEST participants and so in some ways were far more effective than the workshop-type events or *Orientations* in fostering repeat participation. This statement should also be qualified because of a likely self-selection bias; families who started FEST by attending workshop-type events might simply have had a stronger predisposition to appreciate museums and workshop-type events, and were thus more likely to repeat the experience. It should also be noted that most individual participants who came to a FEST event (no matter what type) indicated that they fully intended to come back (though two-thirds did not in fact return).

A later analysis of feedback forms by level of participation (infrequent, moderate, and frequent) revealed that feedback forms were predominantly filled out by those attending moderately and frequently. Feedback form data was thus biased towards the opinion of moderate and frequent participants, and may have not represented those who attended infrequently. When feedback forms were analyzed by level of participation, it turned out that intentions to return actually differed between the three levels. Eighty-six (86%) percent of the frequent participants stated that they would "definitely" return, compared to 72% of those who attended moderately and 63% attending infrequently. In other words those attending infrequently already had given some indication that they were less likely to return when they left their first FEST event; this was not the case for those attending moderately or frequently.

Table 28 summarizes the results of the individual path analyses, contrasting the pathways of individual infrequent, moderate, and frequent participants by their first choice of FEST event. Infrequent participants were more likely to have attended a Family Science Event as their first (and only) FEST event, than moderate and frequent participants. Those attending moderately were twice as likely as infrequent participants to have attended a Family Workshop as their first FEST event. Frequent FEST participants also differed strongly from the infrequent and moderate participant: only half of them first attended a Family Science Event (compared to 88% for infrequent and 79% for moderate participants); almost a quarter (23%) of the frequent users first attended a Family Workshop, in contrast to 11% of those attending moderately and 5% infrequently; 11% of the frequent participants first went to a Special Project, but only 1% of the moderate and less than 1% of the infrequent participants did so.

One of the original objectives of FEST was to create a science education "career ladder" for families, within the structure of FEST, encouraging them to initially attend the more introductory *Orientations* and *Family Science Events*, and then continuing their participation in FEST by attending the more personal, engaging, and focused *Family Workshops* and *Special Projects*. There is little evidence to suggest that this objective was reached; only 6% of the participants who attended a Family Science Event first and then returned chose a Family Workshop or a Special Project as their second FEST event. Of the 74 FEST participants who first attended an Orientation and whose attendance pathway was analyzed, more than two-thirds (69%; n=51) subsequently chose a Family Science Event as their second FEST event. Only one of these participants came back to a Family Workshop and the remaining 30% (n=22) did not return).

Table 28: First choice of FEST event by level of participation in FEST (infrequent, moderate & frequent)

First FEST visit was to…	Total	Only 1 visit "infrequent"	2-5 visits "moderate"	6 or more visits "frequent"
Family Science Event				
Total N	5,876	4,179	1,596	101
Percent of column total	85%	88%	79%	50%
Orientation				
Total N	474	280	162	32
Percent of column total	7%	6%	8%	16%
Family Workshop				
Total N	531	252	232	47
Percent of column total	8%	5%	12%	23%
Special Project				
Total N	66	20	24	22
Percent of column total	1.0%	<1%	1%	11%
Total	6,947*	4,731	2,014	202
Percent of row total	100%	68%	29%	3%

Source: FEST Database. Note (*): Three individual's participation records did not include the event type.

Reinforcing this finding also were the specific path analyses conducted with those attending frequently (Figure 2). Researchers traced frequent participants' choices of FEST events for their first six visits (the minimum number of events required to qualify as a frequent participant), and found that those attending frequently preferred *Family Science Events*. Between 61% and 69% of each of the first six visits of frequent participants were to *Family Science Events*, while the remaining visits were to *Family Workshops* and *Special Projects*. Almost one-third (n=61) of those attending frequently exclusively attended *Family Science Events* for their first six visits, while only a small percentage of frequent users (7%; n=15) did not attend a *Family Science Event* at all during their first six visits. Frequent participants seemed to prefer all-day *Special Projects* over *Family Workshops* after their first two visits to FEST events and more than twice as many frequent users attended *Special Projects* than *Family Workshops* on their sixth visit.

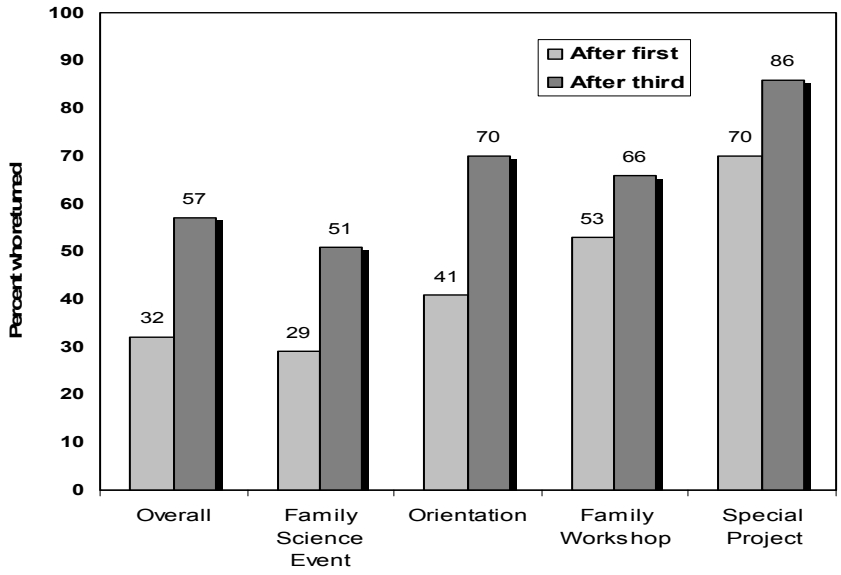

Figure 1: Continuation Rates by event type

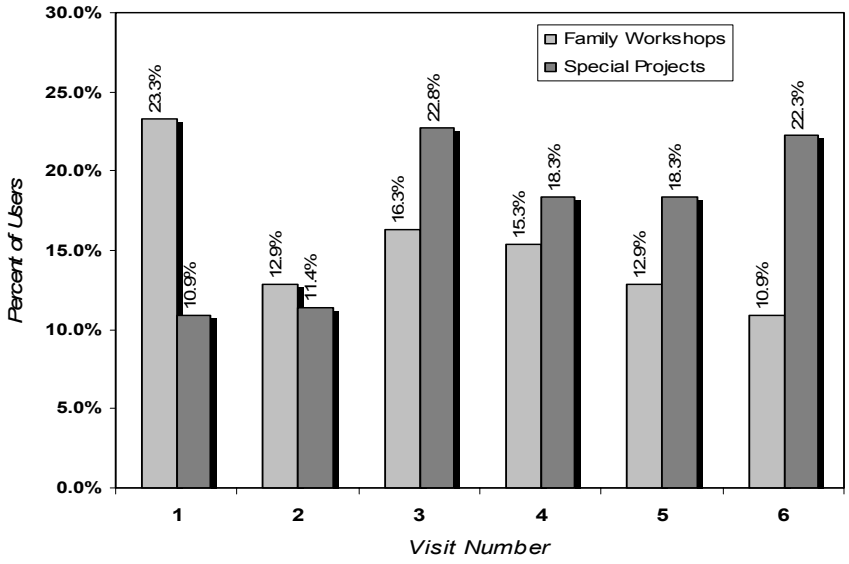

Figure 2: A comparison between frequent participant attendance at Family Workshops and Special Projects

Use of the FEST newsletter FESTivities

Another element of the FEST program was the FEST newsletter, *FESTivities*, serving as a major means of informing FEST families about upcoming events and providing readers with background articles on topics that ranged from science-related activities that families could do on their own to feature articles about the museums.

In Year 3, 42% (n=452) of the 1,079 FEST participants who completed a feedback form stated that they received the FEST newsletter. [This does not necessarily mean that the remaining 627 did not receive a newsletter; feedback forms were filled out by an adult and these individuals within a family might not be aware of the fact that the family received the newsletter.] Almost three-quarters (73%) of self-identified FEST members [i.e., participants who were aware that they were members of a FEST family] stated that they either read the newsletter "occasionally" or "always." In fact, more than half (56%) claimed that they "always" read the newsletter, while 17% said they read it "occasionally."

Not surprisingly, those who completed a feedback form while attending a Family Workshop or Special Project were more likely to "always" read the newsletter (48%), than those completing a feedback form while attending a Family Science Event (30%). *Family Science Events* were generally announced through the newsletter and additional direct mailings from the museums, while *Family Workshops* and *Special Projects* were normally announced through the FEST newsletter and occasionally through bulletin boards, announcements, flyers provided to the community partners by the museums, and publications that originated directly from the community partners. It was expected that workshop participants whose major source of information about workshops was probably through the newsletter would have exhibited a more frequent rate of reading the newsletter than Family Science Event participants. These families also were also extremely engaged *and* savvy about seeking out resources to support their families' learning so that was probably a factor also. These data also support the notion that the FEST newsletter was a major vehicle for informing FEST members of workshop-type events that took place at the four area museums. Family Workshop or Special Project attendance was directly tied to the use of the newsletter. Unless a community partner had included information on workshops in their own communication to members—e.g., posted it on a bulletin board or distributed museum flyers—the newsletter was the only source of information on workshops.

Sixty-three percent (n=524) responded to the question "How do you use the newsletter?" Of those responding, 59% stated that they read about various FEST events, and 55% read the newsletter's articles (Table 29). Roughly half reported using the calendar included in the newsletter to find out when FEST events were taking place. Twenty-nine percent of those responding indicated that they used the newsletter at home to talk about science, and 31% said that they gave their newsletter to others so that they could also learn about FEST.

Table 29: Use of the newsletter*

How do you use the newsletter?	Percent of those responding (n=524)*
I read about the various FEST family events, workshops, and *Special Projects*	59%
I read the newsletter articles	55%
I use the calendar to know when various FEST activities take place	51%
I give the newsletter to others so that they learn about FEST	31%
I use the newsletter to talk about science at home	29%
Other	18%
Not Applicable	2%

Source: Feedback Forms. *Percentages may not total 100% because multiple responses were accepted.

(*) Totals here do not equal totals in Table 30 because of missing data that did not allow participants to be assigned a user level.

Those participating frequently and moderately were more likely than infrequent users to report receiving the FEST newsletter (61% of frequent, 53% of moderate, & 22% of infrequent participants). Frequent participants were more likely to moderately read the newsletter than either those attending moderately or infrequently (81% frequent, 60% moderate and 57% of the infrequent participants). Those who received the newsletter read about the various events at similarly high rates (70-80%) regardless of their level of participation, however, frequent participants were more likely to read the articles than were those attending moderately or infrequently (Table 30). Frequent participants were also more likely than those participating moderately or infrequently to use the calendar in the newsletter or to pass the newsletter on to someone else.

Table 30: Use of newsletter by FEST user level*

Use of FEST newsletter	Frequent (n=219)	Moderate (n=64)	Infrequent (n=16)***
Read about the various events	82%	72%	81%
Read the articles	73%	59%	44%
Use the calendar	72%	52%	63%
Give it to others	41%	23%	38%
To talk about science at home	36%	30%	31%
Wrote an article	1%	0%	0%
Other	3%	8%	6%
Not Applicable	1%	3%	6%

Source: Feedback Forms. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

(*) Percentages may not total 100% because multiple responses were accepted
(**) Chi Square: p< .001
(***) Totals here do not equal totals in Table 29 because of missing data that did not allow participants to be assigned a user level.

Goal Three: Stimulate and engage families in science inquiry and learning

FINDING# 7: FEST families developed comfort, interest and a skill set with which to visit museums and engage in hands-on science effectively together as a family.

Evidence gathered through observations, questionnaires, and interviews suggests a growing interest, comfort and understanding among FEST families about attending FEST institutions and engaging in family-based science learning. Adults in families also discovered that learning is not just for their children but for them also, and that learning together as a family can be enjoyable and rewarding.

WHAT IS THE ROLE OF SCIENCE-RELATED MUSEUMS IN SUPPORTING FAMILIES' INTEREST IN SCIENCE?

Prior understanding and engagement with science-related activities

In order to assess the effectiveness of FEST in changing families' understanding of the role that science museums can play in supporting families' interest in science, it was important to

determine their baseline understanding. In face-to-face interviews conducted at FEST events (Table 31), parents most frequently cited visiting museums or libraries as the best means to support their family's interest in science, which was mentioned by a little over a third of the sample who responded (36%). Although this response may have been influenced by the context of FEST with interviews being conducted in, or in reference to, museums—it suggests that some of those responding recognized that their participation in FEST would help foster their family's interest in science prior to attending and of course it is very possible that is why they were seeking out the FEST program in the first place. Example of responses include:

> *Going to the museum on a moderate basis [supports family interest in science].*
>
> *Come to more events like this, [visit] libraries.*
>
> *Museums help (the children) stay updated with science.*

Those interviewed cited additional ways to support an interest in science, including engaging in nature and outdoor activities (25%), pointing out science in everyday life (16%), reading books and magazines (15%), doing simple science experiments at home (15%), watching science-related shows on television or video (14%), and helping with school projects or science fairs (14%). Some representative comments include:

> *There are lots of things you can do. Today everything is about science, so you are always learning. It is about pointing out the science in everything.*
>
> *Going on a picnic, going into the woods…show them how to plant and why I have to do certain things to help the plants grow and what happens if I don't tend the garden.*
>
> *We do mini-experiments at home - we go to the Exploratorium website on how to do experiments. We did one on [a] helicopter with paper folded. It teaches about air and wind, how weight affects wings. My son learns science experiments at school and we do them at home.*
>
> *I'm also very involved helping my kids with learning and their projects at school. I help them do research. When they have tests in school I help them study.*

Table 31: Ways participants thought they could support their family's interest in science*

General ways to support family interest in science	Percent of respondents (n=73)
Visit museums or libraries	36%
Nature/ outdoors-related	25%
Parental modeling/pointing out science in the world	16%
Read-books, magazines	15%
Do "experiments" at home	15%
TV/Videos	14%
School project or science fair	14%
"Exposure" to science	7%
Conversations	5%
Other	11%
Don't know	7%

Source: Participant interviews. *Percentages may not total 100% because multiple responses were accepted.

When asked what role science museums could play in supporting their family's interest in science, those responding thought its largest role was to expose the family to science and thus provide them with new opportunities to engage in science (Table 32). Museums were also seen as places that make science fun and are hands-on, sparking interest or supporting current interests of family members, offering general support as educational institutions, or providing avenues for parents to become better teachers of their children. Some parents also mentioned that museum visits reinforced learning elsewhere, e.g. watching TV. The following representative comments illustrate these points:

- ✓ Development/exposure/new opportunities:

  We want to encourage them (our children) to grow and develop, and going to places like this does that. Broadens our awareness - it's teaching them. The kids pick up a lot of information at these (events).

- ✓ Makes science fun/hands-on:

  Makes kids want to learn, not a chore or something they have to do.

- ✓ Focus on interests/sparks interests:

  Opens their minds and fascination - they want to learn more. Coming here tonight sparked interests in different things. My niece was excited reading about the animals.

- ✓ Educational:

  Gives me a place to go and learn things I didn't know already to teach them.

  Because the parents don't know how to approach the subject, so the museum helps.

  It gives you a lot of info you don't normally get about everything

  Zoo teaches how to take care of animals.

  Because they learn where the fish live, how they survive.

- ✓ Reinforces other learning:

  They get interested at home and learn more at a museum.

  Help them to touch the things they see on TV

When they watch TV and they see something that they saw at the aquarium, a light bulb goes off and they make a connection.

Table 32: The role of science-related museums in supporting family interest in science*

Role of science museums	Percent of those responding (n=72)
Exposure and new opportunities	22%
Makes science fun or hands-on	19%
Ability to focus on family interests or spark interest	19%
Educational in general	18%
Educational about a specific topic	15%
Reinforces other learning	11%
Accessible	4%
Other	8%
An important role	8%
No role/ minor role	3%

Source: Participant interviews. *Percentages may not total 100% because multiple responses were accepted.

Watching TV and visiting other science museums, zoos, or aquaria were the most common ways in which families had engaged with science in the preceding year before FEST. In both Years 2 and 3, approximately 60% of those attending frequently engaged in at least one of these activities. Moderate and frequent FEST participants were more involved in their children's school-related science activities and more likely to discuss science-related topics at home than those attending infrequently.

Engagement with science-related activities after participating in FEST

In terms of families engaging in science-related activities, researchers found significant differences between those attending infrequently, moderately and frequently and between program years (Table 33). Frequent participants generally reported higher rates of engaging in a diverse range of science-related activities than those attending moderately or infrequently. However, researchers found little change between program years among frequent participants' responses to the question of the types of science-related activities in which they had engaged. Interestingly, FEST events were the most important science-related activities engaged in by frequent participants in Years 2 and 3, and also in Year 3 became an important way to engage with science for those participating moderately, suggesting that FEST filled an important niche for those interested and willing to engage in science.

Table 33: Science-related activities engaged in by FEST families in the preceding year*

Science-related activities	Level of Participation Year 2*			Level of Participation Year 3*		
	Frequent (n=220)	Moderate (n=75)	Infrequent (n=85)	Frequent (n=381)	Moderate (n=126)	Infrequent (n=88)
Participated in another FEST event	70%	37%	22%	73%	52%	16%
Went to another science museum, zoo, or aquarium	63%	43%	44%	63%	58%	46%
Watched something about science on TV	60%	49%	40%	63%	61%	56%
Did something science-related outdoors with my family	55%	43%	37%	48%	38%	31%
Read FEST newsletter	44%	28%	12%	45%	29%	14%
Read about science in newspapers, books, magazines	42%	41%	28%	38%	34%	26%
Science-related activity at home	35%	28%	25%	37%	25%	19%
Talked about something science-related with my family	33%	27%	22%	45%	44%	24%
Attended a science-related event in community	26%	9%	13%	28%	26%	11%
We home school (Yr 2); Science as part of home schooling (Yr3)***	5%	3%	1%	22%	16%	14%
Science homework or science project for school	n/a	n/a	n/a	44%	42%	27%
Used internet for science	n/a	n/a	n/a	43%	41%	32%
Other	1%	3%	4%	3%	2%	17%

Source: Feedback Forms. Only the feedback forms of adults were analyzed since it was quite easy to distinguish the forms of adults from those of children. If unsure, names were checked with the database. In many cases it was clear that the adult had filled out the form for the entire family. When there were forms for both adults and children, researchers ensured that the data analyzed reflected the feedback of each member of the group. Most adult forms analyzed were filled out by the main family contact though if that adult did not attend, the form of the "lead" adult was analyzed instead. Researchers also grouped unidentified families with infrequent participants since their profile suggested a strong overlap with infrequent participants.

(*) Percentages may not total 100% because multiple responses were accepted
(**)Chi Square: p< .001 for Year 2 and 3.
(***) Note the re-wording of the question from Year 2 to Year 3.

Another important FEST goal was to facilitate "family learning." The Institute uses this term to refer to two processes: First, individuals within a family group can learn collaboratively about something, such as science. Because the socio-cultural context so strongly influences the success and dynamic of learning (Falk and Dierking, 2000), group learning processes engaged in as families learn together are as important as the learning processes of the individual. The FEST program team deeply understood this aspect of family learning and designed FEST programming to promote collaboration, conversation and purposeful activity. Observations by Institute researchers during *Family Science Events*, *Family Workshops* and *Special Projects* confirmed that these events provided many opportunities for family members to collaboratively engage in and converse while learning about science.

Second, and less appreciated, "family learning" also refers to a process in which individual members of a group either learn about each other or the group itself through meaningful

engagement and interaction (e.g., in a workshop given at a museum). This aspect of family learning, often overlooked, can be as important an outcome as is increased knowledge or skills (Dierking et al., 2002). In order to explore outcomes of this second type of family learning, researchers probed visitors during face-to-face interviews (and later during telephone interviews), whether or not they had learned something about a family member that was surprising to them and, if so, what they had learned.

Altogether, 79 people discussed this aspect of family learning with us (Table 34). Almost a quarter (23%) stated that they had learned about their child's interest or knowledge in science:

> *They (son and daughter) can be really interested in science - I didn't think they'd like it, but they do.*

Fourteen percent of those interviewed reported learning something in relation to their child's social or developmental skills:

> *Seeing what they are scared of. [I realized that my] 18- month- old is into the 'mine' stage.*

Sharing and working together as a family and the children's excitement and enjoyment were each mentioned by 8% of those interviewed:

> *We are a big family. It's just nice to spend time together.*
>
> *Yes, we work better as a team.*
>
> *Yes-that they enjoyed it as much as I did.*
>
> *The way they want to keep coming back, they really enjoy coming to museums.*

Table 34: Participants' learning about their family or family member at the FEST program*

Learned about…	Percent of those responding (n=79)
Child's interest in/knowledge of science	23%
Child's developmental/social skills	14%
Sharing/work together as a family	8%
Child's excitement/fun	8%
General knowledge (unrelated to family learning)	10%
Other	9%
Nothing	38%

Source: Participant interviews.

*Percentages may not total 100% because multiple responses were accepted.

Frequent and moderate participants reported FEST benefits for the entire family including: family time together (84% of frequent participants and 79% of those attending moderately), science or fact-based learning (31% of frequent participants; 47% of those participating moderately), family learning (22% of those attending frequently; 5% of moderate participants), and having fun (16% of frequent participants; 21% of those attending moderately). Participants attending frequently tended to focus more on aspects of family learning than did moderate participants, while those attending moderately were more likely than frequent participants to focus on science-related learning.

FINDING #8: Many families engaged in a wide range of science learning experiences at home and in the community that built on their in-museum FEST experiences.

Many families, particularly those that participated frequently in FEST, engaged in a variety of science learning experiences that built on their FEST activities. Activities included related conversations back at home, family visits to other science-oriented destinations, conducting home experiments, and assisting children with school and science fair projects. A host of factors probably contributed to this finding, including that subsequent reinforcing experiences such as conversations at home might more likely occur after repeated visits, that these families may generally have been more involved in learning together and conversing about their activities, that they may specifically have been more interested and engaged in science and thus more strongly identified with FEST, or some combination of these factors. However, even if these families were predisposed toward science and learning, FEST clearly provided an effective context in which they could explore their common interests.

WHAT OTHER SCIENCE-RELATED ACTIVITIES DID FEST PARTICIPANTS ENGAGE IN DURING AND AFTER PARTICIPATING IN FEST?

Science activities beyond FEST

In Year 3, almost three-quarters (73%, n=254) of those responding who self-identified as members of a FEST family said that they had visited another science museum, zoo, aquarium or other science-related museum in the preceding year—an indication that at least for some families FEST may have fostered a higher interest in visiting science museums (Table 35). When asked how many times they had visited science institutions in the last year, outside of the FEST program, 17% (n=233) of those responding noted one visit; 25% had made two visits; 27% had made three visits; and almost a third (31%) stated that they had visited science-related museum-type settings between 4-6 times in the preceding year. On average, those responding reported three visits to science-related free-choice settings in the preceding year. Thus, FEST families did not restrict their museum-going activities to FEST events and institutions, but visited other museums as well. Although the question stressed that participants should report on museum visits not related to FEST, it is possible that some, particularly those less familiar with FEST, might still have counted FEST events when they answered the question. Nonetheless, it is a very high number for audiences who are traditionally under-represented in free-choice learning environments like museums. Researchers found no differences among user levels in the number of non-FEST museum visits.

Table 35: Number of visits to science-related museum, zoo, aquarium, etc., by FEST participants in the preceding year (only individuals who self-identified as members of a FEST family)

Number of visits last year	Percent of those responding (n=233)
1	17%
2	25%
3	27%
4	12%
5	10%
6	9%

Source: Feedback Forms.

Almost three-quarters of the participants interviewed face to face (n=61) stated that they had participated in a science event or activity not related to FEST during the past year (Table 36). The most common non-FEST science activity was watching a science-related television program (59%), followed by helping with school science projects, which included science fair projects (51%), and visits to the FEST partner museums outside of FEST programming (31%). Some representative comments from these participants include:

> *[We watch] animal kingdom on TV.*
>
> *School project - had to make a cell, a human cell and a plant cell. My son did a project on the solar system and I helped him with it.*
>
> *We are members of the Franklin Institute. We go there often.*

Table 36: Participation in non-FEST Science Events or activities within the past year*

Types of Participation	Percent of those responding (n=61)
Television	59%
School project or science fair	51%
Visited FEST partner museum	31%
Read books, magazines	16%
Visited non-FEST partner museum	12%
Nature/outdoors-related activity	12%
Experiments at home	12%
Conversations	2%

Source: Participant interviews. *Percentages may not total 100% because multiple responses were accepted.

Other activities included reading science-related magazines or books; visiting other institutions ("We went to the library and saw a science magic show"); activities and experiences outdoors or in nature ("[We] plant a lot at home; [we] had a pet caterpillar (which we) watched grow into a butterfly"); science "experiments" at home; and conversations about science ("Now we have more science-related conversations with family and others. Others were impressed at the amount of knowledge "he [son] has about science").

Two-thirds (66%) of those responding expressed an interest in science activities beyond FEST. Of these, 35% wanted to visit a museum or other science-related institution:

Would consider coming back here to learn more. [There was] not enough time tonight. I want to take her to [the] Fells Planetarium and she wanted to come for [the] Space Station IMAX.

Two-thirds (67%) also expressed an interest in specific science topics—including astronomy, human biology, zoology, earth science, chemistry, and technology—rather than more general activities:

My kids are interested in astronomy, would like to do something related to astronomy—daughter is interested in it. [We] would like to go stargazing for real.

Something that covers chemistry in depth.

Butterflies—growing them and watching them spread their wings.

Learning about seals and sea lions; learn about how they talk and communicate and how to keep the animals.

Science demos on electricity or chemical reactions.

The activities that families participated in beyond FEST were observed differentially between participants based on their level of participation. The percentage of moderate and infrequent participants who stated that they watched something science-related on TV increased by 12-16% between Years 2 and 3, and the percentage of those attending moderately who visited another science museum increased by 15% from Year 2 to Year 3. The fact that more moderate and frequent participants reported talking about science at home in Year 3 than in Year 2, while those attending infrequently reported no increase, suggests that science learning facilitated by FEST extended into the homes of those repeatedly attending FEST events. A host of factors probably contributed to this finding including that subsequent reinforcing experiences such as conversations at home might more likely occur after repeated visits, that perhaps these families are more generally involved in learning and conversing about their activities, that they may specifically have been more interested and engaged in science, thus more strongly identified with the program, or some combination of these.

In follow-up phone interviews and a focus group researchers asked parents whether they had done anything "that was similar to FEST" since the program had ended in summer 2003. Activities that frequent users reported as similar to FEST usually consisted of a visit to a museum or nature center and often included hands-on activities. Nearly two-fifths (41%) reported having done "many" similar activities with their families, defined as three or more separate activities or museum visits. Many of these families also reported having memberships to one of the FEST museum partners. More than a third (38%) of frequent participants had done "a few" activities they felt were similar to FEST, defined as one or two activities or museum visits. Frequent participants seemed to associate FEST or FEST-like activities with museum visits. There was only one category of significant difference between frequent and moderate participants; those attending moderately were less likely to have reported doing "many" additional activities than were frequent users (29% and 41%, respectively). Another almost quarter of those participating frequently (22%) reported having done no activities similar to FEST. Families, even though participating in FEST frequently, seldom mentioned doing hands-on activities at home.

WHAT CHARACTERISTICS DID FREQUENT FEST PARTICIPANTS POSSESS THAT SO ENGAGED THEM AND ENABLED SUCH STRONG IMPACTS TO BE OBSERVED?

Throughout this report, there has been strong evidence suggesting that the participants most influenced by FEST activities were those participating frequently (attending 6 or more FEST events), and to some degree, those involved moderately (attending 2-5 events). Clearly a host of factors are contributing to why FEST was so effective for these families, including the importance of subsequent reinforcing experiences such as conversations at home, that these families may be more involved in learning together and conversing about their activities generally, or that they may specifically have been more interested and engaged in science, and thus more strongly identified with FEST, enabling more impact to be observed.

However, even if these families were predisposed toward science and learning, once they became involved with FEST and the participating museums, there clearly was an effective match. There was little doubt that museum settings provided an effective context in which families predisposed toward science and learning could explore their common interests in fun and meaningful ways. Because there seemed to be such dovetailing between the characteristics of the participants and the settings, the FEST team and the Institute felt it was worthwhile to learn more about the makeup of the array of FEST participants so a set of interviews was conducted in April and June of 2004 (after programming was discontinued), stratified by level of participation. It was very difficult to reach and interview infrequent participants so this sample is primarily composed of frequent and moderate participants. In most cases, the differences between these two groups were not significant but when they are it is noted. Institute researchers also conducted a focus group with "frequent" users of FEST in summer 2004. Seven "frequent" users attended the focus group. These data were qualitatively analyzed for trends and common themes among participants. It was hoped that this portion of the investigation would both help the Project team, as well as the field, better understand how to recruit, stimulate and engage families predisposed toward science and learning in meaningful science inquiry and learning.

Most of the frequent participants, all adults, interviewed by phone in a stratified sampling design were in their mid-thirties to mid-fifties. More than half (52%) were 35 to 44, and 29% were aged 45 to 54. An additional 10% were aged 25 to34; only 3% were less than 25 years old, and 6% were over 55. The mean number of adults in a family participating frequently was 2, and the mean number of children per household also 2.0. More than a third of the frequent participants (37%) lived in a household that earned $36,000-$50,000 last year, in keeping with Philadelphia's mean household income of $40,667, as reported in the 2001 Supplementary Survey of the U.S. Census Bureau.

Table 37: Frequent participants' reported household income for last year

Annual Income (in dollars)	Percent of Frequent Participants (n=27)
$20,000 or less	15%
$21,000-35,000	26%
$36,000-50,000	37%
$51,000-75,000	11%
More than $75,000	11%

Those participating in FEST frequently tended to be fairly highly educated; more than a quarter (27%) had a college degree (BA, BS), and an additional 20% had earned a graduate degree (MA, MBA, PhD). Another 17% had at least some college education, 16% had an associate's degree, 7% had some high school, 7% were high school graduates, 3% had a technical degree, and 3% had some graduate-level education.

When asked what they did for a living, 27% of the frequent participants said they stayed at home full-time, 23% had a job that was related to education in some way, 10% had a science-related career, and 40% had a career that was not related to either science or education. Frequent participants with education-related careers included an elementary school teacher and an outreach specialist at a public library. Those with science-related careers included a registered nurse and an ultrasound technician.

Some of the frequent participants had a prior interest in science themselves, while others became interested in science through their children:

> *[My interest is] purely on an amateur level. Experimenting, discovery. Loved that since my youth. Astronomy, paleontology, geology. (Female, 42, frequent participant)*
>
> *I love science - I like animals, learning about habitats and how they live, like how they take care of their families. (Female, 37, frequent participant)*
>
> *...Only when the kids got interested. I never knew that the Zoo, Academy - that that was science. And reading their books [got me interested], entry level books since I didn't know this before. (Female, 39, frequent participant)*

The type of science that interested frequent users ranged broadly—from zoology to astronomy, and even chemistry. "I like chemistry," replied one mother of a five year old, "I always wanted to be a chemist, but chemistry was very hard."

Views of their children's education

Frequent participants were very interested and willing to discuss their children's learning in general, and schooling in particular, and data was collected on a variety of topics, including their thoughts and concerns about providing guidance to their children, safety and behavioral concerns, quality and topics covered in school, and class size. Although interesting, much of this information is not specifically germane to FEST so it can be found in Appendix H.

However, there was one set of findings that was important to understanding those who participated in FEST frequently. Adults were asked an open-ended question about what they perceived their role in their children's or grandchildren's learning in general, and schooling in particular, to be. Data was collected from infrequent and moderate users also which provides additional insights. Researchers analyzed these data qualitatively and four distinct roles emerged: 1) the advocate, 2) the follow-up monitor, 3) the teacher, and 4) the motivator. These categories were then analyzed across the three levels of participation. Frequent participants tended to provide more in-depth answers and discussed multiple roles, while moderate and infrequent participants were more likely to name only one role.

The Advocate: Almost two-thirds (61%) of frequent users described a role of advocating for their child's education. Some parents participating moderately indicated playing this role; very few infrequent participants did. This role was closely related to the educational concern that involved ensuring guidance and passing on educational values. Parents emerged as "advocates" if they focused on the importance of communicating with school officials and teachers, looking for educational opportunities, taking an active role in providing these opportunities, and demonstrating the value of education. One mother's description captured the advocate role as follows:

> *Moms are advocates in the sense that they must speak for their children's rights, whether that means getting better teachers, finding better ways for them to learn, or being a resource of information for other parents. (Female, 49, frequent participant)*

This frequent FEST participant and others saw their role as one of ensuring a quality education. A number of parents and grandparents in this category also described themselves as guides—e.g., helping to point their children toward more challenging courses or extracurricular activities. Others talked of volunteering in their child's classroom and staying in contact with teachers as part of their role. Parents in the role of advocate were very involved and active in their children's lives and education.

The Follow-up Monitor: Infrequent participants were more likely to refer to themselves in terms of assuming the follow-up role—defined largely as one of helping children finish what was started at school and requiring less personal initiative. Sixty percent (60%) of infrequent participants mentioned the follow-up role, while only 45% of the frequent participants and 53% of the moderate ones did so. These parents were active in checking homework and making sure that it was completed, as well as helping their children with research projects. One parent described herself as "the enforcer. [I] reinforce what they come home with, like fractions." This role was often combined with one of the other roles.

The Teacher: More than a third of the frequent participants (36%) described a role that could be defined as that of "teacher," compared to 5% of moderate participants and none of the adults participating infrequently. This may be due to the fact that more frequent participants were home schooling their children than were moderate or infrequent participants. As one home-schooling parent described, "[I] develop lesson plans, the curriculum, and administer them." Interestingly though, almost twice as many frequent participants as the number who indicated they home schooled their children described themselves in this teaching role. One mother of an eleven year old noted, "I have to give a separate or added-on piece that the school can't or won't—like cultural, spiritual, lots of reading." These parents saw themselves as taking on an active teaching role at home, even though their children also attended school.

The Motivator: An additional 19% of adults participating frequently in FEST described their role as including aspects of motivating and encouraging their children. These parents described themselves as "cheerleading" for their children by providing support and encouragement. One mother described her role as having "a positive attitude." The motivator role was typically combined with the follow-up role.

These roles are similar to others that have emerged independently in recent studies about supporting the learning of children growing up in urban areas (Garbarino, Dubrow, Kostelney & Pardo, 1992; Dierking, Frankel, McCreedy & Adelman, 2002, Calabrese Barton, Drake, Gustavo Perez, St. Louis & George, 2004). Research findings indicate that context profoundly affects how parents raise their children. In poor urban neighborhoods there is an absence of institutions which promote healthy youth or family development. Most children growing up in severely depleted neighborhoods face a daunting array of risk that greatly diminishes their chances of escaping poor economic, educational, social and health outcomes and this research suggests that one can not divorce the study of children's learning in and out of school from an understanding of their environment including peers, social institutions, the larger community and, of course, parents and other significant adults.

A recent study investigated successful parenting in high-risk neighborhoods and three strategies emerged as important to effective parenting: 1) youth-monitoring, that is, supervising their children's time, space and friendships 2) resource-seeking, an ability to garner resources which promote their children's development such as scouting, tutoring, athletic programs and learning resources like museums and 3) in-home learning strategies that promote academic achievement, and provide emotional support and praise to their children for being successful. All three strategies require high personal initiative on the part of the adult. These findings dovetail well with the Ecologies of Parent Engagement model proposed by Calabrese Barton et. al. (2004). This model suggests to understand parent engagement in urban communities (their particular focus has been in elementary schools) one must investigate not just *what* parents do to engage with their children's schooling, but also *how* and *why* they are engaged. The model includes two related constructs – *capital*, the human, social and material resources that one has access to, and *space*, encompassing the individuals who come together for particular reasons, the roles they play, the rules and expectations for their interactions, and the tools used for shared participation. This study and model would certainly suggest that many of the adults participating frequently, and perhaps even moderately in FEST, have a combination of these effective parenting qualities and are probably purposively seeking out the FEST program because they value its ability to meet their family's learning needs through the capital and space it affords.

Frequent participants' perspectives on the effectiveness of FEST

Since many parents, grandparents and other adults significant to children were actively seeking out and participating frequently in FEST, the perspective of frequent participants about the effectiveness of the project is exceedingly important. Forty-four percent of those participating frequently liked the *Family Science Events* best and more than one-third (38%) said they liked every type of event they attended which included a combination of *Family Science Events* and either *Family Workshops* or *Special Projects*. Sixteen percent preferred the workshops, and 2% liked the *Special Projects* the most. There were some participants who had attended moderately in this sample and researchers found no statistically significant differences between them and participants attending frequently, suggesting that those interested in participating moderately are another audience that can be targeted for future programming.

Most frequent participants (71%) liked a particular type of event best because of a program-related aspect—i.e., the topic of the event, the convenience of attending, the staff, or the hands-on activities:

> *We've been to the Family Science Events, and I liked the ones at the National Academy of Science the best because we were able to see real animals, even if they weren't alive, and I've never seen that before. (Male, 16, frequent participant)*
>
> *I liked the choice involved. [We] went to workshops if the children were interested in the topic. (Female, 49, frequent participant)*
>
> *I liked that it was family oriented. They provided a snack. [The] museum was closed to [the] general public- no competition. Parking was free. The hours and location were convenient- [it's] better during the evening. (Female, 41, frequent participant)*
>
> *I like the hands-on. We like doing things. We're not tourists. We want to do more than just walk around. (Female, 40, frequent participant)*

Although seemingly contradictory, since 44% of frequent participants indicated they liked the large events the best, most who mentioned the size of an event as an important aspect preferred the intimate nature of the smaller events. These participants appreciated the atmosphere of these smaller events which they felt allowed more personalized interaction with program staff. One mother of a five-year-old appreciated the workshops and *Special Projects* because "you get more attention and can ask questions one-on-one." Another mother echoed this preference for individual attention: "The smaller events were more intimate, [and] one-on-one for the kids." These frequent participants appreciated the type of staff interactions possible in a smaller event in which fewer families attend. Almost one-quarter of the frequent participants (21%) also appreciated the social aspect or family time the events offered. This included both those who liked having quality time with their own family and those that enjoyed socializing with other families at events.

Researchers also asked frequent participants to comment on the most important reason for their participation in FEST overall. The majority (78%) cited the educational aspects of the events, but participants also mentioned family time (31%), community awareness (19%), and that the event was free (19%) as important factors. No differences between frequent and moderate users were apparent in these categories. (Infrequent users were not asked this question.)

Researchers asked frequent participants why they repeatedly attended FEST events in order to discover what factors motivated them to attend such a large number of events. More than half of the frequent users (53%) said they simply found the events enjoyable. The following frequent participants illustrate this point:

> *[The] children really enjoyed it- they always wanted to go to the zoo. (Female, 34, frequent participant)*
>
> *We enjoyed them [the events]… If you don't enjoy it, you don't come back. (Female, 47*, participant)

Any opportunity for enjoyable hands-on we jump on. (Female, 42, frequent participant)

It gave my children the opportunity to participate. Our family was able to stay together and do things together, we found inexpensive ways to enjoy each other and built trust that we didn't have before. . (Female, 30, frequent participant)

While frequent participants most often mentioned having an enjoyable experience as a factor in their repeated attendance, most participants mentioned multiple reasons. Many of the frequent participants (43%) noted the variety of venues and activities at FEST events as a reason for their continued involvement, as illustrated by one mother of two teenagers: "There were different events-at different venues, a large variety of things to do each time." In the focus group frequent participants also indicated that they highly valued the opportunity for new and different events and activities. Another reason cited by those attending frequently was the educational aspects of the events (41%). Fewer frequent participants mentioned the quality of event organization (28%).

Members of the frequent-participant focus group mentioned that they highly valued family time—an opportunity that FEST offered. For some, FEST was an opportunity to participate in a special activity with only their children. One participant spoke of FEST as a time "for me and my four kids, as opposed to just me inviting all my nieces and nephews." She limited FEST events to only her children because inviting the extended family "might take away from the time that I could be doing something one-on-one with one of my own children." For other participants, however, FEST events were a great opportunity to involve the extended family. A number of participants in the focus group were grandmothers who began taking their grandchildren to FEST events and then convinced their own children to join them, as in the following example:

I was taking my grandchildren, and I said to my son, "You should participate in these things, because these are your kids." And he is busy doing whatever, and then he started coming and he really enjoyed it and he'd say, "Mom, when's the next one?" ... And after a while he said, "Yeah, I want to go. Let me know when's the next one." And it was good. It was good quality time for us. (Frequent-participant focus group)

For this frequent participant, FEST events were a way for the entire family to spend time together. They were also a tool she used to involve her son more in his children's lives.

Frequent participants also talked about the value of new and different experiences and providing opportunities for "exposure." These people commonly acted as advocates for their children's education, seeking to continually provide opportunities for learning and exposure. This value was apparent in the way the focus group spoke of the enhanced museum experience that FEST events provided. The focus group felt that the educational nature, hands-on activities, and staff of FEST provided a more in-depth museum visit than was typically available to most museum-goers. This notion of an enhanced museum visit is linked to the value they placed on finding unique opportunities for their children:

> *I think it has opened my boys' eyes up to what else is out there other than a basketball and a football. I wanted them to know that you can get into the science. Or that you can be a veterinarian, you don't have to play basketball or don't have to play football. No one says just because you are a boy and will be a man that you have to do those things. I wanted them to know that there are other opportunities out there for them, besides just the typical basketball, baseball, football. (Frequent-participant focus group)*

> *...FEST has given that opportunity for our children to see things that they would normally not see, experience things that they would normally not experience, because they are so expensive when you take 5 or 6 children with you. (Frequent-participant focus group)*

> *I love the fact that they do things that –like you were saying-they don't do normally. Like if we went to the zoo and had a program we wouldn't be having that one-on-one with them, and like at the aquarium, we had the tour on top of the shark tank. So I really love the fact that we do things that we wouldn't normally do on just a general visit to some of these institutions. (Frequent-participant focus group)*

> *...If you don't open the kid's eyes- it's like art. If you don't open their eyes, they don't know to search for it. And this is what FEST offers, it opens the opportunity for the kids to explore and it also opens the opportunities for us as adults that I never had the opportunity to have. (Frequent-participant focus group)*

FEST provided these focus-group members and their families with an opportunity that was unlike any other in their community, and was also different from a typical trip to one of the host museums. Some focus-group participants voiced their concern that other FEST families were not taking full advantage of these valuable opportunities. Addressing the high "no-show" rate (families who would register but not attend the event), one frequent user remarked:

> *Then you'd go to an event and four or five people didn't turn up, when the space was filled for them. That was a lot of work put into that. And for the fact that you weren't paying for it and that it was free-I could never understand why they wouldn't take advantage of what they'd sign up for anyway. (Frequent-participant focus group)*

The members of the focus group not only saw FEST as a great opportunity, but also felt that "no show" families prevented them from attending events. Some mentioned trying to sign up for an event, only to be told that it was full and that there was no waiting list. This frustrated them because they knew from their own experience that on the day of the event, some of those who were registered would not attend. As parents or grandparents actively seeking unique educational activities for their children, the frequent users in the focus group viewed those families who were not taking full advantage of the program as preventing those who valued the program from participating.

In the focus group, frequent FEST users described three aspects of the FEST program that they valued most: 1) the educational aspect, 2) the hands-on aspect, and 3) the staff. For many of those participating in the focus group, these aspects formed the core of the enhanced museum experience they valued in FEST.

Educational: Focus group participants frequently mentioned the educational nature of the FEST program. For these parents, FEST was educational for their children as well as for themselves. Some focus group participants discussed FEST in terms of specific content they learned, as in the following quotation:

> *I think that –it's a good educational thing. For all the kids and everything some of the kids don't get an opportunity to participate in a lot of things that they need in school. This way they learn a lot- we went to the zoo and they learned a lot about the animals there. We're an animal family- we have turtles, frogs, all kinds of animals around the house. And they learn and that's how we learned what kind of frog we had, by coming to the zoo. (Frequent-participant focus group)*

Others mentioned the general learning that occurs when they attend a FEST event:

> *Because I actually learned something it wasn't like I just came and was like, "Oh, [I have] already been there. But when I came [for FEST], it wasn't like just coming to the Institute or coming to the aquarium. I go, I've seen fish and it's a fish- but FEST will actually tell you things when you come, not like you just come and just walk through and see the fish and the sharks. They actually give you information that actually teach[es]you things. And we are never too old to learn something. You are 90 years old you can learn something. And it actually got to be fun. (Frequent- participant focus group)*

For this focus group member, as well as others, FEST provided an enhanced visit to the museum that they could not experience otherwise. Because of the information that was available to participants at FEST events, participants felt the events were more educational than a typical, independent visit to the same venue. Focus-group participants highly valued the unique educational aspect of FEST events.

Hands-on: Focus group members also highlighted the hands-on nature of FEST events, for these frequent users, the hands-on aspect of the events was closely linked to their educational value. As with the enhanced educational experience provided by FEST, frequent participants reported that the hands-on aspects of the event were more intense than one would typically experience if visiting the museum on their own. As demonstrated in the following quotations, the participants were able to recall specific hands-on experiences that occurred at FEST events and their impact:

> *...I was an assistant in the classroom last year for the teacher. And we had to learn about the butterflies. So when the kids came to the museum they looked and said, "We know this!" They knew exactly what they were looking at, what they were doing. They asked the gentleman there a lot of questions and he showed them and said, "How did you learn this?" They learned it in school, but then they*

could see it right there in their hand. They could actually see what they learned in school. (Frequent- participant focus group)

…You can go to a museum, but you never have the hands-on. You just look through everything and that's pretty much it. But to actually have people there with tables set up, with information, with things that they could touch and they could feel. … Actually the tiger that was killed that was in the news... Because [her grandson] had a connection with the tiger when he heard the news, he was just saddened by it. But when [he] felt that coat in his hand, he said "Nana, this was the tiger" and I said, "I know, honey." He felt glad- it was good because at least he touched it, he felt it, he would have never have touch[ed] a coat of a tiger. Never. But he had that experience to touch that. So hands-on is very important because you can go to any museum anytime, but to actually have a hands-on experience and to speak to someone about it. To experience different kind[s] of animals, to touch them, whatever, that's a great thing and we got a lot out of that. (Frequent-participant focus group)

Staff: The theme of an enhanced museum visit was also linked to the focus group's comments about the staff at FEST events. Many participants mentioned staff as key to their enjoyment of and satisfaction with FEST events. When asked to compare FEST with other family activities, the focus group overwhelmingly replied that there was nothing else like FEST. Further, many participants highlighted the role of the staff in making FEST different from other activities:

When you come in the front door they have a sign up-"FEST is this way- you go that way, you go this way." They tell you, they try to make sure that you are more, so much more comfortable in the atmosphere that you are in and know exactly where everything is. (Frequent-participant focus group)

…I noticed that the FEST activities are monitored, where as there's volunteers that actually teach and every function that would give us more information separate than if we go by ourselves to the Franklin Institute. (Frequent-participant focus group)

[Because] FEST is the only one who actually provides you with trained people who have the answers and [do not] just stand there- "well I just work here. I don't know. I guess it's over that way." 'Cause the people from FEST they can tell you, they give you information. If you ask them, "What is this? What is that?" they have the answers. (Frequent participant focus group)

Focus group members noted that event staff were welcoming and well-informed, which they viewed as contributing positively to the family learning experience at FEST events. These frequent users saw staff as an essential part of the experience, providing orientation to the events, leading activities and providing additional information.

The educational and hands-on aspects of FEST, as well as the high quality of the staff, made FEST an excellent fit for frequent participants. This was also seen by their preference for the workshops and special programs (although not all members of the focus group had attended a

special program). Members of the focus group generally viewed FEST events that focused on one topic as more educational. Again, they felt that the unique opportunities provided by FEST were largely due to the format of special events and workshops. These included one-on-one time with the staff and the chance to participate in activities that "you wouldn't normally do at those places." While focus- group participants thought the evening *Family Science Events* were fun, for them the events were too crowded to provide the unique educational experiences they sought for their families.

Institute researchers asked both moderate and infrequent participants why they did not attend more events. Reasons that limited attendance included personal issues (work conflicts, no transportation), simply not knowing about additional events, or thinking an invitation was needed to attend the additional events. It is important to note that no one mentioned having a bad experience or not enjoying a past FEST event as a reason for not attending more events.

Frequent participants in the focus group expressed how FEST influenced their lives beyond the event itself—for example, in subsequent conversations or activities:

> *And the thing about leaving and going to the car and talking about it and then going to dinner and talking about it at dinner. ...Because each time you form a conversation, that's the quality time that you are looking for. That you spend together and you're sharing something that's positive. ...So when you can gather your family together to do something positive and talk about something positive and that positive thing goes on. A little bit more than just that moment. Because you can go to Great Adventures…but that just lasts there…But when you learn something that affects you and you see it on TV or on the news, the animals, and that's an on-going conversation. Right now- even right now there are times when something that happened in FEST, something that we've seen comes right back into our lives again, because we watch stuff or see stuff. Sam picked up a book or went on the Internet and found something. Here goes that conversation again- we remember, you remember what happened. And that just brings it all back. (Frequent-participant focus group)*

The focus group with frequent participants also believed that FEST influenced their children's formal education. One mother stated that FEST "actually triggered her [daughter's] interest in science," leading to a high-school science award and several college scholarship offers. In the following quote, another focus group participant recalled how a FEST demonstration on electricity led to a deeper experience for her grandson at school:

> *Now when we went to one [event] they had here, with the electricity and everything, and my grandson got to participate with the gentleman that had it. When he went back to school, he participated in his classroom since he knew more about it. The teacher let him perform the little demonstrations that they had. I think that it's a good educational thing. For all the kids and everything, some of the kids don't get an opportunity to participate in a lot of things that they need in school. (Frequent-participant focus group)*

Focus group participants also mentioned that FEST inspired their children to conduct mini-research projects at the library or on the Internet. Children were often interested in finding information related to a FEST experience, as the following examples illustrate:

> *We got to the point that we would go to the library and he would do his own little research – even with the butterflies or the caterpillars, the different caterpillars that he found. He wanted to know what type of caterpillar and what type of butterfly would come out of that caterpillar - just little things like that. And he wanted to do the research. And he is only 6 years old and he wanted to look into that and those books and find out more about it and wanted me to read it to him. (Moderator: Did that start with FEST?) Oh yes. Well, because of the fact that the first workshop that we went to was the butterfly workshop. He was little, he was like 4, he had so much fun and it would interest him. (Frequent-participant focus group)*

> *And it will continue with you. It doesn't end when we walk out of the doors. And the discussion continues and continues and like what she said - it triggers a learning experience for the kids where they want to do the research. They want to continue with it, they're not limited to "This is it. Let's forget about it once we've walked out." And that's what happened to my children. They are happy to come back to FEST. It opens the door for them where they would go and search for more information because they're interested. (Frequent-participant focus group)*

Families' perceptions of FEST programs was one important way to assess the effectiveness of the FEST project, however, demonstrating that it was a viable and sustainable model (Goal 4), required talking not only to the participants but to the staff partners involved in the collaboration as well.

Goal Four: Demonstrate that long-lasting and effective relationships can be built between informal science education institutions and community-based partners that stimulate, encourage and enrich families' interest, learning and involvement in science

FINDING# 9: The museums and CBOs that made up FEST were able to work together effectively over four years to create mutually beneficial programs and opportunities for "member" families to engage in meaningful science exploration together.

The challenge of any partnership is to develop and sustain a strong, collaborative relationship over time. In this respect, the partnership between the FEST museums and the community-based organizations was a success. All partners were optimistic about the nature of the collaboration, describing the partnership between the museums and the community-based organizations as a strong relationship based on mutual trust and good communication built over 10 years of working together.

HOW DID MUSEUM AND COMMUNITY PARTNER STAFF ASSESS THE NATURE OF THE PARTNERSHIP BETWEEN MUSEUMS AND COMMUNITY-BASED ORGANIZATIONS?

Effectiveness of the collaboration

Institute researchers interviewed seven community-partner staff members (from seven different CBOs) and five museum staff (from all four FEST museums) about their involvement with FEST. By talking with staff members directly involved in the FEST partnership, researchers noted the following findings:

- Staff in both the museums and the community-based organizations thought the partnership was strong and positive.
- The collaboration highlighted key issues that programs must consider when reaching out to "non-traditional" or underserved audiences (e.g., financial limitations, transience, language barriers).
- Such partnerships need to be viewed in terms of the individuals involved, as well as at the institutional level. Providing support for individual staff members within the partnership is essential to preserving the relationships between the organizations.
- Proactively setting up ongoing communication channels and nurturing personal relationships were essential as the museum and community partners continued to work towards the full potential of FEST.

Examining the interview results as a whole, researchers found that the partnership was perceived as positive and strong. This was due in part to the strong foundation developed over the 10 years of working together. The following are representative of staff perspectives on the partnership:

> *With FEST we have monthly meetings where most of the community partners are there. It's a group of people you get to know well - we've worked really well…Obviously, there wouldn't be a project without those relationships. From my perspective, I think we have great relationships. (Museum staff member)*
>
> *Now I have connections with the community. For example, for World Culture Day, we included cultural programming. Now we reach to our FEST [community-based organization] partners first. (Museum staff member)*
>
> *It's very positive. We worked as a group. [Our museum partner] was very good and [we] felt like equals. Always that person that we could call on for concerns or programs. We felt special, always available to each other. Couldn't have been better. (Community-based organization staff member)*
>
> *We were able to speak our mind at the meetings. We had a meeting on cultural differences. With FEST, communication was better than PISEC even. Everything was discussed." (Community-based organization staff member)*
>
> *[Our museum partner was] great. A lot of in-kind help. [We were] on even par with them as far as collaborating. I felt it was a gift. Communication [was] excellent…they answered quickly, always accessible. I don't think it could have been better. (Community-based organization staff member)*

This type of praise illustrates the strength of these partnerships. Both museum and CBO staff members were pleased with the partnership, the working relationships that were forged, and the open lines of communication.

Another sign of a successful partnership was the trust built between the FEST museums and CBOs throughout the process and their willingness to pursue projects together. Partners met monthly face-to-face and often had phone conversations in between; they still meet in order to coordinate activities and plan events or new projects. One museum staff member expressed this as she reflected on the success of the collaboration:

> *[It's a] really strong collaborative - working on [a] fourth grant. We seem to be able to keep it going with [even with] changes in personnel, there is enough good feeling. We have come a long way. When we first met in 1992, we wanted to plan an event and there was such a lack of trust, no community partners would travel to others. We still have monthly meetings which are at community sites too now.*

As this staff member described, the museums and CBOs built and nurtured a sense of trust despite obstacles such as staff turnover at some of the CBOs and the Academy. The consistency of staff at the museums, combined with a few consistent participants from CBOs, helped to build this trust. In fact the consistency of goals, staff, and communication contributed to the sense that there is some increasing institutional commitment, as well as the commitment of the individual partners.

Researchers also found evidence of increased partnering among the community-based organizations as a result of connections made through FEST. Half of the community-based organization partners reported cooperating with another CBO on projects, including new programs for their members. Three of the four museum partners reported that FEST had fostered additional cooperation within the community, including providing camp scholarships for FEST members and holding workshops at community-based organization sites. In most cases, these new opportunities for collaboration were facilitated by the ties formed through FEST: "It would have been difficult without FEST for this (collaboration) to occur," reported one museum staff member. "Instead of trying to reach community constituents directly, it's easier to have organizational contact to reach more people."

When asked to name elements that would be important to successful museum-community partnerships, CBO and museum staff mentioned learning about the other partners and their needs, supporting them, and receiving assistance when the organization needed it. The museum staff interviewed named the following elements as important to these types of partnerships:

- Communication
- Honesty
- Establishing expectations early on
- A willingness to provide programming for the community-based partners
- Familiarizing themselves with the broad range of community-based organizations
- Sharing a common goal of serving the community

Staff from the community-based organizations thought the following elements were important for successful partnerships:

- Sharing information and knowledge
- Commitment from all levels of an organization
- Supporting the other partners and learning about each other's roles
- Building upon the organization's strengths
- Bringing together diverse ethnic groups
- Flexibility
- Diverse programming
- Continuing community support even after the program ends (i.e., sustainability)

While the elements named by staff members varied, they all have the common aim of fostering the museum-community partnership to be strong and sustainable. These elements are good starting points when embarking on such collaborations.

Overall, the FEST partnership, linking museums and community-based organizations, was successful. Trust and long-lasting relationships were purposively built, and community organization liaisons and museum staff shared positive attitudes and opinions about the partnership, such as "the fact that we want to continue after ten years," as one museum staff member stated. The cooperation and trust fostered between both individuals and institutions has nurtured a strong, ongoing partnership between the four museums and many of the community partners, which is important as they begin to collaborate on another NSF-funded grant, *Community Ambassadors in Science Education* (CASE), which will bring museum programming into the community (Most of the community partners chose to join this follow-up project, a testimony to the effectiveness of FEST and the quality of the partnership.)

Important elements in reaching out effectively to new or "non-traditional" audiences

From the point of view of the museum partners, the most important elements of such programs involved communication and relying on each museum's existing strengths. Specific elements named by museum staff included:

- A clear understanding of what museums can offer and what communities need
- Listening to the needs of the community partners
- Including community members in the creation of programs from the outset to foster ownership
- Finding an effective community liaison
- Providing quality programming
- Flexibility on the part of the museum staff
- Providing easy access to the museum
- Receiving audience feedback

The most important elements of such programs for community partners related directly to the families participating: providing services and changing the views that families have about museums and even science in general. Several of the staff members of community organizations who were interviewed also felt that treating underserved families with respect and following

through on promises was essential to attracting and maintaining new audiences. For example, one CBO staff member commented: "Do not assume that the families don't care about their children's education, that going to museums and exploring their world is not important to them, because it is." This was clearly the case in this project; those families attending frequently and even moderately to some degree, sought out FEST and museums as excellent places in which to explore the world together. In addition to these families, there is also great potential for attracting families that have similar learning goals and interests, but may not appreciate that museums are comfortable and enjoyable places in which to pursue these goals and interests.

Another staff member thought organizations seeking to serve families should ask families what they want and then respond to their requests. In the case of the FEST program, this staff member thought that the museum partners had followed through: "These museums have stuck around and continue to reach out and see where they fit into the community." It is gratifying to know that Year One formative recommendations by the Institute about determining ways to fit into the community and meet the *real* needs of families were acted on effectively in the minds of most of the CBO staff. CBO staff also suggested that museum partners need to make a long-term commitment and continued efforts to better understand the needs and desires of audiences who have not traditionally visited museums before they can begin to successfully serve these communities. Museum staff members clearly understand the long-term nature of such efforts given their 10-year commitment and those interviewed largely recognized the long-term nature of the partnership. However, museum staff also appreciate that learning about such communities is an ongoing process. One staff member emphasized this point: "As museums, we still have a lot to learn about community needs. Our community partners are different. We still need to learn about the differences." Programs that reach out to non-traditional audiences provide services to the community, which requires listening and long-term commitment. In these respects, the FEST program was successful.

Improving the collaboration in the future

At least some of the staff interviewed felt that they were personally limited either by their role in their organization or the nature of their organization. When asked what they would do differently the next time they are involved in a similar collaboration, many partners expressed a desire to accomplish more with the program, such as raise attendance, devote more time to the program, and work harder at building relationships with the partners. Community partner liaisons felt that they did not have the resources to devote enough time and attention to the FEST program. For many of these partners, additional time and staff would have been necessary to change how they participated in the collaboration:

> *Our families did not participate in the workshops…We wanted them to be independent and familiar with museums. Maybe if I had more help we could have followed up…For me, getting to the meetings [was a challenge] because I am a one person office…I had to make it to every activity to get our families to participate. We needed a committee of people here to call [families]. (Community-based organization staff member)*

> *To get to know the other agencies better, look for more partnerships. I was too busy-need a tag team person." (Community-based organization staff member)*

From a personal level, I need to try harder and harder to find time for FEST. (Museum staff member)

Despite the earlier comment that partners feel there is some increasing institutional commitment for FEST, some museum staff members linked a certain level of frustration—which generally accompanies any program of the duration and size of FEST—to a lack of "institutional awareness" about it. Some felt as if they were the only ones in their organization who really understood why FEST was important and how it met organizational goals. One museum staff member explained the lack of awareness in the following way: "A lot of people were asking what [is it] worth? Are we getting anything out of it? I do think we are accomplishing, reaching the community – but only I really see it." As another museum staff member pointed out, the Principal Investigators (PIs; the lead staff members at each museum who had helped to write the grant and directed the activities at the individual institutions) "operate at very different levels at the museums, different access and weight." On a practical level, the fact that PIs were at different levels within their organizations influenced the ways in which the FEST agenda was viewed, the resources devoted to FEST, and the approval process for various aspects of the program. At times this was frustrating for individuals and hindered the decision-making process. Museum staff members appreciate that more ongoing commitment and support is needed institutionally in order for programs like FEST to be truly successful in the long run.

This finding suggests that the *long-term* sustainability of a partnership of this magnitude depends upon establishing appropriate formal mechanisms to manage and sustain the partnership, institutional memory and trust, and a culture of cooperation that focuses on moving beyond the level of individuals, while appreciating that *short-term* success depends upon the individuals working directly within the partnership, which of course is essential to any ability to create a sustainable partnership. These individuals need material and organizational support to do their work well. At its most basic working level, the partnership is about relationships between individuals, not abstract organizations. Partnerships succeed when they are based on well-defined roles and relationships and when the individuals who fulfill those roles are well supported by the larger organization. It became apparent over the three-year course of the FEST project that partners who received more institutional support were also more active in the program.

Interestingly the tension between short-term and long-term goals was exemplified in the responses given by FEST museums and CBO staff. CBO staff members tended to focus on families' exposure to museums and science and their short-term participation in the project as important goals as the following comments demonstrate:

[The program goal was] to build on the community connections in getting families more active in going to museums not only as entertainment, but as educational enhancement. For the families that went, yes [this goal was met]. (Community-based organization staff member)

...Science can be fun and a vehicle for families to be together and do science. I feel that [these goals] were [met]. (Community-based organization staff member)

To make families aware that this is a viable recreation option for them. Kids would come back and talk about FEST events, workshops- continued learning.

> *[The] goal was realized because it exposed families to science learning, that it's part of everyday life. (Community-based organization staff member)*

The CBO staff felt the program was successful because they saw evidence that families now viewed museums as a place for learning and enjoyment. These staff members also noticed an increase in their members' interest in science and doing science together as a family. From the point of view of the community partners, FEST was a success because these two main goals were met.

Although museum staff agreed that the short term goal of engaging underrepresented families in doing science together and using museums was accomplished, they focused more on the long-term goals of attracting and *retaining* traditionally underserved audiences and building a new audience base and thus were more hesitant to say that FEST goals had been entirely met:

> *In general, yes, getting families to participate [was met]. We hope long-term families will return, come on their own. Can't say that's been met - we need to look at FEST very long-term. Most families who long-term participate went to museums as children-maybe FEST kids will bring their kids to museums. (Museum staff member)*

> *Long list of goals - most important for me [was] introducing previously underserved audiences to museums…Diversifying the audience of science museums. Yes [this goal was met], a qualified yes – we produced a measurable increase in attendance but is it sufficient? I don't know. Hard to know what a reasonable goal is, but [there's] movement in the right direction. (Museum staff member)*

From the museum professionals' point of view, an important goal of FEST was to reach out to a segments of the community that are underserved and under-represented, both in science and in museums. This goal fits into a broader climate of change within the science education and museum arenas as society attempts to engage communities who have not traditionally been active participants in science or museums. Many of these "reform" efforts have been directed at schools but museums, many centrally located in poor urban communities, are proving interesting and *neutral* places in which to reach out and serve communities not historically as engaged.

Museum staff defined the ultimate goal of FEST as a mechanism for initiating relationships with families in some of the communities with which they had not been as actively involved to help in diversifying their museum audience, a long-term, organizational goal of the four museums involved and a major motivator for their participation in FEST. It is too soon to definitively say whether or not the museums have increased long-term visitation and participation by families in traditionally underserved communities, nor whether the relationships established with community partners will be sustained in the long-run. The fact that some of these partnerships are ten years old and that many of the partners chose to participate in the next phase suggests that even though museum staff feel that this major goal has not yet been met to their satisfaction, there has definitely been movement in the direction of more meaningfully involving families in these underserved communities in science and museums. This reinforces why the insights gained from the in-depth study of frequent participants are so important. The findings demonstrate, as many CBO staff suggested, that there are many families in these communities though not a part of the traditional audience, who will use the resources of a museum extensively to meet their

family learning needs. The museum context is an ideal match for their interests and values. Hopefully this issue will be explored in future efforts.

This finding also highlights a larger issue in museum-community organization collaborations—e.g., that the different perspectives of partners can lead to differing views of the goals, and ultimately slightly different, though not incompatible, perspectives on the degree to which the goals have been met. Although all partners interviewed underscored the strength of the partnership, they did not describe FEST goals in exactly the same way. The community organization liaisons did not cite reaching underserved audiences as one of their more important goals, probably because the activity of providing services to such "underserved" audiences is such an implicit goal, a basic and essential ingredient of their work. Although an implicit goal, it was not explicitly stated and so they did not actively promote that goal throughout the project. On the other hand, community partners did promote museums as places for free-choice lifelong learning, and thus indirectly supported the goal of encouraging diverse audiences to visit and use the resources.

Toward the Future

It is encouraging that the community and museum partners did agree on many issues. For example, when asked what the greatest challenge of the program was, most partners cited the high rate of people who would pre-register for an event, but not actually attend. Although no partner had an answer for this continuing problem, all were focused on it and willing to work together towards a solution.

Suggestions from staff for improving the program itself included providing transportation for families, varying the times of the events so that more families could attend, streamlining the registration process, finding a way to remind families to attend events for which they had pre-registered, encouraging more families to take advantage of *Family Workshops* and *Special Projects*, and, especially for the families connected with Asian American United, overcoming language barriers. It was encouraging to see that museum partners and community organization liaisons were both striving to improve the quality of FEST, willing to experiment during the three years of the program with different types of solutions to ongoing problems, and were open to communicating their failures and successes.

While there are no easy solutions or "silver bullets" for many of the problems that emerged (no-show rates, for instance, declined for workshop-type events, but not for the more popular and well-attended *Family Science Events*), recognizing the problems and discussing them openly was a helpful step, one that fostered trust and strengthened the partnership. Many of these issues are logistical—e.g., dealing with event planning and implementation. Solving these issues will not be easy, in part because there are so many partners involved. As one CBO staff member explained: "When we sit in a meeting we know what we want to do, but to get it to work for all the partners is difficult. But we've been there for each other to solve possible problems. We were able to work through problems and challenges."

Likewise, many partners recognized the need to continually nurture and support the relationships created through collaboration, both among the organizations in the partnership and between the partners and the visiting families. This issue was largely viewed as part of the ongoing process of being involved in a collaboration. Many partners felt they should continue to work on

communication, not because they were doing poorly, but because they realized that without continually nurturing communication lines, the relationships with other CBOs, the museums and family members would not be as strong. It is this atmosphere of mutual support that has made the model of community collaboration established by FEST so successful.

HOW DOES THE FEST PARTNERSHIP COMPARE WITH SIMILAR MUSEUM-COMMUNITY PARTNERSHIPS?

A review of recent initiatives that target underserved audiences suggests three different, though potentially overlapping, models: (1) the training model, in which museum staff train leaders of community-based or formal education sites to implement science education efforts; (2) the partnership model, in which the museum co-plans programming with community organizations that have relationships with families in underserved neighborhoods working through "movers and shakers" within the organizations and/or community; and (3) the outreach model, which creates programming targeted at particular communities which often happens in the community and is generally greatly dependent on the leadership of "movers and shakers" within the community.

Program experiences across all of these models provide insight into the key areas of inquiry that FEST program staff and Institute evaluators have been exploring over the past four years: partnership choices, programming models, characteristics of participating families, and communication mechanisms.

Partnership Choices: Similar museum-community initiatives have found that the best free-choice learning partners are those organizations that share the goal of improving people's quality of life and want to collaborate in meaningful ways to accomplish overlapping goals (Barnett & Frede, 2001; Dierking, Luke, Foat & Adelman, 2001). Such organizations already understood what might motivate a family and had an infrastructure for involving families and significant adults in their activities. Additionally, these partnerships have found that success is based in part on identifying the community organization's resources and support, rather than simply finding new avenues for strengthening the museum (Wright & Smith, 1998). The FEST project was very purposeful in terms of how it selected its partners, utilizing many resources available about building effective partnerships.

Programming Models: Davies (1997) suggests that "a good program will provide a varied menu of opportunities for participation, geared to the diverse needs of families and children." For example, the Science Museum of Minnesota found success with its West Side Science crew project by developing four program components that served children and families at several community partner sites: extensive after-school programming, a summer science camp for families, overnight camp-ins at the museum, and follow-up weekend *Family Workshops*. Another successful strategy for increasing family participation over time has been the "stage model," which utilizes a series of events rather than one-time programs. Park Voyagers, a partnership between nine Chicago museums and local park districts, successfully moved families along a "museum-going continuum" by offering four stages of involvement: 1) after-school activities in the park, 2) family participation in workshops in the park, 3) family visits to the museums for a special programming, and, finally, 4) free year-long passes were provided for participating families to explore museums on their own. Such efforts are an excellent match. CBOs desire the learning opportunities museums offer for the families they serve, and while

accomplishing that goal museums get the opportunity to build a new audience. It is a win-win situation, which research suggests result in the most effective and long-sustaining partnerships

Characteristics of Participating Families: Previous studies show that some of the greatest impacts seem to be made when museums do not make assumptions about new audiences, e.g. whether or not they attend museums and are or are not engaged in other aspects of free-choice learning, but rather assess their characteristics through in-depth research as was accomplished in the FEST investigation of the characteristics of families participating frequently. The Parents Matter! Program, a collaboration between Georgia State University and the Centers for Disease Control involves university-based researchers partnering with three sites in Georgia and Arkansas to develop and implement family-based health programs (Secrest, Lassiter, Armstead, Wyckoff, Johnson, Williams & Kotchick, 2004). They used focus groups to help programmers understand potential participants and then utilized this knowledge to promote better communication and stronger partnerships. By getting to know their audience in this way, the Parents Matter! program was able to utilize the language that community members used, consider their values, and hone in on the strengths of each organization targeted by the university.

In addition, museum-community initiatives have found that successful recruitment requires program staff to inquire about future participants' general priorities related to program participation. For example, the Adults Supporting Kids with Science project (ASK with Science) project, an NSF-funded parent involvement grant at the Institute for Learning Innovation, found that learning English was a priority among the Latino community, and thus sought to highlight this priority side by side with the goal of increasing parents' ability to serve as advocates in their children's education (Korn, 2001; Dierking, 2002).

Communication Mechanisms: Three communication strategies are repeatedly cited as integral to reaching new audiences: 1) capitalizing on pre-existing forms of communication and/or events of partner organizations; 2) maintaining an ongoing two-way communication, utilizing a variety of outreach techniques aimed at understanding a community's needs and values, which helps build stronger partnerships and results in more sustained participation over time; and 3) fostering personal, face-to-face communication. The Franklin Institute's Parent Partners in School Science program, an NSF-funded effort at the Franklin Institute, for example, found that the most successful events were those that built upon existing events within the partner schools (Luke, Bronnenkant, and Adams, 2004); the Parents Matter! program created an ongoing dialogue with their partners by establishing advisory boards that helped to track participant involvement, fostered local support, and facilitated discussions on participation issues as they arose (Secrest et al., 2004), and, a key aspect of the Park Voyager program's success was the continued opportunities created for museum educators to see families in their neighborhoods and thus better understand their diverse needs and backgrounds. The two-way, open communication avenues that were purposively built into the FEST project including monthly face-to-face meetings of all partners, each month at a different partner site so all partners could see the context in which their colleagues worked, frequent telephone calls, and a local project committee at each of the CBOs, all contributed to an ongoing dialogue that continues today.

Benefits and Challenges of Museum-Community Initiatives

Ultimately the success of museum-community projects rests on audience outcomes: How did participants benefit and what did they take away from the program experience? Not surprisingly,

many of these types of initiatives report similar outcomes, which tend to fall into four broad categories (Dierking et al., 2002). First is an increase in museum interest and/or attendance and changes in people's perceptions of the museum, such as the recognition that museums can provide fun and comfortable ways for families to share quality time together. For instance, evaluation findings from the Partners for Seamless Learning IMLS-funded project at the Buffalo Museum of Science suggest that families are now more aware of the museum and its resources, with some families indicating that their visits to the museum spark conversation at home and promote investigation of science topics through encyclopedias and books (Dierking, Kessler, and Cohen Jones, 2004).

Though less commonly reported, another important outcome can be increased interest and motivation in free-choice learning activities generally and particular types of activities specifically (e.g. science, art, etc.). In many museum-community initiatives, participants often identify one of the main benefits as "expanded horizons" or "exposure to culture" (Garabay, Gilmartin & Schaefer, 2003). Although it can be difficult to know exactly what families mean by these terms, and even tougher to actually "measure" those effects, their comments suggest that museum experience can expand the view of available options for family learning at home and elsewhere. This was certainly the case for those participating in FEST frequently and most likely even moderately.

Third, museum-community initiatives report that participants perceive increased opportunities for social learning and spending quality time with family members. Many programs, including FEST, have recognized that providing families with ways to spend quality time together is very important to parents. As a result of spending quality time together, individual family members had opportunities to learn more about one another. Parents often made comments such as: "I didn't realize my child knew so much about sharks." Additionally, participants of some programs recalled months or years later that the program was "an incredible opportunity to know others of different cultural, religious, socioeconomic and educational backgrounds" (Chesebrough, 2004). These kinds of comments suggest that museum-community initiatives are important for families in part because they provide opportunities to spend time with other families. Families who participated in the Park Voyagers program in Chicago offered similar kinds of comments—these families commented that the structure of the program "allowed social interaction with other families" (Garabay et al., 2003).

A fourth outcome reported in previous studies is short- or long-term increase in knowledge and skills—most often cited for programs that have a training model component. For example, the Science Museum of Minnesota's community outreach program targeted families who would engage in substantive science inquiry and problem solving activities at familiar locations in their neighborhoods, at the museum, and at the College of Biological Sciences of the University of Minnesota. One of the goals for the program was to excite and nurture an enthusiasm for science and science learning among participating youth, especially those young people who have fewer opportunities and resources available to them in their daily lives (White, *pers. comm.*). Evaluation findings documented a pre-to-post increase in science literacy of workshop participants.

Finally, additional outcomes frequently reported at the partnership level are the strengthening of ties between museum and community-based organizations, more pride in community, and more

connections within the community. Research on outcomes of a community initiative, A Place for All People, developed by the Museum of Fine Arts in Houston reported that beyond reaching target population clusters that tended not to visit the museum, their efforts also made all partners "stronger and more effective," and many realized they "can do together what each cannot do individually" (Adams, Luke & Cotter, 2003). Similarly, the Park Voyagers program in Chicago found that pre-existing ties between families and parks were greatly increased, and new relationships between families and the museums were beginning to develop (Garabay et al., 2003). There was even some evidence in the Girls at the Center project, an NSF-funded partnership effort at the Franklin Institute, that social learning persisted and positively influenced interactions between children and adults outside the museum such as encouraging science-related conversations in other settings and increasing questioning.

Despite these positive outcomes, each project also encountered a number of challenges in reaching traditionally underserved communities. One of the most frequently cited problems in museum-community projects is light and/or inconsistent attendance, for which there are a myriad of reasons–all of which demonstrate the need to understand audiences and their needs. For example, language is a barrier for non-native speakers, and transportation can also be a challenge because of limited availability, inconvenience, or cost. The Science Museum of Minnesota found that getting participants to moderately and consistently attend required childcare, transportation, and helping families find a time in their busy schedules to devote to the program (HHMI report, 2001). The Museums and Community Initiative of AAM recognizes some of these challenges as "tangibles" (e.g., transportation) and other challenges as "intangibles" (e.g., perceptions of the museum, shared expectations; Museums and Communities Initiative, 2001).

Communicating with a new audience is also frequently described as a barrier. Like many other museum-community initiatives, the Community Partnership Science Project at the Discovery Museum began by mailing flyers to potential participants but soon realized that face-to-face contact was most effective in reaching new audiences (HHMI report, 1997). If the roles and expectations of partners are not clarified, or if partner organizations do not feel listened to, programs also faced problems. With the Parent Partners in School Science (PPSS) program, partners were often unclear about what was expected of them throughout the year, and more specifically what their roles and responsibilities were as compared to those of project staff (Luke et al., 2004).

Ultimately, trust and a sense of personal identity must replace prior perceptions of the institution. Across projects, "continued and repeated in-person contact" is repeatedly cited as the best way to reach families. For example, an important factor in the success of Lawrence Hall of Science partnership programs involved building trust and confidence between project staff, families and the Latino communities that they serve. Project staff indicated that: "repeated invitation and communications about upcoming events in person, through letters and phone calls increased program participation from year to year." Staff also indicated that "word of mouth was a powerful form of publicity within a community as families anticipated annual events like the Fun Day and conference" (HHMI report, 2004). Other programs, including the Park Voyagers program, felt that continued presence of museum staff at the community organizations themselves was essential for building trust and an institutional personality (Garabay et al., 2003), an approach that FEST used by holding its monthly meetings at a different partner site each month.

Recruitment and sustaining the participation of families are also prevalent challenges cited. Merely communicating about or advertising events is often not enough to result in sustained participation— additionally, there is a need to "market" the goals of the program as a whole. Creating a sense of identity with the program helps in this regard since families are more attentive to information that is perceived to come from a known and trusted source and is personally important to them. The Girls at the Center project found that sites that had success promoted the program as a series and created a sense of identity within the program (Adelman and Dierking, 2002; Dierking, et.al, 2002). Similarly, evaluation findings on the Parent Partners in School Science program suggest that families understood the value of sustained participation when the overall goals of the program were explicitly marketed (Luke et al., 2004).

Finally, one of the most important lessons from these projects is that underserved audiences are non-homogenous. The challenge is to find a match between the pre-existing values of diverse communities and the resources and offerings of the museum. This was clearly what FEST was able to accomplish; families attending frequently and moderately found the range of experiences provided with varying levels of intensity (Family Science Events, Workshops and Special Projects) useful to them to meet their family learning needs. Although originally the plan had been to try to move families along the continuum of activity types toward increasing interaction and participation, initially participating in Family Science Events then Workshops and finally Special Projects, families seemed to prefer to pick and choose among the programming options and frequent participants enjoyed all three types of programs.

SUMMARY

Families Exploring Science Together (FEST) was a partnership between four Philadelphia-area science "museums", comprising the Philadelphia/Camden Informal Science Education Collaborative (PISEC), and 10 community-based organizations (CBOs). CBO members primarily represent "underserved communities" (poor urban communities underrepresented in science and the use of museums). FEST was the third project initiated by PISEC.

The summative evaluation was designed to broadly address whether the four overarching goals of FEST were accomplished:

- Develop and offer programs and activities which promote the use of science museums and their programs by communities underrepresented in current museum audiences
- Increase parental involvement in science education through hands-on science activities and resources
- Stimulate and engage families in science inquiry and learning
- Demonstrate that long-lasting and effective relationships can be built between informal science education institutions and community-based partners that stimulate, encourage and enrich families' interest, learning and involvement in science.

Overall FEST was a very successful project, providing many participants with engaging, family-friendly experiences, thus enriching the lives of those who participated in the program.

Goal One: Develop and offer programs and activities which promote the use of science museums and their programs by communities underrepresented in current museum audiences

FINDING #1: FEST institutions successfully developed and offered a variety of programs and activities.

FEST staff at each of the participating institutions developed a menu of informal science programming at various levels of intensity and involvement. Four different types of programs were developed:

A) *Orientations*: Hosted by a community partner and attended by representatives of all four museums, these were designed to introduce families to the four museums generally and the FEST program specifically.

B) *Family Science Events*: These structured, roughly four-hour-long open houses at one of the four area museums were exclusively for participating FEST families and designed to introduce them to the science learning resources of each institution.

C) *Family Workshops*: One- to two-hour-long sessions at one of the four museums were designed for up to 40 participants (approximately 10 families) and focused on a specific science topic related to the content of the participating museums.

D) *Special Projects*: Originally designed as a series of four to six two-hour sessions offered over consecutive or alternating weeks, were changed at the beginning of the second project year into all-day workshops for up to 40 participants (approximately 10 families).

A total of 104 FEST events were held during the three-year research period, and data from all of these events were recorded in the database; most FEST events took place on weekends.

FINDING #2: Significant numbers of individuals and families, traditionally underserved by science museums, participated in FEST programs and activities.

Almost 12,000 primarily African American, Asian and Latino families participated in FEST programs held at the four museums. Each participant took part in at least one structured, hands-on family-oriented science learning experience and almost 80% of those who attended said they would "definitely" return. Almost one third of the FEST participants tracked (32%) returned for at least one additional FEST event. Those visitors who attended more than one event were most likely to attend three, four, or even more events over the course of the three-year effort.

FINDING #3: Families attended FEST programs for a variety of reasons and word-of-mouth was an effective tool for encouraging participation.

Families participated in FEST for a variety of reasons, including doing something together as a family, to learn, have fun, and explore the participating museums. In the first years, most families who attended FEST events were invited through their affiliated CBOs. Increasingly, families who attended FEST invited family and friends, a hoped-for outcome, suggesting that word-of-mouth can operate over time to reach and engage audiences traditionally underserved by science museums.

Goal Two: Increase parental involvement in science education through hands-on science activities and resources.

FINDING #4: The FEST program was appealing to both adults and children with all levels of science interest.

A large percentage of FEST members, even those individuals who did not have high interest in science, indicated that exploring FEST museums was a major benefit of their involvement in FEST, providing their families with multi-generational experiences designed to foster interest and involvement in each other's science exploration.

FINDING #5: FEST families valued the opportunity to explore hands-on science together at the participating museums.

Participants felt that the FEST program was valuable because it gave families the chance to spend "quality family time" together engaged in active experiences. Many also valued the opportunity to learn about science. Museum visits were an ideal mechanism for parents—as well as grandparents, aunts, uncles, and family friends—to learn more about their children's science-related interests, knowledge, and attitudes, and to bring families together around the topics of science.

FINDING #6: Participation in FEST increased parental awareness and involvement in their children's learning generally, and science learning, in particular.

Participation in FEST fostered parental awareness and involvement in their children's (and their own) learning generally, and science education in particular. These outcomes were expressed at a variety of levels: for the adults themselves, their children, and the family as a whole.

Goal Three: Stimulate and engage families in science inquiry and learning

FINDING # 7: FEST families developed comfort, interest and a skill set with which to visit museums and engage in hands-on science effectively together as a family.

Evidence gathered through observations, questionnaires and interviews suggests a growing interest, comfort and understanding among FEST families about attending FEST institutions and engaging in family-based science learning. Adults in families also discovered that learning is not just for their children but for them also, and that learning together as a family can be enjoyable and rewarding.

FINDING #8: Many families engaged in a wide range of science learning experiences at home and in the community that built on their in-museum FEST experiences.

Many families, particularly those that participated frequently in FEST, engaged in a variety of science learning experiences that built on their FEST activities, including related conversations back at home, family visits to other science-oriented destinations, conducting home experiments, and assisting children with school and science fair projects. A host of factors probably contributed to this finding including that subsequent reinforcing experiences such as conversations at home might more likely occur after repeated visits, that these families may have been more involved in learning together and conversing about their activities generally, that they may specifically have been more interested and engaged in science, and thus more strongly identified with FEST or some combination of these factors. However, even if these families were predisposed toward science and learning, FEST clearly provided an effective context in which to explore their common interests.

Goal Four: Demonstrate that long-lasting and effective relationships can be built between informal science education institutions and community-based partners that stimulate, encourage and enrich families' interest, learning and involvement in science

FINDING# 9: The museums and CBOs that made up FEST were able to work together effectively over four years to create mutually beneficial programs and opportunities for "member" families to engage in meaningful science exploration together.

The challenge of any partnership is to develop and sustain a strong, collaborative relationship over time. In this respect, the partnership between the FEST museums and the community-based organizations was a success. All partners were optimistic about the nature of the collaboration, describing the partnership between the museums and the community-based organizations as a

strong relationship based on mutual trust and good communication built over 10 years of working together.

CONCLUSIONS & RECOMMENDATIONS

Findings in this report support the conclusion that FEST contributed to participants' understanding of science and increased their involvement in science, both at the museum and in their homes and leisure time. In particular, FEST attracted families with strong predispositions for science, museums, and family learning, providing them with supportive contexts and experiences in which to explore these common interests. Because of socioeconomic constraints many of these families would not otherwise have had access to such unique, memorable experiences.

- Families that appreciate meaningful science experiences will seek out opportunities to attend events that provide such experiences. In fact, interested participants will find a project like FEST through word of mouth. By participating in FEST, new families were able to affiliate with participating families, extending FEST's reach into the community.

- The FEST program was based on the assumption that once exposed to museums, science- and learning-interested people, who currently are not a part of the traditional visitation, would identify their value and potential and become visitors. Almost a third of all first-time FEST participants returned to attend at least one more FEST event, and the rate of return increased with every additional event attended.

- FEST accomplished its short-term goal of enriching the lives of many families by providing adults and children alike with engaging free-choice learning experiences. However, it remains to be seen whether the population will continue to visit local science museums once the program has ended.

Recommendations for Building Strong Museum/Community Relationships

Museum partners named the following elements as important to community partnerships:

- Communication
- Honesty
- Establishing expectations early on
- A willingness to provide programming for the community-based partners
- Knowing about the broad range of community-based organizations
- Having a common goal of wanting to serve the community

The community-based organizations thought the following elements were important for successful partnerships:

- Sharing information and knowledge
- Commitment from all levels of an organization
- Supporting the other partners and learning about each other's roles
- Building on the organization's strengths

- Bringing together diverse ethnic groups
- Flexibility
- Diverse programming
- Continuing community support even after the program ends (sustainability)

Recommendations for Programs Serving New Audiences

Staff members in both museums and community-based organizations were asked to elaborate on important elements in programs that served audiences that do not traditionally visit museums. Specific elements named by museum staff as important in programs serving non-traditional audiences included:

- A clear understanding of what museums can offer and what communities need
- Listening to the needs of the community partners
- Including community members in the creation of programs to foster ownership
- Finding a community liaison
- Providing high quality programming
- Flexibility on the part of museum staff
- Providing easy access to the museum
- Receiving audience feedback

According to a number of the community organization staff that were interviewed, an essential aspect of programs that reach out to underserved families is to treat them with respect and follow through on promises. For programs that serve audiences, which have not traditionally visited museums, the community organizations working with these families suggested that museum partners need to make an effort to understand the new audience and make a long-term commitment before they can begin to serve the community successfully through their programs. The museum staff interviewed largely recognized the long-term nature of the partnership, and at least one staff member emphasized the need for more learning about the community.

At least some of those interviewed were limited either by their role in their organization or the nature of their organization. When asked what they would do differently next time they are involved in a similar collaboration, many partners expressed a desire to accomplish more with the program: raise attendance, devote more time to the program, and work more on relationships with the partners. Community partner liaisons felt that they did not have the resources to devote enough time and attention to the program. For many of these partners, increased time and additional staff would have been necessary to change how they participated in the collaborative.

Some museum staff felt that for programs such as FEST to be truly successful in the long run, ongoing commitment and support was needed from their own museum. This finding suggests that the *long-term* sustainability of a partnership between four museums and more than ten community-based organizations depends on establishing appropriate formal mechanisms to manage and sustain the partnership, institutional memory and trust, and a culture of cooperation that outlasts the involvement of individuals. On the other hand, *short-term* success depends on *individuals* within the organizations rather than on the organization. It is these individuals who need material and organizational support to do their work and do it well. The partnership, at its most basic working level, is comprised of the relationships between individuals within

organizations. However, it became apparent over the three-year course of the FEST project that partners who received more support from their organizations were also, on average, more active.

Next Steps

Based upon the overall success of FEST, PISEC is continuing its work in engaging non-traditional families in hands-on science learning. *Community Ambassadors in Science Exploration* (CASE), an NSF-funded program that began in May 2004, will continue the relationship with FEST CBOs and families. CASE will train community members to present science workshops to families at the community sites in one of nine different languages. CASE is the fourth in the series of PISEC partnership grants, each of which has increased the scope and intensity of community involvement in hands-on science learning for families.

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