NISE network™
NANOSCALE INFORMAL SCIENCE EDUCATION

NISE Network Regional Workshops: Second Round of Workshops

Formative Evaluation

By Amy Grack Nelson

June 2009

Acknowledgements

Thanks to the members of the data collection, analysis, and reporting team that has been part of the NISE Network evaluation efforts for the SMM Department of Evaluation and Research in Learning: Sarah Cohn, Saroeun Earm, Kirsten Ellenbogen, Melissa Fitzenberger, Katonya Gillard, Amy Grack Nelson, Amy Gramsey, Denise Huynh, Beth Janetski, Elizabeth LaPorte, Jane Miller, Kathleen Miller, Stephanie Nelson, Al Onkka, David Ordos, Gayra Ostgaard, Claire Philippe, Murphy Pizza, Stacie Redemacher, James Satter, Patrick Smith, Elizabeth Wegele, Gina Svarovsky, Levi Weinhagen, and Scott Van Cleave. Additional thanks to the many and various participants and developers of the NISE programs, exhibits, forums, and other activities.

THIS IS A FORMATIVE EVALUATION REPORT

Formative evaluation studies like this one often:

- **are conducted quickly**, which may mean
  - small sample sizes
  - expedited analyses
  - brief reports
- **look at an earlier version** of the exhibit/program, which may mean
  - a focus on problems and solutions, rather than successes
  - a change in form or title of the final exhibit/program

This report was based on work supported by the National Science Foundation under Grant No. ESI-0532536. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the author(s) and do not necessarily reflect the views of the Foundation.

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Background

The second round of NISE Network Regional workshops were held during the winter of 2009 at the Lawrence Hall of Science (LHS), The Franklin Institute (TFI), and the Fort Worth Museum of Science and History (FW). For workshop agendas, see Appendix A.

The regional workshops were developed to address five goals. Formative evaluation was carried out to measure the success in meeting these goals.

1. Integrate new and existing partners into the NISE Network.
2. Provide valuable networking opportunities among workshop attendees: museum educators, outreach coordinators, research scientists, and industry representatives.
3. Create a foundation for strong and lasting regional partnerships within the NISE Network.
4. Present NISE Net's catalog of existing products, including programs, exhibits, and services.
5. Provide professional development resources—including knowledge, tools, and skills—to increase museum educators' capacity to engage a diverse public in nanoscale science, technology and engineering (SET).

The evaluation was carried out using a mixed-methods design. Data collection methods included 1) partner pre-survey, 2) workshop observations, 3) partner post-workshop survey, 4) partner resource survey, 5) debrief with regional workshop team, and 6) content analysis of workshop correspondence, documents, and action plans. A total of 49 partners completed the pre-surveys, 46 completed the post-surveys, and 45 filled out a resource survey.

Results and Discussion

Overall Workshop Experience

Partners were asked what they valued most about their regional workshop experience. Responses were coded into themes (full responses are included in Appendix B). As illustrated in Table 1, over two-fifths of the partners valued the networking that took place at the workshop (Goal 2) and learning nano programs (Goal 5). Close to a third mentioned the Nano 101 presentation (Goal 5). A quarter of partners valued sharing ideas (Goal 5). Some partners commented about their positive experience with the workshop. "*This has been one of, if not THE BEST workshop I have ever attended! Please keep up the good work. I've learned much! Nano-Nano.*" "*This workshop was awesome. I'm totally into Nano now!*" "*I was a little skeptical about the workshop when I first signed on to it. It was a great resource and a wealth of information. I cannot express my gratitude.*"

Table 1: What partners valued most about their workshop experience (n=40)

	Percent of Partners
Networking	45%
Learning Nano Programs	43%
Nano 101 Presentations	30%
Sharing Ideas	25%
NISE Network Staff	15%
Agenda	10%
Other	20%

Partners were also asked what they would change to improve the workshop experience. A variety of changes were suggested as shown in Table 2 (see Appendix C for full responses). Partners had a desire for more hands-on activities, as well as suggestions to improve the agenda and the nano 101 presentations.

Table 2: What partners would change about the workshop (n=27)

	Percent of Partners
More hands-on activities	33%
Agenda	26%
Nano 101 Presentations	22%
More Kit Information	15%
Workshop Participants	7%
Accuracy of Content	7%
Other	19%

Goal 1: Integrate new and existing partners into NISE Network.

Prior Participation in NISE Network Activities

Workshop participants at the 2009 workshops had less experience with the NISE Network than the 2008 workshop participants. Less than half the 2009 workshop participants (45%) had previously participated in at least one NISE Network activity, compared to three-quarters (77%) of 2008 participants. Only a fifth of participants had previously held NanoDays at their institution, compared to over two-thirds (69%) of 2008 participants.

Table 3: How partners previously participated in the NISE Network (n=49)

	Yes	Not Sure
Presented a NISE Net program (other than the NanoDays program or kit pilot testing)	22%	4%
Attended a session led by NISE Net at a professional conference (such as ASTC, VSA, etc)	22%	2%
Held NanoDays at your institution	20%	0%
Pilot tested one of the NISE Net program kits (Wheel of the Future, Surface Area, or World of Carbon Nanotubes)	14%	2%
Reviewed the NISE Net Universal Design Guidelines for Public Programs in Science Museums	12%	6%
Attended a NISE Net workshop at OMSI or NC Museum of Life & Science	10%	2%
Contributed to the nisenet.org website	6%	2%
Participated in the NEO professional development program	4%	2%
Held a NISE Net forum	2%	4%
Contributed to the development of a NISE Net program	2%	2%
Contributed to the development of a NISE Net exhibit	2%	2%
Attended the NISE Net Annual Meeting in San Francisco	2%	2%
Contributed to work of the NISE Net's Viz Lab	2%	2%
Contributed to the development of a NISE Net forum	0%	2%

Questions About the NISE Network

Before coming to the workshop, partners were asked if they had any questions about the NISE Network, its resources, and/or its services. Eleven partners posed questions. As illustrated in Table 4, partners' had questions about receiving assistance from the NISE Network with nano programming, specifics about the NISE Network, and partnering with others to do work. See Appendix D for full responses.

Table 4: Pre-Workshop questions about the NISE Network (n=11)

	Percent of Partners
Nano programs	36%
NISE overview	36%
Partnering	27%
Other	27%

At the end of the workshop, seven partners had remaining questions about the NISE Network, its resources, and/or its services. They posed a variety of questions as illustrated below.

Post-Workshop questions about the NISE Network (n=7)

- Would a NISE rep be willing to travel to Cleveland for a one-day professional workshop? The children's museum doesn't hold a lot of clout and I'm concerned I won't be taken seriously by our Science Center and other museums.
- Can we make a barter location on the web?, How can we obtain direct funding or indirect sponsorship for activities (i.e. - camps and classes)?
- How widespread is this program and what are you doing to reach new audiences?
- Why are the grants submitted without representation from rural science centers? How do the rural centers gain representation through partnerships?
- How long will NISE network continue?
- I am curious about using NanoDays materials in Distance Learning classes. The materials would be easy to incorporate - would it be ok to use NISE materials for pay classes?
- Are there a large number of staff, professional development, PowerPoint on the catalogue?

An outcome of the workshops is that partners will become more involved in the NISE Network by sharing their resources (exhibits, programs, etc) on nisenet.org. To help ensure this outcome is met, partners were asked if they had any questions about sharing resources through the NISE Network. Only two partners had questions. *"Are there opportunities to post your NanoDays on the website?" "What is the best format and where/when do we post?"*

Partners' Relationship with NISE Network Staff

As illustrated in Table 5, all partners felt the workshop strengthened their relationship with NISE Network staff. One partner commented, *"It was nice to personalize my association with NSE Network staff."* One of the partners at the FW workshop that "somewhat agreed" stated, *"The NISE staff are great and we bounced several ideas off of them, but it would help to better understand how they fit in the organization. I think that got lost in translation a bit."*

Table 5: Level of agreement with the statement, "The workshop has strengthened my relationship with NISE Network staff." (n=46)

	Percent of Partners
Agree	91%
Somewhat Agree	9%
Somewhat Disagree	0%
Disagree	0%

Action Plans

At the end of the workshop, partners developed an action plan for carrying out nano programming at their institution. The action plan included the NISE Network program kit they were going to use, what else they were planning to do related to nano at their

institution, how they would collaborate with other ISE institutions, and how they would involve scientists or industry representatives. Over half of the partners felt prepared to carry out their action plan, while close to two-fifths felt somewhat prepared (see Table 6).

Table 6: Level of preparedness for carrying out action plan (n=46)

	Percent of Partners
Prepared	59%
Somewhat Prepared	37%
Somewhat Unprepared	2%
Unprepared	2%

Partners gave suggestions for what NISE Network staff could do to support them in carrying out their action plan. As illustrated in Table 7, almost half the responses were related to NISE Network staff following-up with partners after the workshop. Partners also want staff to be available to answer questions they might have as they implement their plan. Around a quarter of partners wanted to be able to obtain resources from NISE to carry out their action plan. One partner mentioned obtaining help to facilitate partnerships (relating to regional workshop Goal 3). Responses are listed in Appendix E.

Table 7: How NISE Network staff can suppor partners' action plans (n=23)

	Percent of Partners
Follow up with partners	48%
Provide resources	26%
Be available to answer questions	22%
Help facilitate partnerships	4%
Other	9%

Goal 2: Provide valuable networking opportunities among workshop attendees.

The workshop had a variety of networking opportunities built into the agenda; evening dinners, breaks during the workshop, meals during the workshop, and small group work. As illustrated in Table 8, all partners felt the workshop provided valuable networking opportunities with other museum educators. Some partners provided explanation for their rating. *"The network and partnership forming at the workshop were probably the most valuable part, and the part that would have been harder to do in any other way."* "*It was great to meet other non-traditional science partners in my region."*

Table 8: Level of agreement with the statement, "The workshop provided valuable networking opportunities with other museum educators." (n=46)

	Percent of Partners
Agree	96%
Somewhat Agree	4%
Somewhat Disagree	0%
Disagree	0%

Goal 3: Create a foundation for strong and lasting regional partnerships within the NISE Network.

Partnering with Other Informal Education Institutions

Partners who had previously held nano programming or exhibits at their institution, were asked if they had partnered with any informal education institutions. Less than a third (29%) had partnered with others to deliver nano programming or exhibits.

To help foster partnerships, the workshops had a regional focus and included opportunities for partners to network and work together. As shown in Table 9, three-quarter agreed that the workshop provide a foundation for regional partnerships. A partner that somewhat agreed stated, *"The Bay Area seems challenged in finding positive ways to form regional partnerships."* Someone who somewhat disagreed commented, *"Not in my region which made that tough."*

Table 9: Level of agreement with the statement, "The workshop has created the foundation for regional partnerships with other institutions." (n=46)

	Percent of Partners
Agree	76%
Somewhat Agree	20%
Somewhat Disagree	4%
Disagree	0%

Partners were encouraged to think of ways they could partner with other informal science education institutions to carry out their action plan. Of the 38 institutions at the workshops, three-quarters (75%) planned to collaborate with another institution. Partners' plans for collaboration included working together on program development and delivery, sharing educational resources, and cross-promoting nano events.

Working with Scientists and Industry Representatives

A little more than two-fifths of partners (42%) had previously brought in research scientists or industry representatives to talk about nano with visitors. An outcome of the

workshop is that partners feel more comfortable working with scientists and industry representatives. Part of the workshop was devoted to talking about connecting with these audiences to create and deliver nano programming. At LHS and FW at least one representative from research or industry was there to talk about how they have worked with NISE and to answer partners' questions. Partners were also directed to the MRS database for connecting with researchers. As illustrated in Table 10, partners felt more comfortable working with scientists and industry representatives after the workshop, with partners feeling more comfortable with scientists than industry representatives. However, by the end of the workshop there were still large percentages of partners that did not feel completely comfortable working with scientists (43%) and industry representatives (58%).

Table 10: Partner's comfort working with scientists and industry representatives

	Working with Scientists		Working with Industry Representatives	
	Pre (n=49)	Post (n=46)	Pre (n=49)	Post (n=45)
Comfortable	49%	57%	45%	42%
Somewhat Comfortable	25%	39%	22%	56%
Somewhat Uncomfortable	16%	4%	18%	2%
Uncomfortable	10%	0%	14%	0%

Partners were encouraged to think of ways they could work with researchers or industry representatives to carry out their action plan. Of the 38 institutions at the workshops, a little more than two-thirds (68%) planned to contact a local researcher or industry representative to help with nano activities at their institution.

Goal 4: Present NISE Net's catalog of existing products, including programs, exhibits, and services.

During the workshop, partners learned about the range of the NISE Network's programs, exhibits and services. At the end of the workshop, partners were asked if they would be interested in using any of the NISE Network's offerings. As illustrated in Table 11, almost all partners were interested in NanoDays materials and a majority were interested in programs. Half the participants were interested in exhibits and over two-fifths were interested in forums.

Table 11: Partners' interest in using NISE Network offerings

	Yes	Maybe	No	Not sure what resource is
NanoDays Materials (n=44)	98%	2%	0%	0%
Programs (n=43)	81%	19%	0%	0%
Exhibits (n=43)	51%	40%	9%	0%
Forums (n=43)	44%	47%	7%	2%

Even though partners were interested in NISE Network offerings, it was important that they were aware how to acquire these products from NISE. As shown in Table 12, all partners knew how to acquire NanoDays Materials and programs and a majority knew how to acquire information about forums and exhibits.

Table 12: Awareness of acquiring NISE Network resources

	NanoDay Materials	Programs	Forums	Exhibits
LHS Workshop (n=17)	100%	100%	88%	82%
TFI Workshop (n=17)	100%	100%	100%	88%
FW Workshop (n=11)	100%	100%	91%	82%
All Workshops (n=45)	100%	100%	96%	85%

Barriers to Hosting Nano-Related Exhibits and Programming

Partners were asked about potential barriers to hosting nano-related exhibits and programs at their institution. A variety of barriers were mostly or definitely true for over half the partners (see Table 13). These barriers included financial constraints, lack of staff expertise in nano, nano topics seeming difficult to convey to the public, and nano topics not a priority for school groups.

Table 13: Barriers to Hosting Nano-Related Exhibits and Programming

	Definitely Not True	Mostly Not True	Mostly True	Definitely True
Budget issues and resources constraints are a barrier. (n=47)	4%	26%	43%	28%
We lack staff expertise to bring nano topics into our exhibits and/or programs. (n=47)	9%	30%	40%	21%
Nano topics seem difficult to convey to the general public. (n=46)	4%	46%	39%	11%
Nano topics are not a priority for our school audiences. (n=47)	17%	30%	47%	6%
We would not expect nano topics to be of high interest to our audiences. (n=47)	26%	62%	13%	0%
Nano topics might be seen as controversial by our audiences. (n=47)	30%	62%	6%	2%
Nano topics are not consistent with our mission. (n=47)	60%	30%	9%	2%

Goal 5: Provide professional development resources to increase museum educators' capacity to engage a diverse public in nanoscale SET.

Partners' Nano Content Questions

On the pre-survey, partners were asked what questions about nanoscale SET they wanted to see addressed at the workshop. As illustrated in Table 14, partners had a range of questions, with applications of nanotechnology and basics of nano most frequently cited. Close to a third of partners did not ask about nano content, but instead asked about educational strategies for delivering nano-related content to the public. See Appendix F for full responses.

Table 14: Pre-workshop questions about nanoscale SET (n=43)

	Percent of Partners
Applications of nanotechnology	35%
Basics of nano	23%
Risks and benefits of nanotechnology	12%
Nano careers	5%
Other nano-related questions	14%
Educational Strategies (questions not related to nano content)	30%

On the post-survey, partners were asked what questions they still had about nanoscale SET. Only 15 partners had remaining questions. As shown in Table 15, most questions were related to applications of nanotechnology. See Appendix F for full responses.

Table 15: Post-workshop questions about nanoscale SET (n=15)

	Percent of Partners
Applications of nanotechnology	67%
Risks and benefits of nanotechnology	13%
Other nano-related questions	13%
Education Strategies	13%

Partners' Questions About Delivering Nano Experiences

On the pre-survey, partners were asked what questions they had about delivering nanoscale SET topics to the public that they wanted to see addressed at the workshop. Partners had a range of questions, as illustrated in Table 16. See Appendix G for full responses.

Table 16: Pre-workshop questions about delivering nanoscale SET topics to the public (n=41)

	Percent of Partners
Working with children	24%
Types of educational experiences	22%
Engaging a general audience	20%
Content-related	20%
Ties to formal education	15%
Public knowledge about nano	10%
Other	17%

Talking to Visitors About Nano

To gauge partners' comfort with nano content, they were asked how comfortable they were talking to visitors about nano and answering visitors' questions. Partners came to the workshop with varying levels of comfort (see Table 17). By the end of the workshop, they significantly increased their comfort with nano. This comfort was reflected in partners' comments, *"Excellent workshop. I feel more informed and comfortable talking about nano related subjects. One of the better workshops that I have attended in some time." "After viewing the NanoDays kits and programs, I am confident about presenting these programs to children and families."* Overall, partners left feeling more comfortable talking about nano than answering visitors' nano questions.

Table 17: Partner's comfort talking to visitors about nano and answering their questions

	Talking to Visitors About Nano		Answering Visitors Nano Questions	
	Pre (n=48)	Post (n=46)	Pre (n=49)	Post (n=46)
Comfortable	23%	54%	18%	30%
Somewhat Comfortable	23%	35%	20%	57%
Somewhat Uncomfortable	25%	9%	27%	11%
Uncomfortable	29%	2%	35%	2%

Working with Diverse Audiences

During the workshop, a Diversity, Equity, and Access team member asked partners to share how they engage underserved and underrepresented audiences, with the hope that partners would gain new ideas. As illustrated in Table 18, most of the partners felt more prepared. One partner commented, *"I really appreciated the emphasis on this in the workshop."* Some of the partners that disagreed commented that they already do things to engage underserved audiences and the workshop didn't increase their preparedness.

Table 18: Level of agreement with the statement, "I feel more prepared to engage underserved and underrepresented audiences." (n=46)

	Percent of Partners
Agree	50%
Somewhat Agree	30%
Somewhat Disagree	15%
Disagree	4%

Future Professional Development Opportunities

At the 2008 and 2009 workshops, partners expressed their interest in a variety of professional development opportunities. Table 19 includes data from all seven workshops in 2008 and 2009. Partners are interested in a variety of topics, with the highest levels of interest around NanoDays, integrating nano into their current programming, and finding funding for nano activities.

Table 19: Partners' interest level in attending a workshop/session to learn more about the following topics

	Not at all interested	Somewhat Interested	Interested	Very Interested
a. Holding NanoDays at your institution (n=90)	3%	6%	23%	68%
b. Connecting nano to your programs (n=90)	3%	7%	28%	62%
c. Funding sources for nano activities (n=92)	4%	9%	28%	59%
d. Societal and ethical implications of nanotechnology (n=94)	1%	15%	30%	54%
e. Overview of various nano topics (n=92)	3%	10%	37%	50%
f. Nano in youth programs at your institution (after-school programs, summer camps, etc.) (n=91)	1%	15%	35%	48%
g. Marketing nano activities to public school audiences (n=92)	4%	11%	38%	47%
h. Developing a nano-literate floor and program staff (n=93)	7%	9%	40%	45%
i. Connecting nano to your exhibits (n=90)	4%	18%	34%	43%
j. Nano in formal education programs and resources (field trips, outreach, curriculum materials, etc.) (n=93)	4%	19%	38%	39%
k. Working with researchers and industry representatives to deliver nano programs and exhibits (n=93)	3%	22%	38%	38%
l. How to evaluate exhibits and programs (n=92)	7%	25%	34%	35%
m. Using the web to support community and share information (n=92)	3%	25%	41%	30%
n. Universal design of exhibits and programs (n=90)	11%	23%	36%	30%
o. Holding a nano forum at your institution (n=92)	11%	32%	32%	26%
p. Nano at children's museums (n=89)	16%	29%	19%	36%
q. Creating nano media – TV, film, web (n=93)	25%	36%	24%	16%

Workshop Logistics

Partners commented on workshop logistics. They rated the quality of the advanced workshop information, accommodations, and meals. Results are reported in Tables 20, 21, and 22 based on workshop location.

LHS Workshop

Table 20: Quality of LHS Logistics

	Poor	Fair	Good	Excellent
Advanced workshop information (n=17)	0%	0%	47%	53%
Hotel Durant accommodations (n=12)	0%	0%	25%	75%
Sunday dinner at Henry's (n=6)	0%	17%	33%	50%
Monday lunch (n=17)	0%	6%	18%	77%
Monday dinner at Shen Hua (n=11)	9%	0%	9%	82%
Tuesday breakfast (n=16)	13%	0%	25%	63%
Tuesday lunch (n=17)	0%	12%	12%	77%

Comments about logistics

- The communication pre workshop was helpful and also just the right amount. I really enjoyed my stay at the Hotel Durant. The hotel has a lot of character and the staff were very friendly. Although I didn't take the shuttle to LHS, I am glad it was offered.
- I really appreciated how everything was paid for in advance (e.g. Airline tickets, hotel).
- Few vegan options. No real options for breakfast (i.e. bagels). Not a big deal since there aren't many vegans around but I put that down on my registration and don't feel anyone paid attention to that.
- Presenters talk fast - great to be done early - tough on nano neophytes.
- Room was next to elevator so was noisy at times.
- Of course more unstructured time to interact with the other participants is always appreciated.
- Darrell did an amazing job hosting this workshop. The fine details were taken care of and the whole event ran smoothly.
- Very welcoming and accommodating - thanks!
- Excellent host. Fantastic setting.
- Everything went seamlessly. Thanks for the effort. It paid off.

TFI Workshop

Table 21: Quality of TFI Logistics

	Poor	Fair	Good	Excellent
Advanced workshop information (n=18)	0%	0%	11%	89%
Embassy Suites accommodations (n=18)	0%	0%	6%	94%
Wednesday Science Café (n=12)	0%	25%	33%	42%
Thursday lunch (n=18)	0%	0%	28%	72%
Thursday dinner (n=17)	0%	6%	29%	65%
Friday lunch (n=17)	0%	0%	24%	77%

Comments about logistics

- In agenda make it clear that the item on the first day "Nano Days 2008" is where you want the icebreaker activity whether related to Nano Day 2008 or not. As someone who didn't do Nano Day 2008, wasn't expecting to have to speak at that point yet didn't see anywhere else for the icebreaker. In other words, the working of the homework assignment and the agenda didn't match.
- I am pleased with the workshop's logistics. I was never bored! The beginning and ending times made the workshop comfortable. Accommodations were close to the Franklin Institute and very nice. Thank you for the veggie meal choices! I honestly can't think of anything I'd change. Everything was amazing. Good job!
- Jayatri was great at providing pre-conference information. Embassy Suites = great choice. (At the Science Café) couldn't hear speakers but good food - awkward with trivia night onlookers. (For Thursday night dinner) great choice and private seating.
- The venue was too loud (for Science Cafe) for us to hear and have conversations with each other to get to know one another.
- I think it went great. I might have used a different space for the science cafe due to noise, although my table had a terrific discussion.
- I would have liked to participate in a nano program that was being presented on the Franklin exhibit floor. I would have liked to see how the NISE educators answered questions about nano from the general public. I would feel more confident in answering questions from the public.
- Maybe "force" people to sit with different colleagues at meal functions to better encourage networking.
- Thank you for a wonderful and informative experience! I am excited to present Nano to our staff and visitors.
- I liked the structure - especially the breakout session where we tried our own hack of the kits, that was very helpful. Thank you for this great workshop!

FW Workshop

Table 22: Quality of FW logistics

	Poor	Fair	Good	Excellent
Advanced workshop information (n=11)	0%	0%	9%	91%
Residence Inn accommodations (n=9)	0%	0%	0%	100%
Sunday dinner at Gloria's	0%	0%	67%	33%
Monday lunch (n=11)	0%	0%	27%	73%
Monday dinner (n=11)	0%	0%	18%	82%
Tuesday breakfast (n=10)	0%	0%	30%	70%
Tuesday lunch (n=18)	0%	0%	40%	60%

Comments about logistics

- The room was divine. Shuttle service has spoiled me. The food was more than delicious. The presenters as well as our hosts were friendly, helpful, even kind. Thank you so much!
- Shuttle reservations were off, but was worked out easily.
- Salads for non-meat eaters. =P
- I liked having laptop available for ideas, research, and continued contact.
- Excellent workshop. I feel more informed and comfortable talking about nano related subjects. One of the better workshops that I have attended in some time.
- Science content shared, networking, participation in a program that fits our mission.

Conclusions and Recommendations

Goal 1: Integrate new and existing partners into NISE Network.

Before coming to the workshop, less than half of the partners had participated in at least one NISE Network activity. This was significantly less than the 2008 workshop participants. Part of this difference can be attributed to decisions behind who was invited to the workshop. For the 2008 workshops, invitations mainly went out to individuals that had been involved in NanoDays, this wasn't the case for 2009 as reflected in the results.

Partners were required to come up with an action plan they were going to carry out upon returning to their institution. Overall, most of the partners felt prepared to implement their plan. They desire support from NISE Network staff while carrying out their plan, including follow-up communication, being available for their questions, and providing resources.

All partners felt the workshop strengthened their relationship with the NISE Network and its staff. As members of the NISE Network, partners are encouraged to share their

resources (exhibits, programs, etc) on nisenet.org. Only 4% of the partners (2 individuals) had questions about sharing resources, compared to 15% of partners at the 2008 workshop.

Goal 2: Provide valuable networking opportunities among workshop attendees: museum educators, outreach coordinators, research scientists, and industry representatives.

The social activities proved to be important components of the workshop. Partners cited networking as one of the most valuable aspects of the workshop and when asked if they felt the workshop provided valuable networking opportunities, all of the partners agreed. Based on the partner feedback and debrief about the TFI workshop, there is still one area in need of improvement. If Science Cafés are held solely for workshop participants, it is recommended that they be held in a private room. Although TFI was under the impression that they had reserved a private room; that was not the case when the group arrived. The group was seated in a section of the restaurant and a number of partners commented on the noise. There was also a trivia night at the restaurant so the group had to leave by a certain time and the bar patrons were eagerly waiting for the group to leave, making it awkward for some of the partners.

Goal 3: Create a foundation for strong and lasting regional partnerships within the NISE Network.

The workshop impacted partners' desire to work with other institutions within and outside of the NISE Network to deliver nano programming. Before the workshop, less than a third of the partners reported partnering with other ISE institutions in the past to deliver nano programming or exhibits. A majority of partners felt the workshop created a foundation for regional partnerships with other institutions. This was evident when three-quarters of partner institutions stated that they hoped to collaborate with another ISE institution to carry out their action plan.

The workshop also impacted partners' desires to work with researchers and industry representatives. Over two-fifths of the partners had previously brought in research scientists or industry representatives to talk about nano with visitors. After the workshop, partners felt more comfortable working with scientists and industry representatives than they did before the workshop, with partners feeling more comfortable with scientists than industry representatives. Partners' comfort was also evident by over two-thirds stating that they were planning to contact a local researcher or industry representative as part of their action plan.

Goal 4: Present NISE Net's catalog of existing products, including programs, exhibits, and services.

Partners are interested in using the range of the NISE Network's offerings. The 2009 workshops did better than the 2008 workshops at communicating to partners how to acquire the range of NISE Network resources. In 2008, 10% of partners were unsure how to acquire NanoDays materials and programs. In 2009, all partners left aware how to acquire these materials. The 2009 workshops also had a higher percent of partners aware of forums (84% in 2008, 96% in 2009), however some partners still left the 2009

workshops unsure how to acquire forum information. There was little change in the percent of partners aware how to acquire exhibits (83% in 2008, 85% in 2009). All partners should leave the workshop knowing how to obtain all of the NISE Network's offerings. There was an improvement in relaying this information during the second round of workshops, but this is an area that still needs some improvement. In future workshops, facilitators should be more explicit on how to acquire all of the resources and check in during the workshop to ensure all partners know how to obtain them, particularly forums and exhibits.

Partners face a variety of barriers to hosting nano-related exhibits and programs at their institution. The barriers of 2009 workshop participants are similar to the 2008 participants. Barriers include financial constraints, lack of staff expertise in nano, nano topics seeming difficult to convey to the public, and nano topics not a priority for school groups.

Goal 5: Provide professional development resources – including knowledge, tools and skills – to increase museum educators' capacity to engage a diverse public in nanoscale science, technology and engineering.

Partners came to the workshop with varying levels of comfort talking to visitors about nano and answering their nano-related questions. The 2009 workshop participants were less comfortable with nano before the workshop than the 2008 participants, but both workshops saw partners increase their comfort. By the end of the 2009 workshop, partners had significantly increased their comfort with nano and only one person felt "uncomfortable." Overall, partners left feeling much more comfortable talking about nano than answering visitors' questions. Partners also cited learning nano programs and the nano 101 presentations as some of the most valuable aspects of the workshops. Partners who still had questions about nanoscale science, engineering, and technology after the workshop most frequently had questions related to applications of nanotechnology.

During the workshop, partners engaged in discussions about reaching underserved audiences. All DEA discussions used the same format during the 2009 workshops and posed the question, "How does your institution reach out to underserved and underrepresented audiences?"

The discussion question and format was based on experiences from the 2008 workshops. In 2008, a different question was used at the OMSI workshop and their workshop participants did not leave feeling as prepared to engage underserved audiences as participants in the other 2008 workshops where when the above question was posed. The 2009 regional workshop team commented during the debriefs that the standardized format and question for the DEA discussions worked well. Similarly, most partners felt more prepared to engage underserved audiences after the workshop, although some partners stated they already had experience working with these audiences and didn't learn anything new.

Workshop Logistics

The 2009 workshop agenda had a number of changes from the 2008 workshops. The 2009 workshops moved the hands-on work with the three programs to the first day instead of the second. During the debriefs, the regional workshop team felt this change made the first day livelier but the second day was "flat." This was also echoed in a partner's comment, *"First day was very fun and left us excited about getting the word 'NANO' into our programs. We left with lots of ideas. Day two - seemed less dynamic. Could be improved."* For this reason, the second day had slight alterations after the LHS workshop. The DEA and working with scientists discussions were split instead of being back to back since they both involved going around the room and having people share their experiences. The catalog presentation was moved between them to break up discussion times. Additionally, time was added to the catalog section to allow partners to enter comments into the catalog related to the program they worked on in day one. An additional change was made for the FW workshop. The Intro to Nano for the general public program was changed from Tim's Intro to Nano stage presentation to Ander's Intro to Nano cart demo. This change allowed partners to see another format of programs (carts) other than stage presentations (the format of both Nano 101 for museum educators program and the general audience program).

At TFI and FW, regional workshop hosts put together folders of information for workshop participants. The folder's contents were in response to partners' questions and desires for information. The folders included the following items:

- Agenda
- Workshop follow-up for attendees
- Opportunities to get involved with the NISE Network
- Scientist/Researcher collaborations
- Glossary of two worlds: Museum and research center terms related to the NISE Network
- Action plan
- Workshop toolkit contents
- Workshop participant list

It is recommended in future workshops to continue providing folders of important handouts, particularly duplicates of any information that might be included in the kit but would be useful for participants to have in front of them during the meeting and for immediate reference when they return to their institution. This is especially important because partners didn't typically receive the regional workshop kits, which included some of this information, until two months after the workshop.

For the 2009 workshops, the regional workshop team had the NanoDays kit and regional workshop toolkit on display. This way partners would know what was in the workshop kit they would be receiving once they returned to their institution, and the NanoDays kit if they didn't already have one. After the LHS workshop, the regional workshop team also decided not to mention the packages kits since the partners wouldn't need them at that time and it caused confusion to talk about three different types of kits. There was also confusion about the materials included in the three program kits (Inkjet Printers, Nanotube Balloons, and Energy & Nanotechnology) that the partners could chose from on

their action plan. The regional workshop team was unsure what materials were included in each kit, which made it difficult for some partners to decide which kit they wanted to sign up for. It is recommended in any workshops that involve partners choosing between kits, that the workshop leaders are aware of the kit contents.

Appendix A

LHS Agenda

Day One

9:30	Come over early and explore museum on your own w/ continental breakfast
10:30	Welcome and introductions
10:40	NISE Network overview
11:00	NanoDays 2008
12:00	Lunch
1:00	Nano101 for museum educators
1:45	Discussion: questions you, your staff or visitors may have about nano
2:15	Intro to Nano for the general public
2:30	Break into small groups to learn and modify NISE Net programs
4:00	Break
4:15	Each small group presents their NISE Net program
5:15	Workshop ends for the day
7:00	Group Dinner

Day Two

8:30	Continental breakfast at Lawrence Hall of Science
9:30	Nano101 for museum staff
10:00	Diversity, Equity & Access and Universal Design
11:00	Break
11:15	Working with researchers and industry
12:00	Lunch: The Most Exciting NISE net profile EVER
1:00	Nisenet.org Catalog
2:00	Discussion: Future of nano in your museum
2:30	Formulate action plans
3:00	Break
3:15	Wrap up and future plans
3:45	Workshop evaluation
4:00	Workshop ends

TFI Agenda

Day One

9:30 Welcome and introductions
9:40 NISE Network overview
10:00 NanoDays 2008
11:00 Break
11:15 Nano101 for museum educators
12:00 Discussion: questions you, your staff or visitors may have about nano
12:30 Lunch
1:30 The Visitor Experience – Evaluation & Universal Design
2:00 Intro to Nano for the general public
2:15 Break into small groups to learn and modify NISE Net programs
3:45 Break
4:00 Each small group presents their NISE Net program
5:00 Workshop ends for the day
7:00 Group Dinner

Day Two

9:30 Nano101 for museum staff
10:00 Diversity, Equity & Access
10:30 Working with researchers and industry
11:15 Break
11:30 Nisenet.org Catalog
12:30 Lunch
1:00 Discussion: Future of nano in your museum
1:30 Formulate action plans
2:00 Break
2:15 Wrap up and future plans
2:45 Workshop evaluation
3:00 Workshop ends

FW Agenda

Day One

9:00 Breakfast at museum
9:30 Welcome and introductions
9:40 NISE Network overview
10:00 NanoDays 2008
11:00 Break
11:15 Nano101 for museum educators
12:00 Discussion: questions you, your staff or visitors may have about nano
12:30 Lunch
1:30 The Visitor Experience – Evaluation & Universal Design
2:00 Intro to Nano cart demo for the general public
2:15 Break into small groups to learn and modify NISE Net programs
3:45 Break
4:00 Each small group presents their NISE Net program
5:00 Workshop ends for the day
7:00 Group Dinner

Day Two

9:00 Breakfast at museum
9:30 Nano 101 for museum educators
10:00 Diversity, Equity & Access
10:45 Break
11:00 Nisenet.org Catalog
11:45 Working with researchers and industry
12:30 Lunch
1:15 Discussion: Future of nano in your museum
1:45 Formulate action plans
2:15 Wrap up and future plans
2:45 Workshop evaluation
3:00 Workshop ends

Appendix B

What Partners Valued Most About Their Workshop Experience (n=40)

45% (18) Networking

- Opportunities for networking!
- I liked the opportunity to talk to other people in the network. I'm somewhat in a weird position b/c I am new to the network, but my institution isn't. In future workshops, it may be a good idea to have a mixture of new and old. The new participants can help inspire the old and share their thought up a bit.
- we were able to network with other institutions.
- getting to meet educators from other museums.
- Nano networking opportunities
- Networking
- Networking and forming partnerships.
- I valued the networking opportunities the most.
- Networking with other participants.
- Meeting other regional partners.
- I liked network w/ other museums/institutions. I thought it was fantastic! I really liked meeting everyone! The museum crown is so fun, bright, and interesting. I can't wait to work more closely with everyone.
- The networking is very important and inspiring.
- The downtime to network.
- Network Connections.
- Contact and brainstorming with peers.
- Discuss and network
- Meeting staff from different museums, labs, etc.
- Connecting with scientists.

43% (17) Learning Nano Programs

- The hands on kit activities! Awesome opportunity.
- I guess my favorite is getting to see NISE net programs.
- Getting to see activity demos that I can use at my museum.
- Hands-on fun!
- I loved the hands of experiences.
- I think for me, teaching some of the hands on displays and activities was the most valuable as this is what our museum is in the market for at the time. It would be really cool to do more of these activities during the workshop.
- Hands-on activities. Carts.
- Helpful to see public oriented presentations.
- Opportunity to try out demonstrations.
- seeing how to do the programs.
- Learning programs/demos/activities to take back home knowing the materials would be provided.
- when we presented the programs to each other.
- The hands on learning and being able to view the kits are both wonderful opportunities.

- Hands-on practical approach - learning the programs to deliver.
- Hands on activities.
- Very interactive.
- Activities.

30% (12) Nano 101 Presentations

- Learning about nanotech.
- Being someone who is ... scientifically challenged, so to speak, I appreciated that this seemingly difficult topic was approached in a way that someone like myself could understand very easily.
- The PPs were full of helpful and useful information that I will definitely use.
- Also, real-world examples, i.e. seeds, help clarify nano-concepts.
- Leaving basics about nano.
- I didn't really know much about nano so it was simple enough to help me feel more comfortable about explaining it to other people.
- The opportunity to learn something new about science.
- Information.
- Learning so much about Nano and the impact we could have with the public awareness around nano tech.
- Excellent content.
- informational.
- Learning background info about nano

25% (10) Sharing Ideas

- Open discussion of how we'll use nanoscience was a great opportunity to hear ideas, suggestions, collaborate, and support from others.
- getting to learn from educators from other museums.
- Finding out about what people are doing at other institutions. Discovering how much work museum educators do in trying to educate the public.
- Brainstorming ways to make nanotech accessible to museum staff and the public.
- Hearing about others' plans.
- The time to talk about what other organizations are doing.
- Lots of great sharing.
- People to share experience.
- Number of people was right to feel like everyone was able to participate and share ideas.
- Sharing info with staff from different museums, labs, etc.

15% (6) NISE Network Staff

- The presenters, Kim, Anders, Jayartri, Jim, and Margaret were so patient when answering questions. This was so appreciated.
- The presenters were really good and well prepared.
- Interaction with presenters.
- Lots of helpful people.
- I loved the various presenters and their varying viewpoints.
- I appreciated the manner content was delivered - humor and the fact that presenters were able to "talk" in layman terms.

10% (4) Agenda

- The pacing and variety of activities were excellent. I learned a lot and had ample time to process. Never felt overloaded. Great content!
- You stayed on task and within the time frame.
- Good pace. Not too taxing.
- I REALLY like the comfortable pace and abundant free time. So much of what I do is rush, rush, rush. The pace was refreshing and the informal approach to presentations was appreciated.

20% (8) Other

- Presenters took to heart recommendations offered by participants prior to the workshop.
- Anders - Network intro (very much appreciated).
- I learned more about NISE reasons/mission about why they want to inform the public about Nano.
- to have "science" people understand children's museums.
- Personal atmosphere.
- Comfort. Informality.
- Accommodations! Meals!
- Net profile prizes :)

Appendix C

How can we improve the regional workshops? What would you change (n=27)

33% (9) More Hands-On Activities

- More hands-on opportunities, less sharing from participants - took up valuable time.
- More hands-on activities as part of workshop.
- Less yadda-yadda following this [nano presentations] and more doing. Practicality!
- I would add more hands-on activities.
- Perhaps additional practice with program materials, as in day one.
- Learn programs: more written support/documentation to support learning process. Tim's energy presentation great, our version presentation, not so great.
- I would like to see more hands on demos and presentations. Hands on will be the way I will be engaging our visitors.
- I would be most interested in more hands-on activities or demos or tabletop exhibits that I could then fit into programming at Explorit. I imagine as people have more experience incorporating nanotech into their museums, these will be more experiences to share.
- Would have liked to see a hands-on, interactive program for middle school students designed for a classroom period, rather than just cart demos.

26% (7) Agenda

- Perhaps more time for small group discussion. Workshop could be a little "tighter." ~1 hour on second day sitting around. Overall, excellent workshop.
- Perhaps make it one day. It seemed like it was stretched to fill two days with certain topics repeated (i.e. Tim's intro to Nano heard twice then done as the NISE Net program with kit)
- Well, unfortunately, because we came from an area in which severe traffic restricted our traveling, we had to return home a little earlier. Therefore, we didn't have time to properly tour Franklin Institute, which may or may not have related to the workshop, but definitely would have enlightened us. Maybe next time, the workshop could end an hour earlier and leave visitors time to explore and gain ideas?
- More time to explore Philly.
- More small group activities specific to our needs.
- Small group collaboration would break-up the format.
- Maybe having people post activity instead of summary, each one verbally - took a lot of time.

22% (6) Nano 101 Presentations

- Since this was my first exposure to nanotech, I could have used more background on the subject. The intro presentations were too brief.
- Nano 101, 201, 301, 401 for professionals in informal science education. 101 - great, but I feel like I need more.
- Better classifications of nano at beginning.
- I'd like a more detailed intro to nanoscience
- Handouts with presentations. Often too fast.
- The presentations were all really well done, however, possibly survey your participants before the workshop to better plan on what should be presented.
-

15% (4) More Kit Information

- Details on what is provided in each workshop kit (energy & nanotechnology, inkjet printers, nanotube balloons) would be helpful in choosing kit for action plan. I would also like a little more information about what comes in the NanoDays kit.
- Less confusion over "kits." Time to do/learn/explore NanoDays kit.
- Have a discussion time for questions about the kits.
- Maybe time to go out and see one of the carts with the public in the museum.

7% (2) Workshop Participants

- Overall, I thought it was a good mixture. Maybe try to balance different sizes of museums etc, in the future. Very well run and good introduction.
- Attract more children museums.

7% (2) Accuracy of Content

- 1st afternoon session needs improvement. The science shared by participants was at times inaccurate (noted by researchers in room) and yet not addressed by core team. To see best practices, consider have core team present after the group presents. I think the method of sharing our programs was not really a helpful p.d. model - if we are to see best practices for programs, it seemed the mode of sharing that program did not really work. Some of the info shared was inaccurate and not addressed.
- Hmm...hard to say. I would have opted for the energy kit if it didn't say unequivocally that nuclear power was positive vs. negative nuclear weapons.

19% (5) Other

- I'd like to hear from people who are doing nano programming with the public to have an idea for what the public's understanding level and what questions they often ask.
- Have regional participants present at next meeting -> hands-on and evaluation practices.
- Also, it would be great to see perhaps a clip of an actual nano program/exhibit in action?
- I loved that the NISE network staff were so committed. It would have been nice to know a little bit of background on them and how they got involved with NISE for those of us unfamiliar with it.
- Give us a little more info before the workshop in a timely manner.

Appendix D

Pre-workshop Questions about the NISE Network (n=11)

36% (4) Nano Exhibits and Programs

- How can the NISE Network help our institution in providing educational nano activities for the general public?
- Do you have an email newsletter? How are we able to stay updated on your new programs?
- I'm from a university, rather than a museum, so I'm wondering how universities fit within the programming.
- We are currently revamping our website with more science content for children. What suggestions can the NISE network give us for including nano content on our site?

36% (4) NISE Overview

- What is long-range vision of the network? What is the sustainability plan over the coming years?
- What is the future of the NISE Network beyond its initial funding from NSF? Are they seeking a renewal? If so, what will NISE Net 2 look like?
- who are your sponsors?
- I have enjoyed getting to know you through the web site. I would like to get a personal feel of the mission statement of the NISE network and learn how to address the direct challenge that the NISE network is promoting a jaded view of Nanotechnology.

27% (3) Partnering

- I'm currently trying to estimate costs for partnering with NISE Net to host forums and events.
- Can NISE help us form a partnership with informal science education facility to provide expertise in informal education (an area in which we are lacking)? Other
- Since we are an emerging children's museum with no physical space, is there a possibility of partnering with other institutions in the Washington, Dc area to present Nano Days? Are there any universities (like Howard University) in the DC area that we could partner with? What other children's museums are part of the NISE network?

27% (3) Other

- Are there or will there be chances for internet kid-to-kid connections re nanoscience? Would the National Children's museum be able to host this kind of dialogue in the future?
- What reactions do you receive from you public towards Nano technology?
- Is there financial support available for specific programs?

Appendix E

How NISE Network Staff can Support Partners' Action Plans (n=23)

48% (11) Follow-up with partners

- Accountability - Follow-up continued support
- Check in to see how things are going.
- Contact partners, follow up with
- Follow-ups.
- Follow-up support - maybe touch base with email.
- Just be in email contact to answer any questions we might have.
- Keep in contact :)
- I think maybe just following up right before nano days is set to happen would be helpful in case of last minute questions or problems.
- Keep in touch, meet afterwards to talk about our successes and failures. Planning for the future.
- We have network web conferences. Maybe participating in one of those calls to help as partners develop their nano activities, to answer their questions.
- Please check in - I'll need the micromanagement.

26% (6) Provide resources

- I like seeing and doing activities that I can do with the public. More ways to market and engage might be helpful.
- resources
- Data, statistics, studies to support topics on Nano
- I think they should offer people who travel and do shows (for a fee)
- keep updating the website (catalog)
- Maintain the website, which they are already doing.

22% (5) Be available for questions

- Be available for questions via phone or email.
- Be available to help out and answer the questions that I don't know to ask yet!
- Continue to answer our questions and provide support to us as needed.
- I'm not sure - but if I hit a roadblock, I'll ask. The biggest obstacle is internal.
- Just be available for questions/advice (via email, phone)

4% (1) Help facilitate partnerships

- Provide contact information. Places that could be willing to help the nano cause.

9% (2) Other

- Make days longer and give me money.
- Maybe during workshops help to create a more detailed plan of the steps we need to take - but that may take up too much time.

Appendix F

Partners' Pre-Workshop Questions About Nanoscale SET (n=43)

35% (15) Applications of Nanotechnology

- Practical applications of how nanotechnology applies to the real world
- How is nanotechnology currently being used in medicine? Are there any nanodrugs currently being used? If not, how far away is this technology? In the future, will there be ways for nanobots to help with environmental disasters such as oil spills? What other ways can nanotechnology help the environment? Is nanotechnology currently being used in the fight against HIV/AIDS? If so, how? How can nanotechnology be used to help third world countries have cleaner drinking water? How can (or do we currently) we utilize nanotechnology in space?
- What are the applications relevant to air and space content
- How do I relate nanoscale science to everyday life?
- I would like to know more details about medical research and nanotechnology.
- I'd like to know more about NEW things happening in nano.
- What emerging nanoscale technologies will be important in the near future? I've been asked after shows about nanowires in medicine whether treatments using them would be very expensive. Are products and procedures using nanoscale technologies often much more expensive than alternatives?
- What is the state of the technology to date? It seems like it is somewhat in a holding pattern right now -- Is this correct? What new discoveries are exciting nanotechnology scientists right now?
- New research in the fields.
- What companies in Arkansas are actually utilizing nanotechnology in their manufacturing processes?
- I have only a general idea of what nanotech is, so any basic introduction to current practical and experimental nanotechnologies would be very useful to me.
- I have a lot of questions but I am mostly interested in the latest advances and hot topics.
- Everyday applications
- Environmental effects and potential technologies to address environmental issues
- What is the timescale on nano-technology, both past, present, and future? i.e., where are we really?

23% (10) Basics of Nano

- I've only recently been working on our nanotechnology programs. Therefore, I'm interested in learning the basics.
- Just like to learn more about it as this is not my area of expertise.
- Basics please give me a round level of understanding.
- I am pretty much a lay person when it comes to nano anything, so all knowledge will be of interest in this area.
- I'm a beginner with the subject.
- I would just like any background and information I can get.
- I would like to gain more in-depth knowledge about nanoscale science and technology, because it is a topic of which I am mostly unaware.

- Need an overall intro to the topic and understanding of how it relates to our
- mission of promoting environmental sustainability.

What are the lay terms, anecdotes we can use to reach everyone.

12% (5) Risks and Benefits of Nanotechnology

- Are buckeyballs harmful to cells? Have they discovered any ways to neutralize them? How will we insure that nanoscience will not adversely effect the environment?
- Are there environmental impacts to nanoscale science and engineering? If so, are these impacts being addressed by research scientists?
- There seems to be a flourish of concerns around the safety of nano-technology, how do you address these with the public?
- Toxicity of nanoparticles
- Why should the general visitor care about nano? Linkages between nano and climate change.

5% (2) Nano Career

- What kind of degree scientist in this field receive in college. Are there nano programs and degrees available now?
- How many different careers directly link to nano?

14% (6) Other Nano-Related Questions

- What ways/tools do scientists use to manipulate atoms and molecules in nanoscience?
- What were the technological building blocks for the most real-world nanoscale applications?
- Why nano-science is important.
- Use of animals/'natural' nanomaterials as inspirations
- How is nanoscience different from traditional materials science? Seems like a lot of things that have been known for a long time are being relabeled as nano as if it were a fad.
- How is nanoscale science connected to other fields?

30% (13) Education Strategies (Questions not related to nano content)

- Easier ways to communicate the information to non-scientists.
- I would like to participate in hands-on/minds-on activities about nanotechnology that I could do with my at-risk, 5th grade clientele.
- How to demonstrate it simply to the public - especially children
- This is my first experience with Nano. Are the workshops appropriate for children?
- How to collaborate with regional industry
- More hands-on activities for middle and high school.
- I'm looking for techniques that will make something so inherently abstract, more concrete for our younger audiences (and their parents).
- I'm looking for effective method for conveying the concepts of nano to a wide range of audience.
- ideas for outreach to different audiences: general public, schoolchildren, media

- How can we define and teach nano science on a level that school children and the public can understand? What sort of activities can we teach that are easy to do, hands-on, and will bring understanding about nano science?
- How to incorporate nanotechnology and science into interactive activities to use with a variety of ages in a museum setting
- Even though I attended the Nanoscale Science Forum in October, (awesome!), I don't feel as though I have enough information to develop nanoscale science programs for our museum visitors or intelligently discuss nanoscale science with visitors. What resource materials would the team suggest staff and I read to become more nanoscale informed allowing us to develop floor programs?
- What can I do without having a facility? What outreach activities are available?

Partners' Nanoscale SET Questions After the Workshop (n=15)

67% (10) Applications of nanotechnology

- There was a brief overview of timeframe for nano products. I would like to know more about that.
- There are lots of questions I have but it's about specific useful examples I could give to students and adults that I talk to.
- More practical applications.
- What's next? :)
- I feel children will be looking for very specific examples of nanotechnology that is directly relative to their lives.
- No specific questions but simply need to learn more of the background information, especially on applications, to be able to completely talk to guests and audiences about the technology and associated issues.
- I would like to know of some more "everyday" examples to share with visitors.
- I still want to know more about applications of nano to things people are familiar with.
- I need to read and see more applications, as it is still very new to me.
- More specific uses for examples would be great to know.

13% (2) Risks & benefits of nanotechnology

- I have some more ethical questions about products that are already available to the public, but have not be thoroughly reviewed by government agencies.
- I'd like to learn more about the ethical issues that surround nano.

13% (2) Other nano-related questions

- How is nanoscale science used in biology, chemistry, and physics?
- What do nanoscientists do besides look at small things?

13% (2) Educational strategies (Questions not related to nano-content)

- I wish there had been time devoted to helping participants really think about pedagogy of sharing about nano.
- More and better activities (not just demos)

Appendix G

Partners' Pre-Workshop Questions about Delivering Nanoscale SET topics to the public (n=41)

24% (10) Working with Children

- I am interested in delivering content to families and children under 12 years of age: 1. How could NanoArt be used as an effective tool for engaging younger children (under 12 yrs) in Nanoscience? What manipulatives are available to help younger children understand nanoscale? i.e. blocks, balls, sculptures, etc. How could we use the concept of Nanokids to help us connect with younger children? Can you suggest any invention type activities that will allow kids to create their own models of nanoscience?
- How can we adapt the programs to better serve younger visitors?
- I need to know how to help children relate to nano science.
- How to deliver hedonically sound nano concepts to young kids (K-3)?
- What language works best when delivering this information to a younger audience? What are the main concepts important for young children to know about nanotechnology?
- I am an educator for a hands-on science center. I am interested in hearing ideas on how to teach nanotechnology concepts to students K-8 (and their parents!).
- How do we adapt nanoscale education material for very young audiences?
- How do you explain it to young children?
- What is the best way to present and explain nanoscience to middle school children? Are there a series of demonstrations and/or hands-on activities available for use with middle school children?
- How do you teach nanoscale to 4 -8 year olds? How can we prepare high school students to teach interactive nanoscale science to young children? How do we create family learning with nanoscale science?

22% (9) Types of Educational Experiences

- What new programs have been developed since last year's NISE conference in Ithaca? (My coworker Ruth Brown attended this session)
- What floor programs have other museums developed to present to visitors? What was the age of the target audience who experienced the floor programs? Can we discuss some of the successful and not so successful nanoscience forums held at other institutions? What made them successful and what made them unsuccessful?
- How to best present this topic in an interesting, hands-on, and practical way. What are applications about it that can be made? Where can I find short video clips that will help identify and describe this topic?
- Organizing larger-scale workshops or speaker's panels for nanoscience education.
- I am interested in arranging more active public outreach through public forums, etc. I have a PR and media background, but haven't done public education, so any and all info should be helpful.
- Seeing what other similar centers have done will be a good start.
- How to show nano technology on computers or other media that can be used on a mobile cart.

- Are there nano videos that can help show the nano world? Are there nanoscience computer games?
- What are the best ways to get the ideas across?

20% (8) Engaging a General Audience

- I am interested in literature-based best practices for engaging various target audiences (from an informal education standpoint) about nano topics. For example, is there a way to adapt principals discussed in How People Learn (Donovan & Bransford, 2000) to help with the learning side of engaging folks in nano topics?
- How do we make nanoscale science engaging and relevant to visitors? Which areas of nanoscale science, engineering, and technology are likely to be most important for visitors to be informed about?
- I'm having trouble getting the public interested in the Hot Springs area. Who do I target? How do I reach them? Is this a common problem for the other centers?
- The public will not stick around at one thing for very long. How can we engage and teach them in a very short time frame?
- Audience Ease of Understanding Making the Abstract more concrete
- Since it is such a broad and relatively unfamiliar topic to the general public, I would like to learn how to make it more comprehensive to the people we serve.
- How to talk to people when you do not have a lot of knowledge yourself.
- How can we make sustainable education/activities hands-on, accessible, and relevant?

20% (8) Content-related

- How can you balance media-influenced concerns about the dangers of nano-technology with scientific facts and benefits of nano-technology without seeming biased? How can we make a real impression of the size scale of a nanometer and the nano world?
- How to incorporate societal and ethical issues.
- I would like to know more about the environmental applications of nanoscale, and how to incorporate that into public discourse.
- How do you address the ethics of nano technology?
- Where can we obtain examples of nano fabrics that repel stains and wrinkles?
- Representations of nanotechnology/scientists/engineers in popular culture (books, films, games, etc) and other media (news, responses by public groups, etc.)
- There's the perennial issue of how to help people understand scale.
- What materials or products currently use nano-materials and could be pointed at to give the public an idea of how nano is used? What are the future (realistic) hopes for what nano will do in the next 5-10 years?

15% (6) Ties to Formal Education

- How will students encounter information about nanoscale technology in their classrooms?
- Increased discussion on application to the lives of k-12 students and the relationship between k-12 curriculum and nanoscience.
- How do we create an interest in our outreach programs, when faced with school starved for standards centered programs?

- How does nanoscale connect to National Learning Standards?
- How can I effectively bring nanoscience to underserved students? What possible nano science fair project topics would be appropriate for children in underserved schools?
- I have many questions. I need to see examples of bringing this into the classroom.

10% (4) Public Knowledge About Nano

- What examples of nanotechnology might the public already be familiar that can be cited to help ground the science for them?
- What are common misconceptions about nanoscale science, and how should they be addressed?
- What background knowledge most people have so that I know where to start in conversations with them.
- How much of the general public is aware of the research and breakthroughs in nano- tech?

17% (7) Other

- How the concepts are being used with volunteers or explainers to the public.
- Details, details, details
- Everything. Start from scratch.
- How our institution will be able to utilize this information since we do not have a building yet
- How can we get research scientists and industry engineers more comfortable with public speaking so that they can connect with our audiences.
- Is there an already established partnership between NISE and Howard University that might allow others to use some of their exhibits/tools in outreach?
- What role can museums/science centers play in nano education?