

Micro Nano Tech Conference 1



Evaluation Report

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Executive Summary

The First Annual Micro Nano Tech Conference was held in Albuquerque, NM, at the University of New Mexico and hosted by the Southwest Center for Microsystems Education (SCME). Other collaborating ATE Centers included NACK, Nano-Link, MATEC, and NEATEC.

Attendance at the conference included 56 conference attendees, 20 members of participating Centers, and 10 industry representatives and guests. The 56 conference attendees came from 19 different states. One-half of the conference attendees were from two-year educational institutions, one-quarter from secondary schools, and one-quarter from four-year colleges and universities. A majority of teachers, instructors, and professors taught engineering, engineering technology, math/science, or micro/nanotechnology subjects.

The conference program included a variety of activities that ranged from industry presentations and panels to tours of National Labs and museums to hands-on laboratory activities and demonstrations. Over 75% of conference attendees found all activities to be of high value, e.g. gaining new skills/knowledge, accessing resources, discussions with colleagues, industry presentations, and tours. Nine-eighth percent of the attendees said that their expectations for the conference were met, 98% indicated that they would be able to use content and materials from the conference in the classes that they teach, and 84% of the attendees were able to explore new technologies outside of their area of expertise. Ninety-five percent of attendees felt that there was adequate time for networking during the conference.

Only two attendees paid the registration fee for the conference. Most of the attendees received support from one of the participating Centers to attend the conference. Eighty-six percent of the attendees indicated that without this support, they would not have been able to attend and participate in the conference.

Conference evaluations pointed to three areas for improvement. First, the dates of the conference posed a conflict for some participants since the May 9th – 11th dates for the conference coincided with end of year exams. Second, expectations for tours should be clearly delineated for conference attendees and sites hosting the tours. And, third, expectations for speakers and panelists should be clearly communicated and PowerPoint presentations should be submitted prior to the conference.

Overall, the conference was a “success” in terms of providing value to all attendees and provides a good foundation for future Micro Nano Tech Conferences.

Micro Nano Tech Conference 1 – Educating and Preparing the Emerging Technology Workforce

Hosted by the Southwest Center for Microsystems Education (SCME)

I. Introduction

“The Micro Nano Tech (NMT) Conference is a faculty-focused conference co-sponsored by the National Science Foundation’s Advanced Technological Education (ATE) Micro and Nano Technology Centers. The mission of this Conference is to enable micro and nano technology education at Community and technical colleges across the United States by:

- Providing quality education services and best practices
- Offering technical assistance to aid in micro and nano curriculum integration
- Collaborating with industry to address workforce needs

The ATE Micro and Nano Technology Centers who collaborated in presenting this conference are:

MATEC	Maricopa Advanced Technology Education Center (AZ)
NACK	Nanotechnology Applications & Career Knowledge (PA)
Nano-Link	Midwest Regional Center for Nanotechnology Education (MN)
NEATEC	Northeast Advanced Technological Education Center (NY)
SCME	Southwest Center for Microsystems Education (NM)

Conference Program:

Day 1 – Monday, May 9, 2011

- 7:30 Registration & Coffee
- 8:00 Welcome – Conference Mission – Why MNT?
What is NSF’s ATE mission? – Gerhard Salinger, NSF
- 8:30 Centers’ Introduction – Who we are and what we do.
1. SCME – Matthias Pleil
 2. MATEC – Michael Lesiecki
 3. NACK – Robert Ehrmann
 4. Nano-Link – Deborah Newberry
 5. NEATEC – Abraham Michelen
- 9:30 Industry Presentation I – Cutting edge industries will present on what they do, their technology, what the future looks like for their industry and what they expect of the technicians they hire.
- Jeb Flemming – Life BioScience, Inc.

- David Arney – 3M
 - Ed Spivak – NM Optics Industry Association
 - John Krieg – Plextronics
- 10:30 Break
- 10:45 Industry Presentation II
- Terry Sullivan – HT Micro, MEMPro Ceramics, Albuquerque Economic Development
 - Ray Tsui – Raydis LLC
 - Joe Ward – RJA Dispersions
 - Paul Behrendsen – Senda Microtechnologies
- 11:45 Lunch and Networking
- 12:15 Panel of Alumni from Micro and Nanotechnology Programs
- 13:00 Industry Panel – Panel discussion with Q&A from the audience
- Paul Behrendsen
 - Jeb Flemming
 - Ed Spivak
 - Terry Sullivan
 - Ray Tsui
- 14:15 Tours
- Sandia National Laboratories/Los Alamos National Laboratories Center for Integrated Nanotechnologies (CINT)
 - Sandia National Laboratories Microfabrication Facility (MESA)
 - New Mexico Museum of Natural History and Science
- 17:30 Dinner at the National Museum of Nuclear Science and History
- 18:00 Keynote Speaker: Dr. Neal Shinn, Center for Integrated Nanotechnologies
- 18:45 Tour of the National Museum of Nuclear Science and History

Day 2 – Tuesday, May 10, 2011

- 7:30 Coffee
- 8:00 Advanced Technology Education for Micro- and Nanotechnologies
- 9:00 Parallel Sessions:
- Lithography in a Box, Micro Fluidics
 - Crystals, Self Assembly
 - Forces and Interactions, Polymers – Structure and Properties
 - NanoDays NISENet Activities for CC Classrooms
- 9:30 Rotate to Next Session
- 9:35 Parallel Sessions:
- Lithography in a Box, Micro Fluidics
 - Crystals, Self Assembly
 - Forces and Interactions, Polymers – Structure and Properties
 - NanoDays NISENet Activities for CC Classrooms
- 10:05 Rotate to Next Session
- 10:10 Parallel Sessions:

- Lithography in a Box, Micro Fluidics
 - Crystals, Self Assembly
 - Forces and Interactions, Polymers – Structure and Properties
 - NanoDays NISENet Activities for CC Classrooms
- 10:40 Rotate to Next Session
- 10:45 Parallel Sessions:
- Lithography in a Box, Micro Fluidics
 - Crystals, Self Assembly
 - Forces and Interactions, Polymers – Structure and Properties
 - NanoDays NISENet Activities for CC Classrooms
- 11:20 Wrap-up
- 11:30 Lunch
- 12:30 Parallel Sessions
- Group I – Remote Access to Nano Equipment Utilizing Hands-on Labs for the Science and Technology Classroom
 - Group II – A Nano Integration Program Success Story: Show Me the Program & Show Me the Benefits
- 13:40 Rotate to next session
- 13:50 Parallel Sessions
- Group I – Remote Access to Nano Equipment Utilizing Hands-on Labs for the Science and Technology Classroom
 - Group II – A Nano Integration Program Success Story: Show Me the Program & Show Me the Benefits
- 15:00 Break
- 15:15 Forum
- 17:00 Adjourn – Dinner on your own

Day 3 – Wednesday, May 11, 2011

- 7:30 Coffee
- 8:00 Report out – Forum Summary and Discussion
- 9:00 SCME Kit Overview
- 9:25 Parallel Sessions
- Pressure Sensor Process
 - What are MEMS?, MEMS Overview and History, and Making Micro Machines Kit
 - On-line Resources and the Synergy Project, Scale-Shift-Evolution
 - BioMEMS Overview
- 10:25 Go to second session
- 10:30 Parallel Sessions
- Pressure Sensor Process
 - What are MEMS?, MEMS Overview and History, and Making Micro Machines Kit
 - On-line Resources and the Synergy Project, Scale-Shift-Evolution
 - BioMEMS Overview

- 11:30 Networking lunch, wrap-up and educational materials showcase
- 12:30 Adjourn
- 13:00 Executive Centers Team Wrap-Up Meeting – Lessons Learned – Next Conference Location (Closed Meeting)

II. Participants

Eighty-six individuals attended the MNT Conference. This included 56 conference attendees, 20 members and staff of participating Centers, and 10 industry representatives/guests. There were 8 cancellations and four individuals who registered but did not attend.

Table 1 shows the number of conference attendees by Center.

Table 1. Number of Conference Attendees by Center

MATEC	3	5%
NACK	14	25%
Nano-Link	14	25%
NEATEC	8	15%
SCME	<u>17</u>	<u>30%</u>
Total:	56	100%

Figure 1 shows the number of conference attendees by State. Nineteen states were represented by the 56 conference attendees.

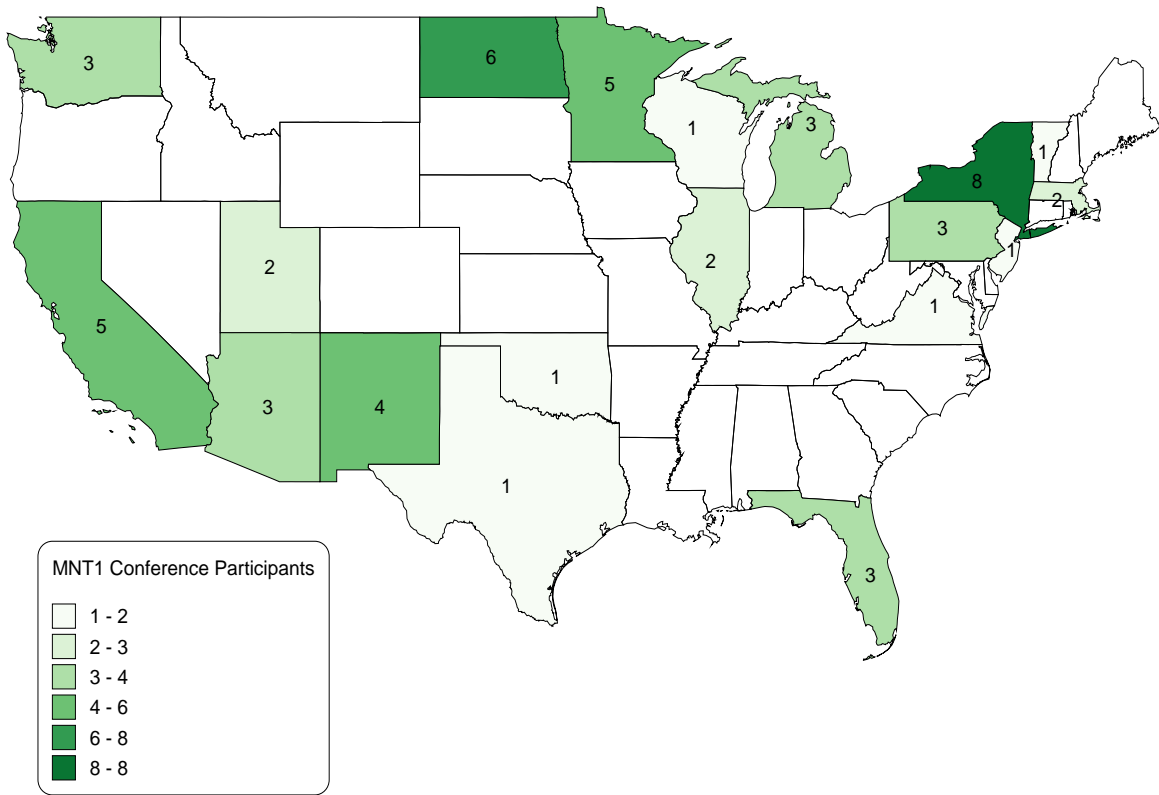


Figure 1. Number of conference attendees by State.

Figure 2 shows the number of conference attendees by educational level. One half of the participants were from community colleges, a quarter from secondary schools, and slightly less than a quarter from four-year colleges and universities.

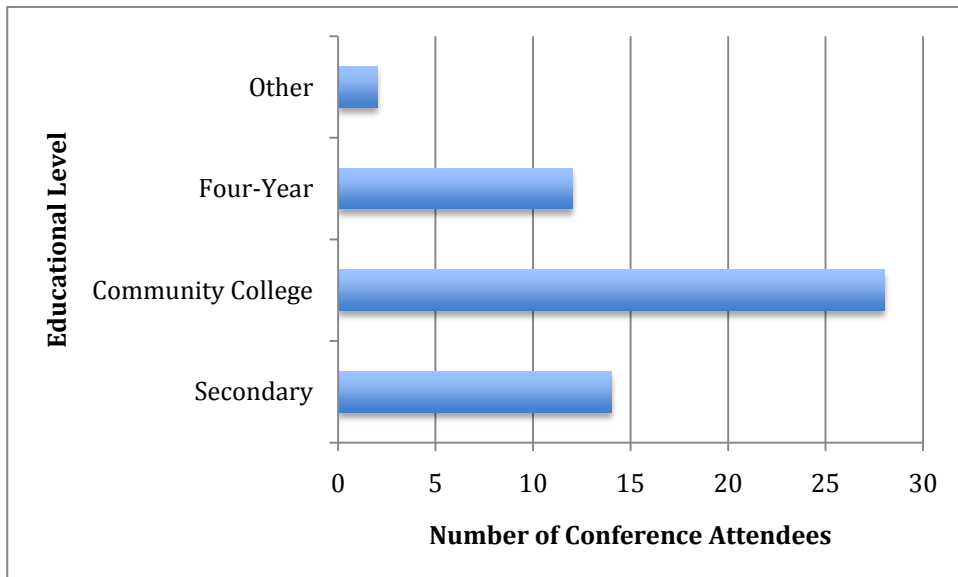


Figure 2. Number of conference attendees by educational level.

The subjects taught by conference attendees ranged from nanotechnology to math and science to social science. Figure 3 shows the distribution of topics taught by conference attendees.

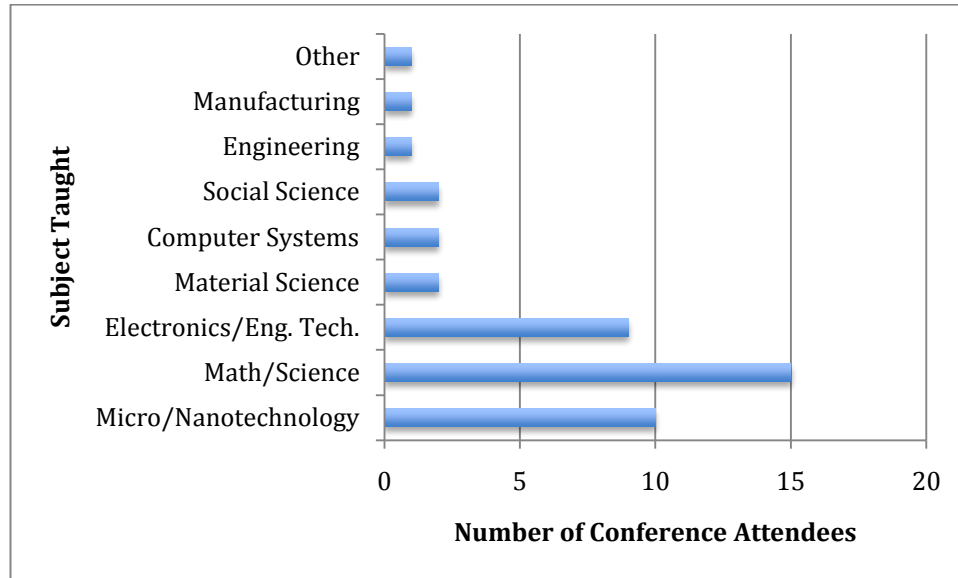


Figure 3. Subjects taught by conference attendees.

Gender and ethnicity data for conference participants is shown in Figure 4 (gender) and Figure 5 (ethnicity).

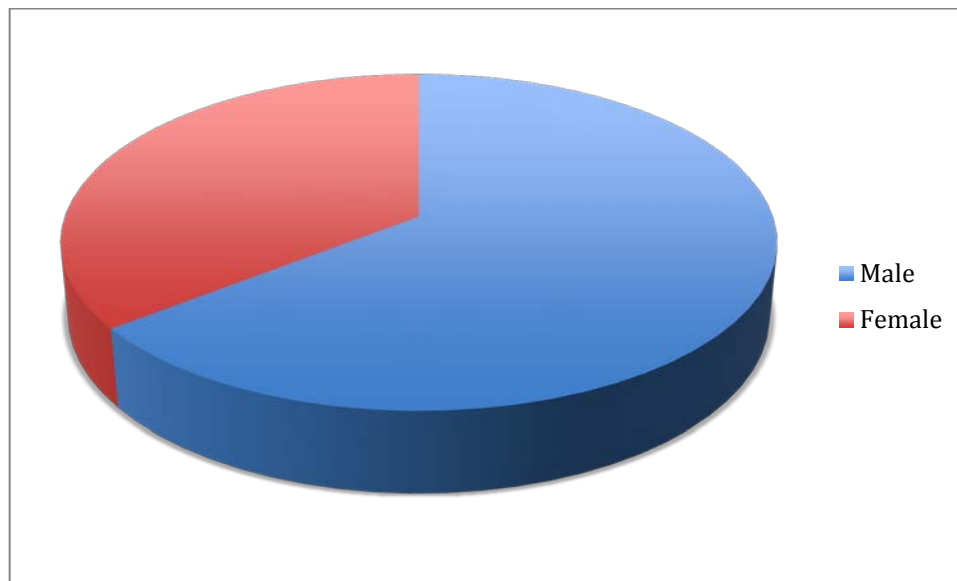


Figure 4. Shows gender distribution for conference participants. (Includes members and staff from participating Centers.)

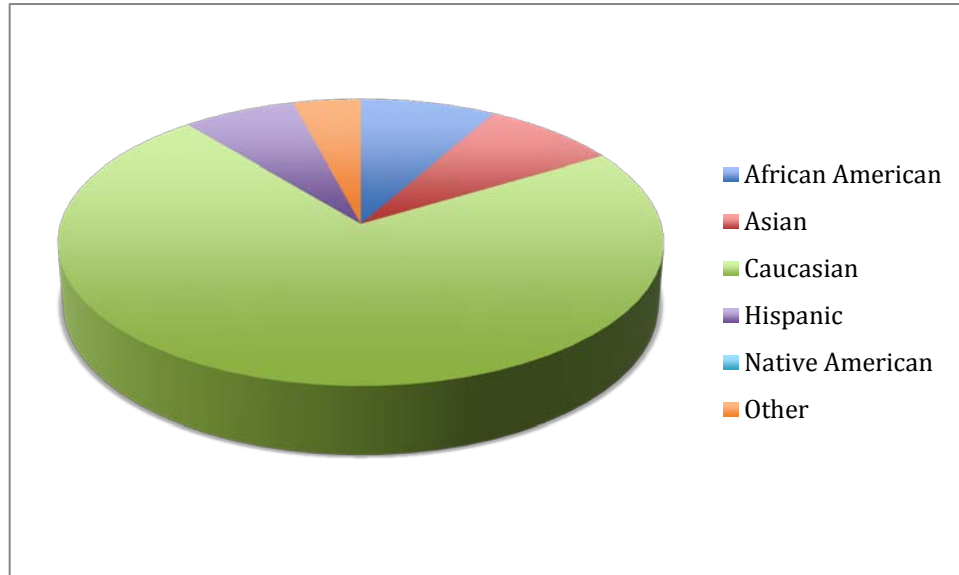


Figure 5. Shows ethnic distribution for conference participants. (Includes members and staff from participating Centers.)

Forty-eight of 56 conference participants received a scholarship through one of the participating Centers. Two attendees paid the registration fee. Thirty-seven of 44 conference participants who completed the post-conference survey said that they would not have been able to attend if they had not received funding. This reflects the current state of funding for education at all levels and that in most states, funding for professional development activities is lacking. It also points to the importance of scholarships to attend future MNT Conferences.

III. Post-Conference Survey Results

This section summarizes the responses to the questions posed on the post-conference survey. The survey was completed by 44 of the 56 conference attendees (79%). Five members of participating Centers did complete post-conference survey, but data from those surveys were not included in the following summary.

In the first three questions, conference attendees were asked if they “Agreed” or “Disagreed” with the statement in the question. Conference attendees were then asked a follow-up question that required a written response. Sample responses are included. A complete listing of responses is provided in the Appendix at the end of this report.

Question 1. There were adequate opportunities for networking at the conference.

Strongly Agree	30 responses
Agree	12 responses
Disagree	1 response
Strongly Disagree	1 response

Finding: The conference program did provide adequate opportunities for networking among conference attendees and with Center members and staff. Forty-two of 44 responses checked either “Strongly Agree” or “Agree” with the statement.

Follow-up question: How do you anticipate benefiting from these connections?

Sample responses:

“Collaborations, sharing of material, using on-line resources, building new connections within my region and field.”

“I’ll build relationships with local community colleges for program outreach and look into remote access.”

“Exchange project ideas. Grant proposals. Partnerships with Centers.”

“Having collaborations for workshops and teaching activities.”

“I don’t want to reinvent the wheel and I can benefit from the wealth of experience of successful programs already in existence.”

Ten of 44 surveys did not have a written response to this question.

Question 2. My expectations were met for this conference and I would recommend it to others.

Strongly Agree	31 responses
Agree	12 responses
Disagree	0 responses
Strongly Disagree	0 responses
No Response	1 response

Finding: All, but one response indicated “Strongly Agree” or “Agree” with this statement. This indicates a high degree of satisfaction with the conference format and program and that conference attendees had their expectation met and that they would recommend the conference to others.

Follow-up question: Why would you choose to attend, or recommend, this conference over another conference?

Sample responses:

“Great place to learn about ATE Center resources – wish this had happened 5 years ago.”

“Excellent practical hands-on demos with strong on-line support and great overall energy.”

“Focus on technicians (and technician education).”

“Great hands-on sessions that can easily be done in the classroom at low expense (cost).”

“Well structured, coverage of diverse topics, but also good introduction to specific programs (SCME, NACK, Nano-Link) – excellent blend of practical and strategic topics.”

Thirteen of 44 surveys did not have a written response to this question.

Question 3. I will be able to use the content and materials presented during the conference in the classes I teach.

Strongly Agree	26 responses
Agree	17 responses
Disagree	0 responses
Strongly Disagree	0 responses
No Response	1 response

Finding: The conference program hit-the-mark in providing content and materials that attendees could take back and use in the classes that they teach.

Follow-up question: How will what you learned impact your students?

Sample responses:

“I can recognize strengths in (my) students and push (them) in that direction.”

“Better understanding of material being taught.”

“More fun and hands-on activities that I can incorporate (in my classes).”

“Informing them about opportunities that exist in the field.”

“(Provide them) with real-life applications, community college offerings, and job opportunities available.”

Twelve of 44 surveys did not have a written response to this question.

Question 4. If you received funding to attend this conference, would you have been able to attend if you did not receive funding?

Yes	5 responses
No	37 responses
No response	1 response

Finding: The overwhelming “No” responses point to the importance of scholarships. Over 80% of conference attendee would not have been able to attend this conference were it not for the scholarships provided through the Centers.

Follow-up Question: What is the one thing you would like to tell your sponsor?

“Thank you. What a great experience.”

“Very worthwhile.”

“I have been given the tools and excitement to delve into curriculum writing and infusion into the classroom. Thanks!”

“Thank you for the opportunity to network with people in the field of nanotechnology.”

“Thank you very much and I hope to share what I have learned and give something back to our group.”

Eleven of 44 surveys did not have a written response to this question.

Question 5. Did you explore new technology areas outside your area of expertise?

Yes	37 responses
No	4 responses
No response	3 responses

Finding: The conference, with it’s diverse topics, did provide attendees with the opportunity to explore new technology areas.

No follow-up question.

Question 6. What type(s) of experiences did you have that will help you to better serve your students and programs? Five areas were listed: Gaining new skills and knowledge, accessing resources, discussions with colleagues, industry presentations, and tours. Attendees were asked to rate each area as “Highest Value,” “High Value,” “Low Value,” or “Lowest Value”.

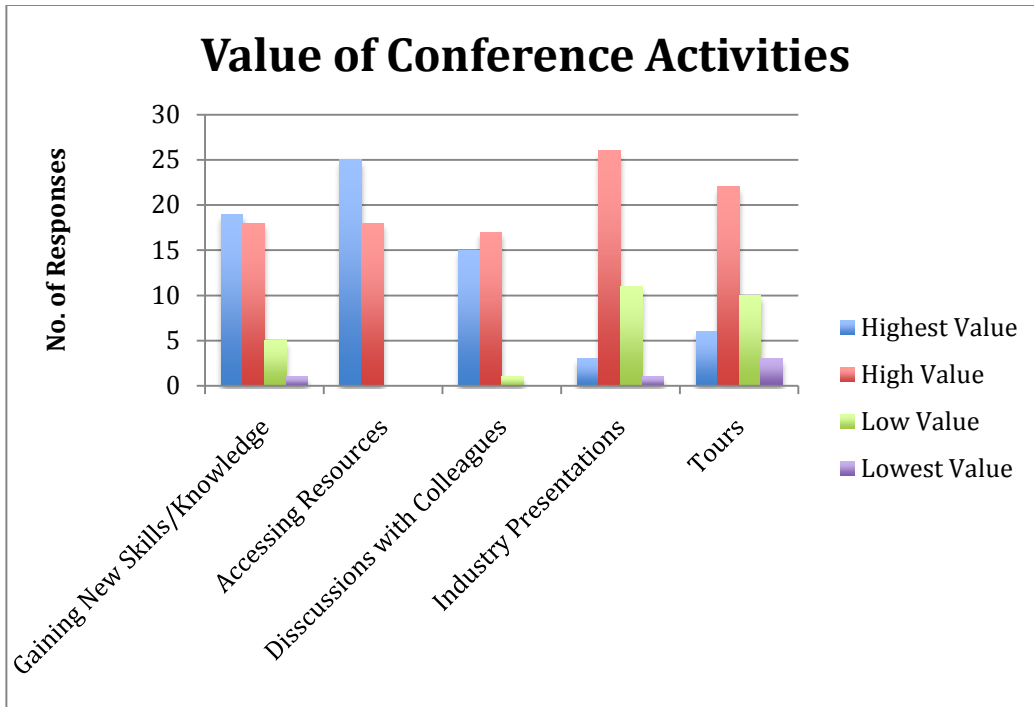


Figure 6. Shows the value of conference activities to attendees.

Finding: Looking at the “Highest Value” ratings, conference attendees were most satisfied with sessions where they gained new skills and knowledge and accessing resources. Discussions with colleagues also received a “Highest Value” rating from approximately a third of the attendees. The tours and industry presentations received the “Highest Value” rating from 10% or fewer of the attendees. Sample responses include below point to some dissatisfaction with the industry presentations and tours.

However, when the “Highest Value” and “High Value” ratings are combined, a majority of conference attendees found value in areas of the conference.

Follow-up question: Comments?

Sample responses:

“Industry presentations were had to follow. Could they be organized and labeled as ‘start-up guy’, ‘big company’, ‘former student’, etc.”

“I wasn’t sure what I was supposed to get out of each industry presentation. Were they representing certain types – large business, start-up, etc. or certain industries?”

“The CINT tour was disappointing. He kept us in a hallway looking at posters.”

“The tour of Sandia (CINT) did not allow us to see a lab.

Thirty-three out of 44 attendees did not include a written comment in response to this question. (A very limited sample of written responses.)

Question 7. What type(s) of knowledge did this conference provide you?

Figure 7 shows the ratings for the types of knowledge provided by the conference. Four ratings were used: “Highest Value”, “High Value”, “Low Value”, and “Lowest Value”.

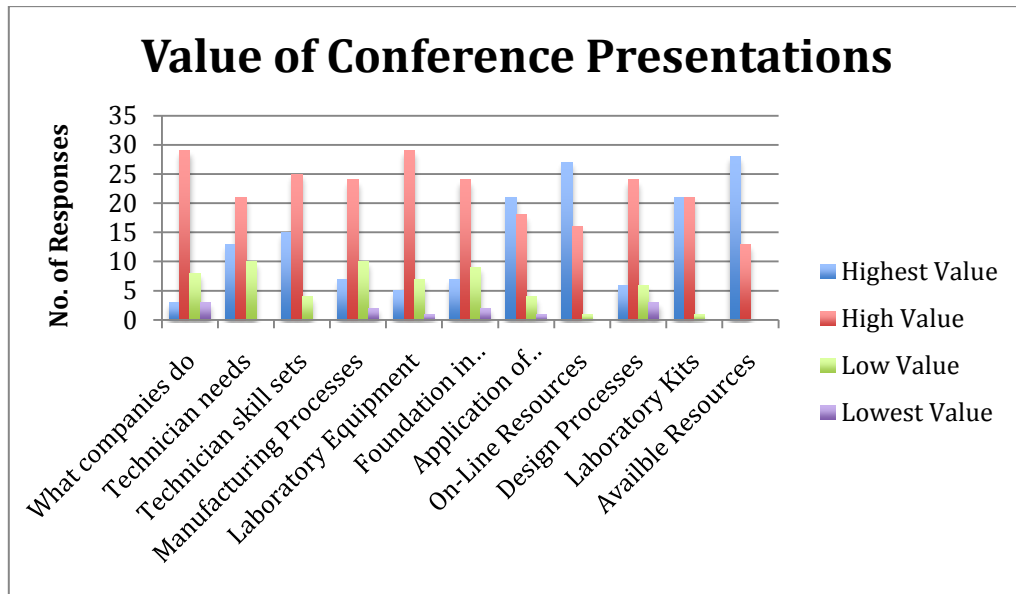


Figure 7. Shows the value of conference presentations to conference attendees.

Findings: The “Highest Value” responses again show the interest of attendees in finding instructional resources that they could use in the classes they teach. On-line resources, laboratory kits, and available resources along with the applications of micro/nano received the most “Highest Value” ratings. When the “Highest Value” and “High Value” rating are combined, the data shows that over 75% of the attendees found all presentations of importance to them.

Follow-up question: Comments?

Sample responses:

“The low value rankings weren’t areas that were poorly done, just not what I thought there was much focus on.”

“Industry presentations were not so much value. Ability to leverage existing curriculum was of exceptional value.”

“Open session on Wednesday morning in groups (do not have brainstorming in same room.”

“Many of the presenters were especially adept at explaining technicians at many levels. Great for non-tech audience.”

“Thank you for continuing to develop affordable and meaningful labs.”

Thirty-three out of 44 attendees did not include a written comment in response to this question. (A very limited sample of written responses.)

8. Tours to local laboratories and museums. Comments:

Sandia National Laboratories/Los Alamos National Laboratories' Center for Integrated Nanotechnologies – Sampling of Comments:

- “The PowerPoint presentation was too long (1 hour). I wish they could have planned a hands-on lab for us.”
- “Learned their business model and what they do at Sandia.”
- “We were not able to see any lab. We just walked around and looked at results outside the labs.”
- “The speaker was informative and enthusiastic, but we spent an hour learning about how to apply for one of their grants. Was that the purpose?”

Sandia National Laboratories Microfabrication (MESA) Facility – Sampling of Comments:

- “Tour helped me gain a national perspective of the importance of microsystems.”
- “Gained insight on additional MEMS applications.”
- “I was a blank slate and it was a fantastic experience. It excited me into learning more so I feel comfortable discussing (the subject) with my students.”

New Mexico Museum of Natural History and Science – Sampling of Comments:

- “Great museum. Why did the tour stop with 1980s technology?”
- “I have a better understanding of the history of the personal computer industry.”
- “Reminded me of things I had forgotten.”
- “We don't have a good Natural History Museum where I am from. I loved walking around looking at all the stuff.”

9. Please offer suggestions/preferences for future MEMS conferences:

Keynote Presenter:

- Teri Odom, Northwestern University – great at SME Micro/Nano Manufacturing Conference in Oakbrook Terrace, April 9-10, 2011. Presented on nano imprinting, creating arrays, an inexpensive exposure system using LEDs \$400.”
- Deb Newberry
- Some champion CEO who loves technical education and is motivational.
- Industry speaker from a company using techs in nano labs.
- I thought that this year’s fellow was good. You need someone who can look at the big picture and how it applies to all the stakeholders.
- President of CNSE (University of Albany, NY)
- Dave Arney (3M). He is a real champion for integrating nano-educated technicians in a high tech R&D laboratory.
- Industry-oriented or possibly education “problem solving” oriented presenter.
- A social scientist specializing in crowd dynamics and motivational techniques.

Industry Panelists/Companies:

- Graphene Solutions, Platteville, WI.
- 3M, IBM, Medtronic, pharmacy company.
- Materials, biotech
- Local and national companies hiring grads from programs.
- Small company person had a poor general perspective.
- Start-up/spin-off from research universities.
- More and more diverse industry/company representatives.
- Eight companies may be too many – four would be better.

Conference Sessions:

- Birds-of-a-feather forum was very beneficial.
- Curriculum development techniques.
- MNT curriculum development – on-line resource development.
- Add handouts from sessions.
- Technical and applied research. New equipment sessions.
- Continue to sponsor sessions highlighting resources available to everyone.
- Continue with hands-on sessions and workshops.
- Differentiated strands (e.g. scope and sequence of content, project-based nano units, new to nano, industry needs, curriculum, assessment of soft skills, what’s new in nano.)
- I like the panel with the students and their perspectives.

- Define specific curricula for AAS, diploma/certificate, etc.
- Focused conversation on how ATE assesses overall effectiveness of its work, or how it finds/shares successes of funded programs or ideas about how this can be done.
- Very beneficial to show direct applications into classrooms!

Workshops:

- Some facilitators seemed flustered by their demos – others were great (e.g. Dr. Nano & crystals).
- More time for each (Tuesday morning sessions).
- Hands-on work with a table top SEM.
- Curriculum module use – continue this year’s sessions.
- Many times, pieces aren’t relevant now, but do become so later – nothing to go back to.
- New equipment sessions. Nano fab, micro fab, safety and maintenance.
- “Demo back” the activity you just learned.
- Add some specific topics related to skills of techs for demonstrations.
- Enjoyed the one where we got to play with stuff (hands-on). My students say this about their lab experiences. They like the hands-on versus the demos.
- Teach the teacher. I really liked learning about things I can bring back and use in my classroom. I would like to learn more about things I can bring to my room.
- More lithography workshops/the makeshift spin coater was excellent.

Additional Comments:

- Please give round table facilitators guidelines – one of mine kept shooting down ideas instead of writing all ideas on the paper (or at least helping to reword/redirect).
- First day was way too long. I wish our hotel was near shops, restaurants like downtown or near the University.
- Videotape the opening discussion and some of the high-level workshop wrap-up sessions.
- Consider scheduling the conference at a different time of year. This timeframe is difficult for some to participate due to the end of semester/final exam dates.
- I like that the good was build you own, but it took too long – two lines – no snack the second day. Hotel had a number of problems. Great conference.
- It would be beneficial to hear industry discuss future technology.
- Bus picked us up a little early for each day’s activities. Face-to-face presentations are more effective than Skype.
- Have some longer breaks (with food) to allow for more networking. Also, a session on problem solving for centers/partners – to provide solutions.

- At least two hours free (3 pm on) to experience the community we have been brought into for the conference. More hands-on experience as well as forum work.
- Since I am a high school teacher, I am most interested in ways to bring things back to the classroom to promote nanotechnology.
- Not clear how different ATE centers fulfill different “niches” and how participants for the conference were selected. We were “sold” on nano before arriving and knew quite a bit about industry expectations. Maybe a pre-assessment of participants to design sessions. Everyone did a great job collaborating to bring the conference together.
- It would be a good idea to offer the conference at times that do not interfere with final exam week.
- Less sitting – especially several sessions in a row. It would be so appreciated.
- Perhaps, having sessions to help colleges, universities, “starting” or “building” nano programs. You might group by educational levels. There might also be “workshops” to help faculty/schools that want to start a program. (Have “expert” mentors provide suggestions.) Again, thanks to Matt/Anna. This was the best “Nano Event/Conference” I have ever attended.
- Have another evaluation level (like, Mid Value) for Question 7.
- Time during the conference to look up some of the many websites that were shared with us.
- Of course, I’d like to see satellite and space programs brought in as a topic for the application of MEMS/nano.
- Better time management! Felt rushed through activities. Disorganized speakers (some, not all). Better hotel location near more amenities.

Recommendations for Improvement:

- Consider alternate dates for the conference. The May 9th – 11th dates in early May conflicted with end of the term exams. Those that did attend were able to work around this conflict, but some who might have attended may not have been able to get released from their teaching responsibilities. The reality, however, may be that it will be difficult to find an ideal time that will suit everyone who wants to attend.
- Carefully select sites for tours and effectively communicate expectations for the tours with the host site. On one tour, the attendees were expecting more than a hallway tour. They wanted to see inside the labs, but did not get the opportunity.
- Communicate expectations to speakers so that they can stay on the subject. PowerPoint presentations should be submitted prior to the conference and reviewed for relevance.

- Use a similar conference format for the next MNT Conference. The 2011 MNT1 Conference program provided attendees with opportunities to find classroom resources, network with other attendees, and explore new technologies.

Summary:

Participants expressed a high degree of satisfaction with the conference. The mix of presentations and hands-on workshops provided participants, primarily teachers, with resources that they could take back to their classrooms. The small size of the conference, approximately 60 participants, encouraged networking that laid the foundation for discussions and collaborations following the conference.

Participants expressed concern for the dates of the conference. Several cited the end of the semester and final exams as a conflict. Obviously, they found a way to attend, but there may have been many that wanted to attend, but could not get released from their classes. The conference dates for 2012, May 7-9, will face the same conflicts, and the conference planning committee might want to consider moving the 2012 conference to dates that do not conflict with end of semester exams.

Participants expressed concern with one of the tours (CINT). Their dissatisfaction was based on the “hallway/window” tour. Their preference was to see actual laboratories and equipment, not posters showing results of the research being conducted in the labs.

Participants expressed concern with the local of the conference hotel. Some preferred a location closer to restaurants, shopping, and other amenities.

The industry presentations received some negative reviews. Some of the presenters did not follow the guidelines they were given and participants found the presentations somewhat disjointed and lacking in relevance.

Nevertheless, for a first conference produced through a collaboration of five NSF ATE Centers focusing on microsystems and nanotechnology, the conference was successful and participants felt the time was well spent. Follow-up surveys of conference participants will tell if the conference produces a change in classroom activities and ultimately, student learning.

This report was produced by:
David M. Hata
SCME External Evaluator

Appendix A

Post-Conference Evaluation Form

Micro Nano Tech Conference 1

Educating & Preparing the Emerging Technology Workforce

May 9-11, 2011

Conference Evaluation

Please circle the item that represents your opinion and comment where appropriate:

1. There were adequate opportunities for networking at this conference.

Strongly Agree

Agree

Disagree

Strongly Disagree

How do you anticipate benefiting from these connections?

2. My expectations were met for this conference and I would recommend it to others.

Strongly Agree

Agree

Disagree

Strongly Disagree

Why would you choose to attend, or recommend, this conference over another conference?

3. I will be able to use the content and materials presented during the conference in the classes I teach.

Strongly Agree

Agree

Disagree

Strongly Disagree

How will what you learned impact your students? _____

4. If you received funding to attend this conference, would you have been able to attend if you did not receive funding? Yes No

What is the one thing that you would like to tell your sponsor? _____

5. Did you explore new technology areas outside your area of expertise? Yes No

6. What type(s) of experiences did you have that will help you to better serve your students and programs?

Gaining New Skills and Knowledge:	Highest Value	High Value	Low Value	Lowest Value
Accessing Resources:	Highest Value	High Value	Low Value	Lowest Value
Discussions with Colleagues:	Highest Value	High Value	Low Value	Lowest Value
Industry Presentations:	Highest Value	High Value	Low Value	Lowest Value
Tours:	Highest Value	High Value	Low Value	Lowest Value

Comments: _____

7. What type(s) of knowledge did this conference provide you?

What companies do:	Highest Value	High Value	Low Value	Lowest Value
Future technician needs:	Highest Value	High Value	Low Value	Lowest Value
Future technician skill sets:	Highest Value	High Value	Low Value	Lowest Value
Manufacturing processes:	Highest Value	High Value	Low Value	Lowest Value
Laboratory equipment:	Highest Value	High Value	Low Value	Lowest Value
Foundations in chemistry & physics:	Highest Value	High Value	Low Value	Lowest Value
Applications of microsystems & nanotechnology:	Highest Value	High Value	Low Value	Lowest Value
On-line resources:	Highest Value	High Value	Low Value	Lowest Value
Design processes:	Highest Value	High Value	Low Value	Lowest Value
Laboratory kits:	Highest Value	High Value	Low Value	Lowest Value
Availability of Resources:	Highest Value	High Value	Low Value	Lowest Value

Comments: _____

8. Tours to local laboratories and museums were included in the conference program. Which tour did you select and what did you learn that enhanced your understanding of microsystems and nanotechnology?

___ Sandia National Laboratories/Los Alamos National Laboratories Center for Integrated Nanotechnologies

___ Sandia National Laboratories Microfabrication Facility

___ New Mexico Museum of Natural History and Science

New information and/or insight gained:

9. Please offer suggestions/preferences for future MNT Conferences:

Keynote Presenter: _____

Industry Panelists/Companies:

Conference Sessions:

Workshops: _____

Additional Comments or Suggestions:

Your name: _____ (Print legibly)

Appendix B

Micro Nano Tech Conference 1 May 9-11, 2011

Transcript of Written Responses on Conference Survey (44 conference participants and 8 partners)

1. How do you anticipate benefiting from these connections (networking connections)?
 - (1) Collaborations, sharing of material, using online resources, and building new connection within my (geographic) region and field.
 - (2) I'll build relationships with local community colleges for program outreach and look into remote access.
 - (3) Support
 - (4) No written response
 - (5) We plan to share AFM experiences on-line with Harper Community College. We have a meeting next week on a grant proposal!
 - (6) Share ideas and success stories.
 - (7) Was able to get some new ideas and new avenues to explore.
 - (8) Following up on the many connections and especially building in curriculum.
 - (9) Further development of existing courses or those I'm in the process of developing.
 - (10) No written response
 - (11) No written response
 - (12) Exchange of project ideas. Grant proposals. Partnerships with Centers.
 - (13) Having collaborations for workshops and teaching activities.
 - (14) Keep in touch with previously known/worked with colleagues.
 - (15) Making new collaborations.
 - (16) No written response

Question 1. How do you anticipate benefiting from these connections (networking connections)? (Continued)

- (17) Expand resources and leverage opportunities.
- (18) Very good contacts made and curriculum-helping websites will enhance my curriculum.
- (19) I don't want to reinvent the wheel and I can benefit from the wealth of experience of the successful programs already in existence.
- (20) No written response
- (21) Obtaining additional information on successful collaborations, industry relationships, and curriculum development.
- (22) Starting to infuse nano/micro at the earliest stages of education and beginning to improve curriculum through shared modules and more conferences. Questions – call or e-mail for support!
- (23) Contacts very good.
- (24) Getting more activities for my classroom.
- (25) Developing new programs in my school system.
- (26) I will adopt the crystal experiment in my programs.
- (27) Not enough time for questions that would help develop understanding of what other participant's strengths and concerns are.
- (28) I got a lot of information about the major programs/centers, but not too much on a personal level from other chemistry teachers.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) Not sure
- (33) Future partnerships for projects and grants.
- (34) Course/program development

Question 1. How do you anticipate benefiting from these connections (networking connections)? (Continued)

- (35) I would like to share resources, ideas, knowledge with them to further my and my students' exposure to this area.
- (36) We have learned what exists in other areas of the U.S. so that we do not duplicate it for our ATE Center (NEATEC).
- (37) Exchanging curriculum, websites, etc.
- (38) Collaborations to get more activities started.
- (39) Addressing equipment and supplies needs.
- (40) I was amazed at the "breath" of organizations – K12, community colleges, and universities - involved. I was able to listen plus offer advice, particularly to schools/faculty thinking of starting a new program.
- (41) New approaches, new ideas
- (42) Coordination of programs.
- (43) Lots of connections on multiple issues: pedagogy, industry relations, etc. – great use of time.
- (44) I'm planning on keeping in touch with the many wonderful people via e-mail/phone. I am very excited about using their vast knowledge.
- (45) To continue networking with others that attended the conference.
- (46) Connections with faculty that are doing similar training.
- (47) No written response
- (48) Resources, ideas
- (49) I plan on following up with three people in particular.
- (50) Modeling activities after other partners.
- (51) No written response
- (52) No written response.

2. Why would you choose to attend, or recommend, this conference over another conference?
- (1) Great place to learn about all of the ATE center resources – wish this had happened 5 years ago!
 - (2) I need to learn the in's and out's of several fields of academia.
 - (3) Valuable networking.
 - (4) No written response.
 - (5) Excellent practical hands-on demos with strong on-line support and great overall energy.
 - (6) Focus on technicians (& technician education).
 - (7) Very good group of people willing to help problem solve.
 - (8) The ability to “work” with peers. It's a real working workshop.
 - (9) In order to meet with experts from other centers/projects to learn of success stories and possible development ideas.
 - (10) No written response
 - (11) No written response
 - (12) State of the art in micro/nano education and outreach. Partnership opportunities.
 - (13) It was practical and to the point.
 - (14) Contacts and hands-on module work.
 - (15) This represents a unique opportunity for people involved in two-year programs.
 - (16) No written response
 - (17) Practical resources and new information was shared.
 - (18) Great hands-on sessions that can easily be done in the classroom at low expense (cost).

Question 2. Why would you choose to attend, or recommend, this conference over another conference? (Continued)

- (19) This conference is pinpointed in the area of micro-nano-technologies and it serves the needs of any institution that wants to implement a micro-nano program.
- (20) No written response
- (21) All participants were either engaged in nano or developing nano curriculum.
- (22) Yes!
- (23) Very good networking
- (24) To gain more information about nanotechnology and opportunities for bringing that back to my classroom.
- (25) People are approachable. Everyone is willing to discuss topics of interest.
- (26) No written response
- (27) No written response
- (28) There was a lot of information presented that will help me to enhance student interest in this area of study.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) I attended the pressure sensor workshop in January 2010, so this was a good opportunity to follow-up and make contacts.
- (33) Available resources
- (34) Practical applications
- (35) No written response
- (36) Diversity of group participants; hands-on experiences; university location

Question 2. Why would you choose to attend, or recommend, this conference over another conference? (Continued)

- (37) Disseminate knowledge in nano.
- (38) Aid and support for doing something with emerging technologies.
- (39) Networking purposes and obtaining ideas/suggestions for nanotech-related content/labs.
- (40) This program focused on “nano” and it is such a challenging, broad field. The number of initiatives and projects underway is amazing. This is a great way to spread best practices and make personal connections.
- (41) Definitely
- (42) New technology
- (43) Well structured; coverage on diverse topics but also good introduction to specific programs (SCME, NACK, NanoLink) – excellent blend of practical and strategic topics.
- (44) It is a topic (nano) that drives EVERYTHING, but no one knows about it.
- (45) No written response
- (46) Hands-on lab activities! Affordable and available.
- (47) Network and see what others are doing in the area of 2 – 4 year nano-micro education.
- (48) No written response
- (49) This was an excellent balance of hands-on activities, general information, and specific topics.
- (50) Content
- (51) No written response
- (52) No written response

3. How will what you learned impact your students?

- (1) Looking forward to incorporating SCME SCOs (even as short demos).
- (2) I can recognize strengths in students and push them in that direction.
- (3) Better understanding of material being taught.
- (4) No written response
- (5) We will finally get our equipment on-line for remote access and utilize our AFM to its full potential.
- (6) More fun and hands-on activities that I can incorporate.
- (7) Different ways of doing the same labs.
- (8) That was the biggest benefit – to rapidly build curriculum.
- (9) It will provide some insights on why they (students) need to be more cross-disciplinary in their learning.
- (10) A few good nuggets to add to what we are doing.
- (11) The BioMEMS module will definitely be useful.
- (12) Experiments, kits, and teaching aids.
- (13) Informing them about the opportunities that exist in the field.
- (14) Infusion of micro/nano into the traditional curriculum.
- (15) Many new material was presented that can be used.
- (16) No written response
- (17) The faculty at my school will be able to integrate into multiple programs (engineering, medical, . . .).
- (18) Topics were current and cutting-edge. Great learning environment.
- (19) The hands-on workshops concretized it for me and I will be teaching with confidence.
- (20) No written response

Question 3. How will what you learned impact your students? (Continued)

- (21) No written response
- (22) Real-life applications, community college offerings, and job opportunities available.
- (23) I will use for teaching and recruiting.
- (24) Exposing students to nanotech to get the word out there.
- (25) Provide knowledge to students for jobs that exist today, not in the past.
- (26) Use of a visual/safe experiment.
- (27) Materials and resources will help me in my work with teachers, administrators, and industry partners.
- (28) I will integrate more micro/nano materials into my classes and make them aware of SCME.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) At the present time, since I have to include some of it in physics classes, I can only plant some seeds.
- (33) No written response
- (34) No written response
- (35) I would like to use resources I have learned about to do labs and demos in my classroom.
- (36) Lab experiments will be implemented with career application (integrated science).
- (37) Intro to nano
- (38) At the intro level first. Possible "special topics" course in future.
- (39) The makeshift spin center and resist substitute – Excellent!

Question 3. How will what you learned impact your students? (Continued)

- (40) No written response
- (41) Better understanding
- (42) Curriculum changes
- (43) N/A (not a science/tech instructor)
- (44) No written response
- (45) Relate to their program areas.
- (46) The labs, SCOs, etc. will help the students to better understand nanotech.
- (47) No written response
- (48) Possible incorporation into a project.
- (49) I will be able to use most, but not all.
- (50) No written response
- (51) No written response
- (52) No written response

4. What is the one thing that you would like to tell your sponsor?

(1) Thanks!

(2) No written response

(3) Very worthwhile.

(4) No written response

(5) Thank you and thanks, NSF.

(6) Thanks!

(7) Thank you very much, Deb Newberry.

(8) I am from California, the bankrupt state; funding made this possible.

(9) N/A

(10) Thank you. What a great experience.

(11) No written response

(12) Keep doing the good work. I will partner with you on the outreach and bring students to you.

(13) Thank you for your support. My experience will impact our program offering in the nanotech area.

(14) Send more instructors, have more conferences, advertise resources.

(15) No written response

(16) No written response

(17) I plan to share this information with multiple campuses.

(18) We have maintained a great working relationship and I look forward to future collaborations and thanks!

(19) This wide-impacting, professional development opportunity was made possible by you.

(20) No written response

Question 4. What is the one thing that you would like to tell your sponsor? (Continued)

- (21) Excellent job to bring all the nano/NSF centers together and bringing a fine agenda related to what we are looking for.
- (22) I have been given the tools and excitement to delve into curriculum writing and infusion into the classroom. Thanks!
- (23) Very well worth the time.
- (24) Thank you for the opportunity to network with people in the field of nanotechnology.
- (25) Thank you. My school district has a freeze on travel because of the loss of federal dollars.
- (26) No written response
- (27) Thank you!
- (28) Didn't receive funding from my institution, but I have to say that the "scholarship" money does make a difference in terms of my willingness to spend several days of my semester break. Overall, I feel it was worth it, but it's possible you might get more local buy-in with a larger "scholarship" for the locals.
- (29) No written response
- (30) No written response
- (31) Thanks! We will put the things we learned to immediate use.
- (32) Thank you.
- (33) Thanks! This was invaluable.
- (34) Impressed by the collaboration "open source" type environment.
- (35) Thank you very much and I hope to share what I have learned and give something back to our group.
- (36) Thank you and I will take what I have learned and continue the momentum once I return to NY (New York).
- (37) Will advance our technical charter.

Question 4. What is the one thing that you would like to tell your sponsor? (Continued)

- (38) Thank you and I hope the funding continues in the future.
- (39) No written response
- (40) It was the “best” nano I ever experienced. Thanks for all your hard work/support.
- (41) No written response
- (42) Continue to provide funding.
- (43) For anyone wanting an overview of nano-related programming, this meeting is very helpful.
- (44) Thank you SO much for the opportunity to learn about nano and bring these ideas into my classroom.
- (45) No written response
- (46) Thank you! It was one of the Best!
- (47) Thanks – the trip was worthwhile.
- (48) Thanks.
- (49) Having teachers attend has a huge impact upon the topics they include in their classrooms. I can’t wait to share!
- (50) No written response
- (51) Thank you!
- (52) Thank you!

5. No written response called for in this question.
6. Comments:
 - (1) Industry presentations were hard to follow. Could they be organized and labeled as “start-up guy”, “big company guy”, “former student”, etc.
 - (2) No comments
 - (3) Free research help @ CINT
 - (4) No comments
 - (5) Excellent sharing
 - (6) Why did we get a tour of the Nuclear Museum? We could have used that time to go out and see the area with others in the group.
 - (7) Tours were a lot of fun, but the networking was of the most value.
 - (8) CINT was so-so. Working with colleagues was the best part.
 - (9) Tours were interesting, but not specifically related to the conference. It is understandable in that security clearances were required for Sandia. Some alternative tours in nanotech industries would be welcome if they could be provided.
 - (10) I wasn't sure what I supposed to get out of each industry presentation. Were they representing certain types – large businesses, start-up, etc., or certain industries.
 - (11) No written response
 - (12) Well-organized and very useful conference. Thank you.
 - (13) No written response
 - (14) No written response
 - (15) The tour to Sandia (CINT) did not allow us to see a lab.
 - (16) No written response
 - (17) No written response

Question 6. Comments: (Continued)

- (18) No written response
- (19) No written response
- (20) No written response
- (21) No written response
- (22) No written response
- (23) No written response
- (24) No written response
- (25) No written response
- (26) No written response
- (27) No written response
- (28) I liked the MESA tour at SNLA. It pointed out the fact that jobs in this area are available here in Albuquerque.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) Not exciting. In MESA tour, we only walked in halls and saw nothing first hand.
- (33) No written response
- (34) No written response
- (35) No written response
- (36) I would have liked to have visited with researchers at CINT.
- (37) No written response
- (38) No written response

Question 6. Comments: (Continued)

- (39) No written response
- (40) I learned about nano/micro – what industry is doing to apply nano in new products and also how “nano” is being imbedded in education at all levels.
- (41) No written response
- (42) No written response
- (43) No written response
- (44) No written response
- (45) No written response
- (46) The museum was good.
- (47) No written response
- (48) But I enjoyed.
- (49) The CINT tour was disappointing – he kept us in a hallway looking at posters.
- (50) No written response
- (51) No written response
- (52) No written response

7. What type(s) of knowledge did this conference provide you? Comments:
- (1) The low value rankings weren't areas that were poorly done, just not what I thought there was much focus on.
 - (2) No written response
 - (3) No written response
 - (4) No written response
 - (5) Excited about getting remote-access going.
 - (6) Looking forward to reading the stories on the alumni network.
 - (7) Everything was of great value.
 - (8) Industry presentations were not so much value; ability to leverage existing curriculum → exceptional value.
 - (9) No written response
 - (10) Rankings based on how much I learned about each topic, not a value system.
 - (11) No written response
 - (12) All round micro-nano program development, delivery, and sustainability.
 - (13) No written response
 - (14) No written response
 - (15) No written response
 - (16) No written response
 - (17) No written response
 - (18) MATEC, NanoLink, SCME on-line resources are key!
 - (19) No written response
 - (20) No written response

Question 7. What type(s) of knowledge did this conference provide you? Comments:

- (21) No written response
- (22) No written response
- (23) No written response
- (24) -No written response
- (25) No written response
- (26) No written response
- (27) Could have used dedicated time to review resources on-line, etc.
- (28) No written response
- (29) No written response
- (30) No written response
- (31) No written response
- (32) No written response
- (33) No written response
- (34) All of the above.
- (35) No written response
- (36) Especially those that can be at no or low cost. Times are tough; we would not have the resources otherwise.
- (37) No written response
- (38) No written response
- (39) No written response
- (40) No written response
- (41) No written response

Question 7. What type(s) of knowledge did this conference provide you? Comments:

- (42) Open session on Wednesday morning in groups (do not have brainstorming in same room).
- (43) Many of the presenters were especially adept at explaining tech at multiple levels; great for non-tech audience.
- (44) No written response
- (45) Skill sets are very important.
- (46) Thank you for continuing to develop affordable and meaningful labs!
- (47) No written response
- (48) No written response
- (49) No written response
- (50) No written response
- (51) No written response
- (52) No written response

8. Tours/New information and/or insight gained.

- (1) NMMNHS/ Great museum; Why did the tour stop with 1980's technology?
- (2) NMMNHS/ No written response
- (3) CINT/ Availability of the National Labs as a resource.
- (4) NMMNHS/ No written response
- (5) NMMNHS/ Excellent information on world's improved safety – USA 69,000 nuke weapons 1969; 6,000 in 2011? Nice theme on physics/science and how we continue to move forward.
- (6) CINT/ The PowerPoint presentation was too long (1 hour) – I wish they could have planned a hands-on lab for us.
- (7) Did not take a tour.
- (8) CINT/ Learned their business model and what they do at Sandia.
- (9) NMMNHS/ An interesting tour
- (10) NMMNHS/ I highly enjoyed both the museum tours. Wish we had more time at the Nuclear Museum.
- (11) CINT/ No written response
- (12) CINT/ Current research at CINT. Opportunities for research at CINT.
- (13) NMMNHS/ Background information and visuals about computer hardware and software.
- (14) CINT/ No written response
- (15) CINT/ How the center works.
- (16) CINT/ No written response
- (17) SNLMF/ The tour helped me gain a national perspective of the importance of microsystems.
- (18) SNLMF/ Gained insight on additional MEMS applications.

Question 8. Tours/New information and/or insight gained. (Continued)

- (19) SNLMF/ Sandia National Labs could be used for free if your proposal is approved. Also, provides support.
- (20) SNLMF/ MEMS basics
- (21) CINT/ We were not able to see any lab. We just walked around and looked at results outside labs.
- (22) SNLMF/ I was a blank slate and it was a fantastic experience. It excited me into learning more so I feel comfortable discussing with my students.
- (23) No response
- (24) NMMNHS/ Nuclear Museum was fabulous.
- (25) SNLMF/ What type of lab work that goes on at the lab and who can use the lab. The process for applying for lab use.
- (26) No response
- (27) CINT/ The speaker was informative and enthusiastic, but we spent one hour learning about how to apply for one of their grants. Was that the purpose?
- (28) SNLMF/ See previous page at the bottom (Question # 6).
- (29) CINT/ No written response
- (30) NMMNHS/ I have a better understanding of the history of the personal computer industry.
- (31) CINT/ No written response
- (32) SNLMF/ Not much
- (33) NMMNHS/ No written response
- (34) SNLMF/ Wow, steeped in so much history – hard to grasp.
- (35) SNLMF/ No written response
- (36) CINT/ It brought me back to a university mindset when I performed research myself and did poster sessions/presentations.

Question 8. Tours/New information and/or insight gained. (Continued)

- (37) CINT/ No written response
- (38) SNLMF/ Level of facilities/projects (outstanding); how underutilized their facilities are.
- (39) SNLMF/ No written response
- (40) CINT/ Impressed by the “Nano” research capability and opportunity to make future connections and for education at Sandia Labs CINT.
- (41) NMMNHS/ Reminded me of things I had forgotten.
- (42) CINT/ Had gone there before, aware of information, which is excellent.
- (43) CINT/ Got a good sense of how CINT operates; unfortunately, no actual visits into labs, equipment, or Q&A with researchers were included in presentation, so that was disappointing.
- (44) NMMNHS/ We don't have good Natural History museums where I am from. I loved walking around looking at all the stuff.
- (45) CINT & SNLMF/ No written response
- (46) NMMNHS/ Nice display of computer history
- (47) SNLMF/ No written response
- (48) NMMNHS/ Some information on the history of technology of computers. It stopped too early . . . 1983. A lot of advancements have been made since then.
- (49) CINT/ None – he discussed the history in detail but failed to tour the facility.
- (50) SNLMF/ No written response
- (51) SNLMF & NMMNHS/ No written response
- (52) No written response

9. Suggestions/preferences for future MNT Conferences:

(A) Keynote presenter:

- (1) None Great
- (2) No written response
- (3) ?
- (4) No written response
- (5) Teri Odom, Northwestern University – great at SME Micro/Nano Manufacturing Conference in Oakbrook Terrace, April 9-10, 2011. Presented on nano imprinting, creating arrays, an inexpensive exposure system using LEDS \$400.
- (6) No written response
- (7) Deb Newberry
- (8) Nano bio technology
- (9) No written response
- (10) Great presentation!
- (11) No written response
- (12) Industry Leader
- (13) No written response
- (14) No written response
- (15) No written response
- (16) No written response
- (17) No written response
- (18) Some champion CEO who loves technical education and is motivational
- (19) No written response
- (20) No written response
- (21) Industry speaker from a company using techs in nano labs.
- (22) Successful student
- (23) No written response
- (24) No written response
- (25) No written response
- (26) Good to view the funding goals
- (27) No written response
- (28) I thought that this year's fellow was good. You need someone who can look at the big picture and how it applies to all the stakeholders.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) No written response
- (33) No written response
- (34) No written response
- (35) No written response
- (36) President of CNSE (University of Albany, NY)
- (37) No written response
- (38) No written response

Question 9. (Continued)

- (39) No written response
- (40) Dave Arney (3-M). He is a real champion for integrating nano-educated technicians in a high tech R&D laboratory.
- (41) No written response
- (42) Industry/employer person
- (43) No written response
- (44) No written response
- (45) No written response
- (46) Industry-oriented or possibly education “problem solving” oriented presenter
- (47) No written response
- (48) No written response
- (49) No written response
- (50) No written response
- (51) No written response
- (52) A social scientist specializing in crowd dynamics and motivation techniques

Question 9. (Continued)

(B) Industry Panelists/Companies:

- (1) See response to Question 6. Also, encourage speakers to stick to topics given (asked of them). Maybe, have panel at end of meeting?
- (2) No written response
- (3) More variety
- (4) No written response
- (5) Graphene Solutions, Platteville, WI
- (6) No written response
- (7) 3M, IBM, Medtronic, Pharmacy Company
- (8) Discuss industry trends in business – what product/sectors are growing.
- (9) Materials/biotech
- (10) Student panel was most valuable – theme throughout industry
- (11) No written response
- (12) Top companies across the country
- (13) No written response
- (14) No written response
- (15) No written response
- (16) No written response
- (17) No written response
- (18) No written response
- (19) No written response
- (20) No written response
- (21) Local and national companies hiring grads from program
- (22) No written response
- (23) No written response
- (24) No written response
- (25) No written response
- (26) Small company person had a poor general perspective
- (27) No written response
- (28) Again, good choices for this conference – good mix of small and large companies and their concerns.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) No written response
- (33) A moderator who can guide the discussion
- (34) Include educators
- (35) No written response
- (36) Global Foundries (NY)
- (37) No written response
- (38) No written response
- (39) No written response
- (40) Start-up/spin-offs from research universities

Question 9. (Continued)

- (41) No written response
- (42) No written response
- (43) No written response
- (44) No written response
- (45) No written response
- (46) More and more diverse industry/company representatives
- (47) IBM, AMD, TI (fab companies)
- (48) Eight companies may be too many - 4 would be better
- (49) No written response
- (50) No written response
- (51) No written response
- (52) No written response

Question 9. (Continued)

(C) Conference Sessions:

- (1) No written response
- (2) No written response
- (3) Birds-of-a-feather forum was very beneficial.
- (4) No written response
- (5) No written response
- (6) No written response
- (7) Curriculum development techniques
- (8) No written response
- (9) MNT curriculum development – on-line resource development
- (10) Add handouts from sessions.
- (11) No written response
- (12) Technical and applied research. New equipment sessions.
- (13) No written response
- (14) No written response
- (15) No written response
- (16) No written response
- (17) No written response
- (18) Continue sponsor sessions highlighting resources available to everyone.
- (19) No written response
- (20) No written response
- (21) Continue with hands-on sessions and workshops
- (22) No written response
- (23) No written response
- (24) No written response
- (25) No written response
- (26) Issues and concerns were excellent
- (27) Differentiated strands (e.g. scope and sequence of content, project-based nano units, new to nano, industry needs, curriculum, assessment of soft skills, what's new in nano)
- (28) I liked the panel with the students and their perspectives
- (29) No written response
- (30) No written response
- (31) No written response
- (32) No written response
- (33) No written response
- (34) No written response
- (35) No written response
- (36) No written response
- (37) No written response
- (38) Define specific curricula for AAS, diploma/certificate, etc.
- (39) No written response
- (40) See comment under “Additional Comments or Suggestions”.

Question 9. (Continued)

- (41) No written response
- (42) No written response
- (43) Focused conversation on how ATE assesses overall effectiveness of its work, or how it finds/shares successes of funded programs or ideas about how this can be done.
- (44) Very beneficial to show direct applications into classrooms!
- (45) Excellent
- (46) Nice variety
- (47) No written response
- (48) No written response
- (49) No written response
- (50) No written response
- (51) No written response
- (52) Session for advisors/counselors

Question 9. (Continued)

(D) Workshops:

- (1) Some facilitators seemed flustered by their demos – others were great (e.g. Dr. Nano & crystals)
- (2) No written response
- (3) More time for each (Tuesday morning session)
- (4) No written response
- (5) No written response
- (6) No written response
- (7) No written response
- (8) Hands-on work with a table top SEM
- (9) Curriculum module use – continue this year's sessions
- (10) Many times, pieces aren't relevant now, but do become so later – nothing to go back to.
- (11) No written response
- (12) New equipment sessions. Nano fab, micro fab, safety and maintenance.
- (13) No written response
- (14) No written response
- (15) No written response
- (16) No written response
- (17) The hands-on workshops were beneficial.
- (18) Newest SCOs
- (19) More of the same
- (20) "Demo back" the activity you just learned.
- (21) Add some specific topics related to skills of techs for demonstration.
- (22) No written response
- (23) No written response
- (24) No written response
- (25) No written response
- (26) No written response
- (27) No written response
- (28) Enjoyed the one where we got to play with stuff (hands-on). My students say this about their lab experiences. They like the hands-on versus the demos.
- (29) No written response
- (30) No written response
- (31) No written response
- (32) No written response
- (33) No written response
- (34) No written response
- (35) Teach the teacher. I really liked learning about things I can bring back and use in my classroom. I would like to learn more about things I can bring to my room.
- (36) No written response
- (37) No written response
- (38) No written response

Question 9. (Continued)

- (39) More lithography workshops/the makeshift spin coater was excellent.
- (40) See comments under "Additional Comments or Suggestions".
- (41) No written response
- (42) No written response
- (43) No written response
- (44) No written response
- (45) Excellent
- (46) Good information/methods, etc.
- (47) No written response
- (48) Good
- (49) No written response
- (50) No written response
- (51) No written response
- (52) No written response

Question 9. (Continued)

(B) Additional Comments or Suggestions:

- (1) Please give round table facilitators guidelines – one of mine kept shooting down ideas instead of writing all ideas on the paper (or at least helping to reword/redirect).
- (2) Valuable networking
- (3) No written response
- (4) No written response
- (5) Great conference – lots of effort – thanks!
- (6) The first day was way too long. I wish our hotel was near shops, restaurants like downtown or near the University.
- (7) Had a great time.
- (8) Videotape the opening discussion and some of the high-level workshop wrap-up sessions.
- (9) Consider scheduling the conference at a different time of year. This timeframe is difficult for some to participate due to the end of semester/final exam dates.
- (10) I like that the food was build your own, but took too long – two lines – no snack the second day. Hotel had a number of problems. Great conference.
- (11) No written response
- (12) Well organized, very useful. Thanks.
- (13) No written response
- (14) No written response
- (15) No written response
- (16) No written response
- (17) It would be beneficial to hear industry discuss future technology.
- (18) Bus picked us up a little early for each day's activities. Face-to-face presentations are more effective than Skype.
- (19) No written response
- (20) Stay on time
- (21) Have some longer breaks (with food) to allow for more networking. Also, a session on problem solving for centers/partners – to provide solutions.
- (22) At least two hours free (3 pm on) to experience the community we have been brought into for the conference. More hands-on experience as well as forum work.
- (23) No written response
- (24) Since I am a high school teacher, I am most interested in ways to bring things back to the classroom to promote nanotechnology.
- (25) None
- (26) May have had too much content.
- (27) Not clear how different ATE centers fulfill different “niches” and how participants for the conference are selected. We were “sold” on nano before arriving and knew quite a bit about industry expectations. Maybe a pre-assessment of participants to design sessions. Everyone did a great job collaborating to bring the conference together.

(28) Perhaps the forum facilitators could have had a bit of additional training to help keep things on track within the small groups. People seemed to get off track and focus on their own little world or completely unrelated “garbage.”

Question 9. (Continued)

(29) No written response

(30) It would be a good idea to offer the conference at times that do not interfere with final exam week.

(31) No written response

(32) No written response

(33) No written response

(34) No written response

(35) Things I can bring back and use in my classroom.

(36) Less sitting – especially several sessions in a row. It would be so appreciated.

(37) No written response

(38) No written response

(39) Longer tours to the Sandia Labs.

(40) Perhaps, having sessions to help colleges, universities, “starting” or “building” nano programs. You might group by educational levels. There might also be “workshops” to help faculty/schools that want to start a program. (Have “expert” mentors provide suggestions.) Again, thanks to Matt/Anna. This was the best “Nano Event/conference” I ever attended.

(41) No written response

(42) Have another evaluation level (like, Mid Value) [for Question 7].

(43) Great group and extremely well designed meeting – varied content and good opportunities to digest as we went along.

(44) This was exceptional in opening my eyes to “Nano.” Many (99%) of high school teachers don’t get nano. We need to be educated. It is our students who will be going to the CC for nano! Educate high school teachers about “nano.”

(45) This is excellent conference. I hope this type (of conference) will be continued.

(46) Keep up the good work! This was a very good conference.

(47) No written response

(48) Time during the conference to look up some of the many websites that were shared with us.

(49) Of course, I’d like to see satellite and space program brought in as a topic for the application of MEMS/Nano.

(50) Better time management! Felt rushed through activities. Disorganized speakers (some, not all). Better hotel location near more amenities.

(51) No written response

(52) Workshops allotted too little time.