



Zoom into Nano **Events Guide**

Credits and Rights



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Table of Contents

Credits and Rights.....	2
Table of Contents	3
Introduction	4
Timeline	5
Planning Your Event	8
Training Event Staff and Volunteers.....	15
Resources	16

Introduction

Welcome to *Explore Science—Zoom into Nano!* This Museum & Community Partnerships project is an initiative of the Nanoscale Informal Science Education Network (NISE Net). NISE Net is a national community dedicated to fostering public awareness, engagement, and understanding of nanoscale science, engineering, and technology.

The *Explore Science—Zoom into Nano!* kit provides a great opportunity to do hands-on science, or STEM, in a variety of lifelong learning settings. This guide will help you use the kit with a variety of audiences, in event settings such as family science nights.

“STEM” stands for Science, Technology, Engineering, and Mathematics:

- **Science** is knowledge about the natural world, learned through experiments and observation
- **Technologies** are tools, machines, and equipment that have a practical use
- **Engineering** is the use of science to create useful things or structures
- **Mathematics** is the science of numbers

The kit includes activities that engage learners in STEM concepts and help them develop science and engineering skills. These hands-on activities engage learners in different aspects of the scientific process: asking questions, collecting data, interpreting data, solving problems, testing assumptions, and communicating ideas to others. The kit can also support learners in developing a positive attitude toward science and building important skills related to science.

Everyone can do these activities, though different learners may need different support. The activities in this kit have been tested extensively with many different kinds of facilitators, including both professional educators and volunteers with no science, education, or youth development experience. They have also been tested extensively with many different kinds of learners, including children, teens, and adults of different backgrounds and abilities.

An event is a great way to further involve students in their own learning and invite families and the community to participate. You might plan an event as your primary activity with your community partner, or you might include a culminating event for families at the end of an out-of-school program.

This *Events Guide* prescribes very little about the exact nature of your Explore Science event, for a good reason: events reflect the capacity, needs, and resources in each community. There is no one kind of event that is most successful, and each community is encouraged to discover what is best for its own situation and audience. You can find more information about nano-related museum and community events by looking at NanoDays resources on the www.nisenet.org website.

Timeline

Three to six months before your event

Get in touch with your collaborators and schedule a kickoff meeting to organize your event.

Topics for the agenda include:

- What are your goals for holding an Explore Science event?
- Who is your target audience?
- What kinds of events and activities would reach this audience and meet your goals?
- Who will lead the planning of the event? Who else will be involved?
- How will you communicate with your collaborators?
- What dates will you hold your event?
- Do you need funding to support the event? If so, where will it come from?

Choose a date and add your event to your institutional calendars.

Two to three months before your event

Become familiar with the materials in the Explore Science kit with your staff and your collaborators.

Plan your event. Your planning process might include creating:

- A brief description of the event, including activities, dates, times, and location
- A budget (and fundraising plan, if necessary)
- A list of event goals (and a plan for evaluating how well the event meets your goals)
- A list of tasks (note of who is responsible for each task)
- A schedule with the major milestones for preparation
- A marketing strategy

Review your plans with your facility manager and/or health and safety officer. Many facilities have guidelines or restrictions that could affect the logistics of your event or the demonstrations and activities you can include. You might ask about:

- Restrictions related to use of water or affixing materials to walls
- Parking
- Cleaning and sanitation service schedules
- Security needs

A month or two before your event

- Ensure you have adequate staff and volunteers for your event.
- Draft an activity floor plan. Keep in mind that some activities need water, some can be messy, and some are better with a place for visitors to sit down.
- Identify and invite any guest presenters or speakers.
- Work with your colleagues and your collaborators to create final promotional materials. Customize Explore Science materials, flyers, and ads for your event.
- Begin promoting your event. Coordinate efforts among your own institution's marketing and promotional staff, as well as your collaborators' staff.

A few weeks before your event

- Continue to promote your event.
- Create additional tabletop signs (if you are adding activities beyond those provided in the kit), purchase any additional supplies, restock activity materials, and make copies of activity worksheets.
- Consider creating signs or handouts listing the activities you're offering, as well as their time and location.
- Do a test run of the activities.
- Prepare training sessions for staff, volunteers, and guest speakers in advance or on the day of the event.
- Make final preparations for your event (staffing, supplies, floor plan, schedule, and evaluation).

The week of your event

- Hold training sessions for staff, volunteers, and guest speakers in advance or on the day of the event. In addition to using the Explore Science training materials, be sure to talk to your group about your particular venue, event schedule, audience, and expectations.
- Hold your Zoom into Nano event!

After your event

- Debrief on your event with your planning team. Identify elements of your event that were successful, as well as things you might want to change next time.
- Fill out your Explore Science report form. Reports are due October 15, 2016.
- Document your event for your future use. Save copies of programs, posters, and any newspaper or media coverage of your event.

- Share information and images using the NISE Net links on social networking outlets, such as NISE Net’s Facebook page.
- Thank your collaborators, sponsors, and volunteers.
- Discuss future plans with partners, collaborators, and colleagues. Choose additional event dates and get them on relevant community and organizational calendars.

Year round

- Incorporate *Explore Science—Zoom into Nano!* materials into other activities. The activities in this kit are appropriate for camps, afterschool clubs, science festivals, and other activities.
- Check out additional resources on www.nisenet.org.
- Leverage the partnerships you have established through Explore Science for other projects.
- Look for upcoming opportunities from the NISE Network!

Planning Your Event

Finding collaborators

Your Zoom into Nano event and program will benefit from close collaboration between partner organizations. Depending on the nature of the collaboration, roles and responsibilities will vary. The *Collaboration Guide* and the *Creating Successful Collaborations* video include many more details about finding and working with partners.

Potential event partners include:

- Museums
- Community organizations involved in youth development and out-of-school programs for the public (Boys and Girls Clubs, Girl Scouts, 4-H, afterschool programs)
- Nano research centers at local universities
- Individual scientists at a local college or university
- High school science teachers
- Local technology or nanotechnology businesses
- Libraries and schools
- Local government agencies

Finding volunteers

In addition to your primary partners, you may need to reach out and find additional volunteers to help facilitate the activities and provide different kinds of programming opportunities.

Potential sources of volunteers include:

- College students, classes, or clubs with community service requirements
- High school science clubs, or students suggested by local high school science teachers
- Local chapters of professional science and engineering groups, such as:
 - American Indian Science and Engineering Society: www.aises.org
 - American Chemical Society (ACS): www.acs.org
 - Materials Research Society (MRS): www.mrs.org
 - National Action Council for Minorities in Engineering: www.nacme.org
 - National Society of Black Engineers (NSBE): www.nsbe.org
 - National Organization of Gay and Lesbian Scientists and Technical Professionals: www.noglstp.org
 - Society for Advancement of Chicanos and Native Americans in Science (SACNAS): www.sacnas.org

Society of Asian Scientists and Engineers: www.saseconnect.org

The Society of Mexican American Engineers and Scientists: www.maes-natl.org

Society of Hispanic Professional Engineers: www.shpe.org

Society of Women Engineers (SWE): www.swe.org

- Drama and theater students
- Local industry staff and retirees

Kit contents

The *Explore Science—Zoom into Nano!* kit contains 16 hands-on activities. These activities can be used individually, or presented in five units with the following themes:

- Zoom into Nano
- Small and Surprising
- Labs and Tools
- Tech and Nature
- Nano and Our Lives

In an event setting, such as a family science night, you may prefer to set out all the activities at once and let your guests approach them in any order, rather than presenting them unit-by-unit in a sequence. In this case, you can place activities from the same unit near each other to organize them according to the overarching themes.

If you choose to use these activities in an event program, you may need to sort the activity materials differently from how they come packaged in the kit. Each activity comes complete with five sets of materials. This allows the activities to be used in out-of-school settings such as afterschool programs. You may only need one or two sets of materials in an event context. There is an activity booklet that ties together the activities in each unit. You don't need to use this booklet if you're using the activities individually (you can use individual worksheets instead).

For each activity you include in your event, you will need:

- At least one set of activity materials and one activity guide
- An activity sign and sign holder
- A colored tablecloth
- Copies of any additional activity educational materials or worksheets (Note: there are single-activity worksheets as well as activity booklets)
- Educator notes and tips for leading hands-on science activities

You may also want to use the Explore Science promotional banner and other promo materials such as photos, posters, or advertisements.

Planning and preparation

As an important part of your event planning, familiarize yourself and your primary collaborators with the Explore Science kits. Look through the materials to understand what the kit contains and how everything is organized. Be sure to watch the training videos, as they'll show you everything you need to know to do a great job delivering each activity. Then review the guides; they'll be handy references while you're doing the activities.

Try out the activities ahead of time so you're familiar with them. You and your team can present the activities to each other to get practice with them. As you become familiar with the activities, notice how they're structured. Each activity is presented in three main blocks: **Try this!**, **What's going on?**, and **How is this nano?** This format sets up a process of exploration, explanation, and making connections.

It's up to you to assess the needs, interests, and capabilities of your group, and to implement accordingly. As you organize a time and place to do the activities, make sure you choose an appropriate space, where learners can work comfortably in small groups and don't need to worry about making a mess.

Arrange to have enough facilitators, so that learners have the support they need and you can be sure that they're using the materials safely. In an event setting, you might plan to have two facilitators at each activity station. If your event will bring in additional volunteers or guest presenters, you'll want to plan to train them as well.

Be sure you have enough materials! The kits contain materials for around 100 uses of each activity. When you need to restock your kit, the supplies are inexpensive and easy to find. Suggested sources are provided for any materials that you won't find at a discount store.

Finally, and most importantly, *Explore Science—Zoom into Nano!* is an opportunity to have fun! Be ready to enjoy the activities along with your group.

Additional activities and programs

In general, the more you can tailor your Explore Science event to the unique strengths and resources of your community, the more compelling it will be to your audience. In addition to the materials contained in your *Explore Science—Zoom into Nano!* kit, ideas for programs and demonstrations can be found online at www.nisenet.org.

NISE Network partners have also contributed many ideas that might inspire you as you start to think about your Explore Science event. Some of these are listed below.

Schedule a public presentation or demonstration by a scientist

A local university or college might have scientists or student groups that would be interested in sharing their research.

Host a theater presentation

Work with local actors or theater students to do a creative performance addressing nano themes. NISE Net has theater programs designed for families, as well as programs that focus on issues suitable for adult audiences.

Set up a magnification station

Set out interesting objects for visitors to explore with magnifying glasses and microscopes. Share images of a world too small to see with the naked eye. The www.nisenet.org website has a collection of sample images.

Create a reading area

Create a small quiet spot at your event displaying books for children and adults on nano topics. Some children's books are suitable for read-aloud story time presentations. A list of suggested books can be found on www.nisenet.org.

Show educational videos

There are many great videos available for public audiences on www.nisenet.org. DragonflyTV produced by Twin Cities Public Television for PBS Kids also has a series focusing on nano at pbskids.org/dragonflytv/nano/.

Meet a scientist

Create a space at your event where visitors can talk informally with a nano scientist and ask questions. Prepare some signage and questions to help get discussions started. Follow the write-up for the Scientist Speed Dating program on www.nisenet.org.

Engaging diverse audiences

In planning your *Explore Science—Zoom into Nano!*, event think about how you can best engage diverse audiences in your community. Make events at your organization accessible—or go where people are. Identify barriers that could prevent the audience from participating and develop strategies to overcome them. For example, you might provide an orientation to your organization, provide multilingual interpretation and support, waive fees, provide snacks, offer childcare, provide transportation, or accommodate work and family schedules.

Think about the space you choose for your event. You can host activities at churches, libraries, after-school programs, and community centers. Build partnerships with diversity-focused organizations such as cultural centers, community centers, faith-based organizations, and academic societies.

Use facilitators who know the community

Be sure that your facilitators are sensitive, aware, and (if applicable) fluent in the language your audience speaks. Have diverse facilitators when possible—this can encourage different audiences to participate. It isn't necessary for educators to belong to a community, but it is crucial that they relate to and are accepted by the audience.

Make it social

Encourage sharing and discussion of the activity with friends or family. Set up activities so that more than one person can participate at a time. Actively seek and include ideas, thoughts, and opinions from members of the audience you hope to engage. Consider assigning roles so that every visitor has an active role to play.

Feature diverse role models

Feature images and stories that reflect your audience. Learning about positive role models is inspiring for learners, and it's important for everyone to recognize that diverse people can learn about science, technology, engineering, and math (STEM) and consider careers in these areas.

Use inclusive language

Remember that people have very different backgrounds and experiences, but that everyone can do science. Make pronouns gender neutral whenever possible, and don't repeat common stereotypes about what kind of people are and are not good at science.

Engage the senses

Promote a multisensory experience with a variety of colors, sounds, smells, and textures. Take time to make sure the activity remains aesthetically pleasing and inviting.

Make it relevant

Link science to everyday experiences and topics that are culturally relevant, such as cooking. Share things people relate to, such as a story about the person who discovered a technology or a story about someone who might use it. Encourage people to tell their own stories.

Make it personal

Find common connections between the activity and the everyday lives of audience members. Encourage them to tell you about a time they saw or experienced something similar, or where they might imagine using something related in the future.

Encourage creativity

Find ways to allow for creative self-expression in the activity. Invite audience members to draw, paint, make, act, or tell stories.

Highlight social dimensions

Feature ways that scientific discoveries or new technologies have been or may be used to help people. Encourage people to brainstorm ways the technology might be useful or express concerns they have about it.

Bilingual events

If possible, deliver programming in the most comfortable language(s) for families. Encourage participants to use their home language(s) as they participate. You can incorporate extra cues (such as models, pictures, charts, props, and body language) and provide a glossary of pertinent terms.

Photo Release Form

Most institutions require that some kind of photo release form be signed in order for you to circulate photos from your event in any way. Whether or not this is a formal policy in your institution, you should always ask for permission before photographing participants, especially children. Getting signed releases gives you the flexibility to use your photos in newsletters, reports, and other settings.

We welcome you to share photos from your event with the network, with the following caveat: in order to be able to use and share photos, we must have a release signed by each person in the photo. In the NISE Network, photos are often shared and used by multiple institutions, so we need permission for all institutions in the NISE Network to use the image (not just your own institution). We understand that for many of our partners, it is not possible to get release forms from every person photographed or recorded. For this reason, the NISE Net does not require or expect photographs of your events.

The NISE Net photo release form is included on the next page. Fill in your organization's name in the second blank on the first line, then copy the form to use at your event. When you are asking visitors to fill out the form, be sure to explain that they can choose **not** to have their photograph or their child's photograph taken and still participate in the activity.

Here are a few tips to ensure you get a release from every person you photograph:

- If you are using a photographer for your Explore Science event, be sure to explain to them that they will need to get consent before taking photographs.
- It's helpful to have the releases and pens on a clipboard you can hand to the visitor.
- In larger settings, or spaces with a lot of activity, consider assigning a staff person to join the photographer and ask visitors to sign the release before the photographer takes pictures. This person can ensure that no photographs are taken without consent, and can also ask the photographer to delete any pictures from their camera of visitors who did not consent.
- Jot down a description of the person on their release form (for example, "young girl, brown hair, yellow shirt"). This can help you match releases to photos later on.
- If you are hosting an event with nametags and registration, you can ask visitors to fill out the release when they register. If they have consented to have their photo taken, give them a sticker for their nametag. Then the photographer can take photos only of people with the stickers.

If you are able to get signed releases for your photos, please share them with us! You may send a CD with photos along with a scan of the releases to the Museum of Science at:

NISE Network
Museum of Science
1 Science Park
Boston, MA 02114

Questions regarding acknowledgements or credits can be directed to info@nisenet.org.

Museum of Science and NISE Network
Photo Consent and Release

I, _____, hereby authorize _____ and the Museum of Science, Boston, MA (the "Museum") as agents acting for and on behalf of the Nanoscale Informal Science Education (NISE) Network, and its agents, representatives, assigns, successors in interest and licensees, to photograph, audiotape, and/or videotape me and grant the Museum and the NISE Network the irrevocable right to use my photograph, audio recording, video recording, or any reproduction or modification thereof (the "Photograph", "Audio, and/or "Video"), in any manner or medium throughout the world an unlimited number of times in perpetuity for advertising, trade, promotion, exhibition or any other lawful purpose.

I understand that I will not receive any monetary compensation for the permissions I am granting herein. I hereby waive any right of inspection or approval of the uses to which the Museum and the NISE Network may put the Photograph, Audio, and/or Video. I acknowledge the Museum and the NISE Network will rely on this permission and hereby release and discharge the Museum and the NISE Network from any and all claims and demands arising out of or in connection with the Photograph or the exercise of the permissions granted here, including any and all claims for libel, invasion of privacy or emotional distress.

I understand that I cannot withdraw my consent after I sign this form and that this consent and release is binding on me and my heirs, legal representatives and assigns.

YES NO (please check)

 I grant permission for Photographs to be collected and used by NISE Network

 I grant permission for Audio be collected and used by NISE Network

 I grant permission for Video to be collected and used by NISE Network.

Date: _____ Signature: _____

Address: _____

Telephone Number: _____

If the individual named above is under 18 years of age, please complete the following:

I am the parent or legal guardian of the individual named above, and I hereby sign this Media Consent and Release on behalf of such individual in accordance with the statements above.

Name: _____

Date: _____ Signature: _____

Address: _____

Telephone Number: _____

Training Event Staff and Volunteers

The *Explore Science—Zoom into Nano!* kit includes training materials you can use with the staff and volunteers who will help make your event a success. Training materials include:

- Activity instruction sheets
- Educator information sheet for each activity, with tips for leading hands-on science
- Training videos for each activity, included in your kit and also online: vimeo.com/album/3636993
- *Science Outside of School* slides (with presenter notes)
- *Intro to Nanotechnology* slides (with presenter notes)
- *Activity Overview* slides (with presenter notes)

The Explore Science kit is designed for learning by doing. The activities and materials are safe, appropriate, and fun for a broad range of learners. The activities are all thoroughly tested with educators and public audiences. Your event volunteers can successfully present the activities just by reading the instructions, trying out the activity, and reviewing the information sheets and tips. They'll be better prepared if they also watch the training videos and practice doing the activities ahead of time. Finally, you can provide a more thorough training by presenting some or all of the slideshows, as fits the needs of your facilitators.

Guest presentations

Expert speakers can be a wonderful addition to your Zoom into Nano event. With extra preparation and support, guest presentations can provide a great experience for both the speaker and the audience.

Here are some suggestions to help things go smoothly:

- When inviting scientists to participate, be clear about their role and type of experience you're seeking.
- Familiarize invited guest speakers with your expected audience, including anticipated ages and levels of background knowledge.
- Let speakers know about any expectations you may have related to audience involvement.
- Discuss the content and length of the planned presentation.
- Share some of the Explore Science training materials with your speaker, such as the tips for leading hands-on science.
- Encourage your invited speaker to use plain language, avoiding jargon and technical terms.
- Ask to review a draft slideshow or notes in advance and discuss the planned presentation together.

- Discuss details about your facility, including room size, seating style, and audiovisual equipment.
- Schedule time before the presentation to work out any audiovisual or logistical issues.
- Prepare questions that may help stimulate audience discussion.

Evaluating your event

The activities and materials included in your Zoom into Nano kit have been evaluated with public audiences and reviewed by scientists and informal science educators.

Additionally, you may want to evaluate your program against your own goals. Evaluating your local program has several benefits. It can help clarify your goals, provide information that you can use to improve other programs, gain funding or sponsorship for projects, and inform your understanding of your audience and the impact of your work. If you're interested in learning more about evaluation, here is a selection of resources to help you get started.

NISE Network evaluation efforts

Information about NISE Net evaluation is available from www.nisenet.org. Additionally, you can download program evaluation tools including guidelines and templates: www.nisenet.org/catalog/tools_guides/nise_network_program_evaluation_tools_package.

Team-Based Inquiry

Team-Based Inquiry (TBI) is a practical approach to empowering education professionals to get the data they need, when they need it, to improve their products and practices and, ultimately, more effectively engage public and professional audiences. The TBI process involves an ongoing cycle of inquiry: question, investigate, reflect, and improve. The Team-based Inquiry guide explains each step of the TBI process and features ways TBI is used in the NISE Network to improve educational experiences and professional practice. You can download a copy of the guide from the website: http://nisenet.org/catalog/tools_guides/team-based_inquiry_guide.

Additional Resources

- Informal education resources: www.Informalscience.org
- The National Science Foundation guidebook on project evaluation for researchers: www.nsf.gov/pubs/2002/nsf02057/nsf02057_1.pdf
- The University of Wisconsin Extension guides to planning and implementing evaluations: www.uwex.edu/ces/pdande/evaluation/evaldocs.html
learningstore.uwex.edu/Planning-a-Program-Evaluation--P1033C0.aspx

Resources

NISE Network

The Nanoscale Informal Science Education Network (NISE Net) is a national community of researchers and informal science educators dedicated to fostering public awareness, engagement, and understanding of nanoscale science, engineering, and technology. Nisenet.org is an online digital library of public nano educational products and tools designed for educators and scientists. In addition to the Explore Science kits, many more resources related to nano education and educator professional development are available on the project website. See more at www.nisenet.org.

Afterschool Alliance

The Afterschool Alliance is dedicated to raising awareness of the importance of afterschool programs and advocating for more afterschool investments. They provide resources related to getting started with STEM, funding afterschool STEM programs, research on STEM learning, and more. See more at www.afterschoolalliance.org/stem.cfm.

Boys & Girls Clubs of America

Boys & Girls Clubs of America offers DIY STEM, a hands-on, activity-based curriculum that connects youth to science themes they encounter regularly. It is available for use by Clubs, other non-profit organizations, and the general public. See more at www.greatfutures.org/pages/TWC-DIYSTEM.aspx.

Center for the Advancement of Informal Science Education

The Center for the Advancement of Informal Science Education (CAISE) provides InformalScience.org, a central portal to project, research, and evaluation resources designed to support and connect the informal STEM education community in museums and other learning environments. See more at www.informalscience.org.

Click2Science

Click2Science is an interactive professional development site for trainers, coaches, site directors, and frontline staff/volunteers working in out-of-school-time STEM programs, serving children and youth. It was developed by the UNL Extension in partnership with the Noyce Foundation and in collaboration with many other organizations. See more at www.click2sciencepd.org.

How to Smile

Howtosmile.org collects the best science and math activities, designed especially for those who teach school-aged kids in non-classroom settings. The project is a collaboration of educators at science museums and children's museums. See more at howtosmile.org.

National Girls Collaborative Project

National Girls Collaborative Project (NGCP) brings together organizations throughout the United States that are committed to informing and encouraging girls to pursue careers in STEM. NGCP offers many resources to strengthen collaborative networks and advance STEM education for girls. See more at ngcproject.org.

4-H

4-H science programs create hands-on learning experiences to encourage young minds and help fill our nation's shortage of young leaders proficient in science, engineering, and technology. Their professional development tools build understanding and support implementation and evaluation. See more at www.4-h.org/resource-library/professional-development-learning/science-training-guides-resources.