SCIENTIST SPEED DATING

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General Description

Type of program: **Facilitated Activity**

Scientist Speed Dating is a facilitated, yet informal and high-energy, social activity to encourage a large group of people to speak with one another, ask questions, and learn about specific areas of research and practice within the field of nanoscale science and engineering, as well as the related societal and ethical implications of work in this field.

Program Objectives

Big idea:

It is not often that the general public has opportunity to informally chat with scientists, engineers, and social scientists; nor is it often that scientists, engineers, and social scientists get the opportunity to discuss their work with the general public in a social environment. This program facilitates these kinds of interactions in a thought-provoking and exciting forum.

Learning goals:

As a result of participating in this program, participants will be able to:

1. Have questions about nanoscale science and engineering immediately answered by scientists and engineers actively working in the field; as well as consider questions about the societal and ethical implications with social scientists.
2. Hear questions from other participants, having their own interest and understanding broadened based on questions they had not previously considered.
3. Discover that scientists often have questions of the general public, and perhaps be able to provide invaluable feedback to scientists and engineers as they continue their work.

NISE Network content map main ideas:

[ ] 1. Nanometer-sized things are very small, and often behave differently than larger things do.

[X] 2. Scientists and engineers have formed the interdisciplinary field of nanotechnology by investigating properties and manipulating matter at the nanoscale.

[X] 3. Nanoscience, nanotechnology, and nanoengineering lead to new knowledge and innovations that weren't possible before.

[X] 4. Nanotechnologies have costs, risks, and benefits that affect our lives in ways we cannot always predict.

National Science Education Standards:

[X] 1. Science as Inquiry

- [ ] K-4: Abilities necessary to do scientific inquiry
- [ ] K-4: Understanding about scientific inquiry
- [ ] 5-8: Abilities necessary to do scientific inquiry
- [ ] 5-8: Understanding about scientific inquiry
- [x] 9-12: Abilities necessary to do scientific inquiry
- [x] 9-12: Understanding about scientific inquiry

[X] 2. Physical Science

- [ ] K-4: Properties of objects and materials
- [ ] K-4: Position and motion of objects
- [ ] K-4: Light, heat, electricity, and magnetism
- [ ] 5-8: Properties and changes of properties in matter
- [ ] 5-8: Motions and forces
- [ ] 5-8: Transfer of energy
- [ ] 9-12: Structure of atoms
- [ ] 9-12: Structure and properties of matter
- [x] 9-12: Chemical reactions
- [ ] 9-12: Motions and force
- [ ] 9-12: Conservation of energy and increase in disorder
- [x] 9-12: Interactions of energy and matter

[ ] 3. Life Science
- [ ] K-4: Characteristics of organisms
- [ ] K-4: Life cycles of organisms
- [ ] K-4: Organisms and environments
- [ ] 5-8: Structure and function in living systems
- [ ] 5-8: Reproduction and heredity
- [ ] 5-8: Regulation and behavior
- [ ] 5-8: Populations and ecosystems
- [ ] 5-8: Diversity and adaptations of organisms
- [ ] 9-12: The cell
- [ ] 9-12: Molecular basis of heredity
- [ ] 9-12: Biological evolution
- [ ] 9-12: Interdependence of organisms
- [ ] 9-12: Matter, energy, and organization in living systems
- [ ] 9-12: Behavior of organisms

[ ] 4. Earth and Space Science
- [ ] K-4: Properties of earth materials
- [ ] K-4: Objects in the sky
- [ ] K-4: Changes in earth and sky
- [ ] 5-8: Structure of the earth system
- [ ] 5-8: Earth's history
- [ ] 5-8: Earth in the solar system
- [ ] 9-12: Energy in the earth system
- [ ] 9-12: Geochemical cycles
- [ ] 9-12: Origin and evolution of the earth system
- [ ] 9-12: Origin and evolution of the universe

[x] 5. Science and Technology
- [ ] K-4: Abilities to distinguish between natural objects and objects made by humans
- [ ] K-4: Abilities of technological design
- [ ] K-4: Understanding about science and technology
- [ ] 5-8: Abilities of technological design
- [ ] 5-8: Understanding about science and technology
- [x] 9-12: Abilities of technological design
- [x] 9-12: Understanding about science and technology

[x] 6. Personal and Social Perspectives
- [ ] K-4: Personal health
- [ ] K-4: Characteristics and changes in populations
- [ ] K-4: Types of resources
- [ ] K-4: Changes in environments
- [ ] K-4: Science and technology in local challenges
- [ ] 5-8: Personal health
- [ ] 5-8: Populations, resources, and environments
- [ ] 5-8: Natural hazards

[ ] 5-8: Risks and benefits
[ ] 5-8: Science and technology in society
[x] 9-12: Personal and community health
[ ] 9-12: Population growth
[x] 9-12: Natural resources
[x] 9-12: Environmental quality
[x] 9-12: Natural and human-induced hazards
[x] 9-12: Science and technology in local, national, and global challenges

[x] 7. History and Nature of Science

[ ] K-4: Science as a human endeavor
[ ] 5-8: Science as a human endeavor
[ ] 5-8: Nature of science
[ ] 5-8: History of science
[x] 9-12: Science as a human endeavor
[ ] 9-12: Nature of scientific knowledge
[ ] 9-12: Historical perspective

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Time Required

Set-up	Program	Clean Up
		
5 minutes	≥ 20 minutes	5 minutes

Background Information

Definition of terms

Nano is the scientific term meaning one-billionth (1/1,000,000,000). It comes from a Greek word meaning “dwarf.”

A nanometer is one one-billionth of a meter. One inch equals 25.4 million nanometers. A sheet of paper is about 100,000 nanometers thick. A human hair measures roughly 50,000 to 100,000 nanometers across. Your fingernails grow one nanometer every second.

(Other units can also be divided by one billion. A single blink of an eye is about one-billionth of a year. An eyeblink is to a year what a nanometer is to a yardstick.)

Nanoscale refers to measurements of 1-100 nanometers. A virus is about 70 nm long. A cell membrane is about 9 nm thick. Ten hydrogen atoms are about 1 nm.

At the nanoscale, many common materials exhibit unusual properties, such as remarkably lower resistance to electricity, or faster chemical reactions.

Nanotechnology is the manipulation of material at the nanoscale to take advantage of these properties. This often means working with individual molecules.

Nanoscience, nanoengineering and other such terms refer to those activities applied to the nanoscale. “Nano,” by itself, is often used as short-hand to refer to any or all of these activities.

Program-specific background

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Materials

- Timer;
- Loud bell or buzzer;
- Notecards at the tables with extra questions to encourage any lagging discussion;
- One round table per scientist/engineer/social scientist;
- Enough chairs, distributed equally amongst the tables, to seat all event attendees;
- Microphone for event administration and scientist/engineer/social scientist introductions.

Set Up

Time:

Less than 5 minutes

Prep:

Prime the scientists/engineers/social scientists prior to the event with conversation-prodding questions. In the unlikely event participants are a bit sluggish in joining the frenetic spirit of the event, we suggest that the "experts" ask their tables any of the following: 1) What are your concerns about (this particular field of research)? 2) How do you think the media portrays advances in this field? 3) What sort of social impacts do you see (or foresee) as a result of applying this research or these advances?

Program Delivery

Time:

≥ 20 minutes

Program timing depends on number of experts. With about 40 participants and seven scientists/engineers/social scientists, at 3-5 minutes per table, this program can take anywhere from 20-45 minutes. With fewer people it may go a bit faster. With a more engaged and enthusiastic group the follow up discussion could last longer.

- Give a very brief introduction about the structure of the event
- Invite each of the scientists/engineers/social scientists to come on stage and give a succinct (30 seconds only! – time them!) introduction to their area of expertise.
- Direct speakers to their tables where participants are already seated.
- Start the timer (no more than 5 minutes maximum) and let the sessions begin.
- With 30 seconds remaining in the session, give a warning (either through music or a bell or an announcement).
- When the time is up, sound the bell or buzzer and indicate that all participants (except for the scientists) need to get up and move to a different table. Give them just 60 seconds for this switch.
- Start the timer again for the next session, and repeat this entire process until the participants have had the opportunity to speak with each scientist/engineer/social scientist.

Safety

Players can sometimes get quite excited during the timed sessions and may not pay attention to their surroundings. Make sure that there is enough space for the players to move around and clear the ground of low objects that players could trip over.

Tips and troubleshooting

- The short time allotment for expert introductions should be stringently enforced with a stopwatch and buzzer, as it sets the tone for the fun and frantic pace of the event.

  Featured experts can have wide-ranging expertise, giving the participants the ablity to chat about a huge number of topics: astrobiology, human disease and health policy, environmental chemistry and pollutants, science policy, neuroprosthetics, research ethics, new developments in IT, and so many more.

- Again, prime the scientists/engineers/social scientists prior to the event with conversation-prodding questions. In the unlikely event participants are a bit sluggish in joining the frenetic spirit of the event, we suggest that the “experts” ask their tables any of the following: 1) What are your concerns about (this particular field of research)? 2) How do you think the media portrays advances in this field? 3) What sort of social impacts do you see (or foresee) as a result of applying this research or these advances?

- It has been our experience that none of the experts reported having to nudge the conversation along, and instead noted that they were on their toes to keep up with the questions and the rapid communication at the tables. In addition, both experts and

participants alike bemoaned the short time for each session, and so continued their discussions at the mixer afterward.

- This event works best with at least 20 people but can be adjusted to accommodate different numbers.

Common visitor questions

- Why can't we have more time?
- Will we have time after the event to talk further with the scientists?
- Is there contact information for follow-up questions, or recommended resources?

Clean Up

Time:
Less than 5 minutes

Universal Design

This program has been designed to be inclusive of visitors, including visitors of different ages, backgrounds, and different physical and cognitive abilities.

The following features of the program's design make it accessible:

[ ] 1. Repeat and reinforce main ideas and concepts
Through discussion, live demonstrations, volunteer-assisted demonstrations, and power-point slides the main ideas and concepts will be verbally and visually reinforced.

[x] 2. Provide multiple entry points and multiple ways of engagement
Again, through discussion, live demonstrations, volunteer-assisted demonstrations, and power-point slides, audiences will be engaged with hands-on/tactile activities, visually through the demonstrations and slides, and aurally through the live, spoken presentation.

[x] 3. Provide physical and sensory access to all aspects of the program
See above.

To give an inclusive presentation of this program:

Presenters can help make the program accessible to participants who are blind or have low vision by assisting them from table-to-table, and those who are deaf by providing an ASL interpreter.

If there are visitors with limited mobility, you can change the event structure so that the participants remain at one table while the scientists/engineers/social scientists circulate amongst the tables.

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