

THE SOUTH CAROLINA CITIZENS' SCHOOL OF NANOTECHNOLOGY [SCCSN]

A series of experiments in science &
technology outreach to enhance nonexperts'
voices and roles in nanotech policy

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December 2003: NSF workshop on societal implications of nanotechnology generated three themes:

Public knowledge of nanotech almost nonexistent;

Polarizing visions of nanotech likely to dominate the ideological landscape in lieu of balanced or centrist understandings;

Process of building nanoliteracy must include dialogues in which laypersons can express their concerns and values, and ask questions and receive responses from experts.

DEWEY-MILLER VISION:

- Making science/technology policy in a democracy requires a well-informed citizenry;
- But civic scientific literacy in the U.S. is consistently very low;
- Unrealistic to believe that large proportions of the adult population will become well informed about nanotech.

RECENT OBSERVATIONS AND DEVELOPMENTS:

- * **Stakeholder democracy:** people self-select themselves as interested, active;
- * Nonexperts acquire, comprehend and deploy relevant scientific knowledge when they want to or have to;
- * Informal science education is especially powerful because it is self-motivated;
- * **Participatory democracy:** nonexperts have active and constructive roles in making science & technology policy.

MECHANISMS:

Lobbying, litigation, legislation, appropriations, referendums, regulations, school science curriculums, etc.

CASES:

Local environmental disputes;
Nonexperts on NIH advisory panels;
AIDS activists as principals in clinical trials;
2004 California referendum on stem cell research;
etc.

NANOLITERACY:

condition in which stakeholders in nanotech

[A] can be informed about nanotech [including a spectrum of views on a topic], and are comfortable discussing it; and,

[B] are able to pursue their own interests by learning more about it from various sources; and,

[C] are confident that they can employ their knowledge to participate in shaping nanotech policy; and,

[D] societal considerations are integrated into decisions about technological change, so the technology is not isolated from society.

THE SCCSN MODEL:

1. Faculty experts who are comfortable speaking about their work with nonexperts.
2. Package of readable articles for each session which give participants background and confidence to make comments and ask questions.
3. Numerous procedures, formal & informal, which allow participants to question the experts and express their values and concerns.
4. Small size creates friendly, intimate atmosphere.
[target = 45; typical = 35 to 40]
5. Revisions after each round to incorporate participants' suggestions.

Thus the SCCSN is:

More intimate than a mini medical school;

More formal than a science café;

With its background readings, it provides more depth of content than a science café or a mini medical school.

But, the three formats can co-exist and complement each other.

EXECUTING THE SCCSN

SCCSN.1 [SPRING 2004]:
6 sessions in 6 weeks on Wednesday evenings.

SCCSN.2 [FALL 2004]:
7 sessions in 7 weeks;
Added lab tour with SEM, TEM, STM;
Added unit on societal implications.

SCCSN.3 [APRIL 2005]:
7 sessions in 4 Sunday afternoons;
Science museum venue in connection with
IT'S A NANO WORLD exhibit.

SCCSN.4 [FALL 2005]
8 sessions, including roundtable discussion for participants
to pose questions and comments to experts.

SCCSN.5 [Spring 2006]
Venue of Benedict College, an HBUC.



NOV. 2005: participants in SCCSN.4 pose questions in concluding roundtable session...



... and faculty experts respond to their questions and comments



SPRING 2006: SCCSN.5 at Benedict College



APRIL 2006: Professor Ming Yin demonstrates the atomic force microscope.



MAY 2006: roundtable discussion at
the conclusion of SCCSN.5

PRELIMINARY MEASURES OF PARTICIPANTS' KNOWLEDGE AND CONFIDENCE:

COGNITIVE:

Identify scanning tunneling microscope as a crucial instrument for nanotech: baseline 32% endpoint 100%

Recognize R. Feynman as author of "Plenty of Room," 1959: baseline 20% endpoint 88.8%

Recognize that C₆₀ is made of carbon atoms: baseline 53% endpoint 94.4%

ATTITUDINAL: More confident about:

- explaining their opinions on nanotechnology;
- understanding a newspaper article on nanotech;
- speaking at a community meeting on nanotech.

THEMES IN PARTICIPANTS' QUESTIONS AND COMMENTS, SCCSN.4 – FALL 2005 [by Ryan Reynolds]

Women's questions/comments more concerned with societal/ethical topics; men's questions more technical.

Nanomedicine was the topic that elicited the most questions.

Growing sophistication of questions/comments over time.



FOR EXAMPLE:

"Are all atoms the same size?"

[from the first session]

"If we could build a particle accelerator on the nanoscale, it seems we could build a very good one *due to increased surface area.*"

[from the last session]

DEBRIEFING THE SPEAKERS

[by Argiri Aggelopoulou]

n = 11: 2 Philosophers;
 1 English professor;
 1 Art professor;
 1 Geneticist;
 5 Chemists;
 1 Chemistry doctoral student

Various levels of participation, from 5/5 to 1/5 rounds.

SCCSN EXPERIENCE CHANGING SPEAKERS' RESEARCH:

Philosopher: more concerned about participants' interest in near-future commercial products; also, participants' interest in nanobots, even if unrealistic.

Chemist: More inclined to ask *why* she takes certain directions in her research:

"The participants' insistence on knowing how the various aspects of my research are important and relevant has forced me to face the same questions."

Almost everyone said they changed how they present their research, to make it more accessible to nonexperts.

Most were surprised and impressed that participants were well informed, reasonable, and articulate.

They noted participants' interest in medical applications.

Some bothered by participants' interest in nanobots and grey goo.

Noted that participants were eager about nanotech, but speakers were concerned about participants' high expectations.

SPEAKERS' COMMON GROUND OR COMMON INTERESTS WITH PARTICIPANTS?

[inspired by recent Lancaster/Demos results]

Answer: Yes, common interests...

But in the sense that the each speaker felt that the participants were interested in the speaker's research.

Does not necessarily mean that speakers/nonexperts had common concerns about societal/ethical questions.

ADDITIONAL SCCSN SERVICES:

Web site: <http://nsts.nano.sc.edu/outreach>

- “how to organize a citizens’ school of nanotech”;
- “history & ethos of SCCSN”: why we do it this way.
- sample programs.

Responding to requests for info from NSECs and other organizations.

Past participants of SCCSN have formed a Science Café in Columbia SC.

Currently seeking support for experiments to:

- improve participation of underserved populations;
- assist universities and science museums that want to use or adapt the SCCSN model;
- discover whether the SCCSN model can be used for other scientific topics.

Said one of the SCCSN speakers,

“I feel that people are getting bored and tired of powerpoint presentations.”

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