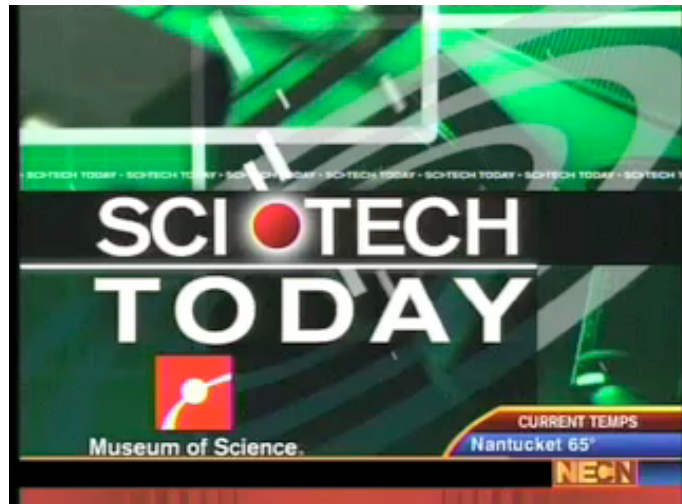




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Formative Evaluation of Nanotechnology Segments
on New England Cable News *Sci•Tech Today*



Report for
Museum of Science
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Research Report No. 08-002
February 2, 2008

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INTRODUCTION

Sci•Tech Today is a brief televised science news program designed to enhance public understanding of current science, engineering and technology. The 3-5 minute segments are researched and presented by Museum of Science staff and mediated by a news anchor of New England Cable News (NECN). The segments are cablecast live from the Museum of Science's Gordon Current Science & Technology stage and NECN's Needham, Massachusetts studios. Twice a month, the segments feature nanoscale science and engineering research. These segments are produced with support from (1) the Center for High-Rate Nanomanufacturing, which is funded by the National Science Foundation (NSF) and the Massachusetts Technology Collaborative, and headquartered at Northeastern University and at the University of Massachusetts, Lowell, and (2) the NSF-funded Nanoscale Science and Engineering Center headquartered at Harvard University. NECN's Nielsen ratings estimate that each *Sci•Tech Today* segment, with repeat broadcasts, reaches approximately 28,000 adult viewers in Boston and the surrounding five-state New England region.¹

To help guide the production of the *Sci•Tech Today* segments, Multimedia Research implemented a formative evaluation whose general goal was to obtain feedback about appeal, clarity and format features of nano-topic *Sci•Tech Today* segments with focus group participants representative of the NECN broadcast audience.

METHOD

Procedure

Two Boston-area eight-person focus groups met for 1 3/4 hours to view and discuss the formats of the NECN nano-topic *Sci•Tech Today* segments, following these steps:

1. Completed pre-viewing questionnaire that included demographic questions and questions that established participants' awareness of nanotechnology.
2. Viewed six *Sci•Tech Today* segments on DVD, as listed in Table 1 below. The rationale for the segment order is based on beginning with nano basics, alternating presenters, and increasing in complexity of presentation support features.

Table 1. *Sci•Tech Today* Segments Presented to Focus Groups

Segment	Presenter	Topic	Support Feature
1	Amy	Nanotechnology Basics	None
2	Tim	Hydrogen	None
3	Lisa	Anthrax	Prop
4	Amy	Nanofibers	Photo
5	Tim	Desalination	Demo
6	Lisa	Cleaning art	Video

¹ Per 2/27/07 email from Heidi Currier Ferris, VP/Media Director, Gearon Hoffman, Inc., Boston.

After viewing each segment, participants completed a short reaction survey. Questions asked for ratings on segment appeal and clarity, topic interest, density of information, and impact on curiosity and learning. Additionally, questions gathered feedback about the museum presenter; issues that bothered or distracted the viewer; relevance of the science to issues that concern the viewer; and main messages taken away from the segment.

3. Completed closing multiple-choice questions that addressed the importance of a local newscast to present current science news and the influence of the segments on interest in visiting the Museum of Science. Viewers also answered an open-ended question to assess the impact of the segments on their understanding of nanotechnology.
4. During the final half-hour, participants discussed the presenters' style and the content support features (see Table 1) in relation to segment appeal and clarity of content. Also addressed was an issue of referencing local Massachusetts' research organizations.

Sample

The focus group demographics were designed to reflect the demographics of NECN's viewing audience, which was reported by Scarborough as having 57% men, 47% college educated, 91% white, with a median age of 49.7 years.² Table 2 on the next page shows that the characteristics of our responding sample of 16 is very close to NECN's audience, including 50% men, 50% college educated, 94% white, with a median age of 49.5 years. One focus group of eight included the college educated; the second group of eight included those without college degrees. Most (87%) of our sample are NECN viewers, but only 19% were familiar with *Sci•Tech Today* segments.

All of the participants have visited the Museum of Science, with 69% reporting that their last visit was more than one year ago.

Of the 16 participants, 11 (69%) were "very" or "somewhat" interested in current science research. Interest in science was independent of education but not of gender; men expressed a significantly higher interest in current science research than women. This is a typical finding in our studies of current science programming.

With respect to TV viewing habits, 13% "seldom" watch science programming, 56% watch "sometimes," and 31% watch "frequently." Men reported watching science programming significantly more frequently than women. Again, this gender difference is typical in science media. Three-quarters of the sample watch NECN "sometimes" or more frequently, but only 19% "occasionally see *Sci•Tech Today* on NECN."

² Per 2/27/07 email from Heidi Currier Ferris, VP/Media Director, Gearon Hoffman, Inc., Boston.

Table 2.³ Demographic and Background Characteristics of Sample

		% of N = 16
Gender	Male	50%
	Female	50%
Age	Range	33-73 years
	Mean	49.4 years
	Median	49.5 years
Race/Ethnicity	White, not of Hispanic origin	94%
	Minority	6%
Education	High school graduate or less; Some college or technical	50%
	College graduate; Courses or degrees beyond college	50%
Last visit to MoS	More than one year ago	69%
	Within the last year	19%
	Within the last six months	13%
Interest in current science research	Somewhat not interested	13%
	Neutral	19%
	Somewhat interested	44%
	Very interested	25%
Frequency of watching TV science programming	Seldom	13%
	Sometimes	56%
	Frequently	31%
Frequency of watching NECN	Never	13%
	Seldom	13%
	Sometimes	56%
	Frequently	13%
	Daily	6%
Frequency of watching <i>Sci•Tech Today</i> on NECN	Don't receive or watch NECN	13%
	Never seen <i>Sci•Tech Today</i>	69%
	Occasionally see <i>Sci•Tech Today</i>	19%

Participants were told that the *Sci•Tech Today* segments that they would view present a new field of science called “nanotechnology.” They then answered a standard question asked in national surveys of public awareness of nanotechnology: “How much have you heard about nanotechnology?”⁴ Table 3 on the next page shows that more than half (56%) of our group reported having “heard some” about nanotechnology, which is a much higher percentage than the national sample statistics. Men, both nationally and in our sample, report a significantly higher awareness of nanotechnology than women; however, half of our men who said they had “heard some” could not associate any ideas with nanotechnology prior to viewing the segments (see Table 12 in the Appendix).

³ Percentages are rounded in all tables in this report.

⁴ Hart, P. D. (September 25, 2007). Awareness of and attitudes toward nanotechnology and federal regulatory agencies. Retrieved 12/07 from http://www.nanotechproject.org/events/archive/public_awareness_nanotechnology_what_do/
National Science Board (2008). Science & Engineering Indicators. Volume 2: Chapter 7 Appendix Table. Retrieved 1/08 from <http://www.nsf.gov/statistics/indicators/>

Table 3. Awareness of nanotechnology

	Focus Group Sample N = 16	Hart/Woodrow Wilson 2007 National Sample N = 1014	University of Chicago, General Social Survey 2006 National Sample N = 1864
Heard a lot	0%	6%	5%
Heard some	56%	21%	15%
Heard a little	13%	29%	25%
Heard nothing at all	31%	42%	54%
Not sure	0%	2%	2%

Data analysis

Segment ratings and multiple-choice questions were examined for statistically significant differences related to the sample’s descriptive variables. No significant relationships were found for education, gender, or frequency of viewing NECN.⁵ A few differences significant at the $p < .05$ level are reported for recency of museum visitation and awareness of nanotechnology.

⁵ There may be an influence of these variables, however, it is not strong enough to detect with our small sample.

RESULTS: ASSOCIATIONS WITH THE TERM “NANOTECHNOLOGY”

Prior to viewing the six *Sci•Tech Today* segments, participants were asked to write any thoughts, ideas, emotions, definitions or questions that they associate with the term “nanotechnology.” Immediately after viewing, participants added to their pre-viewing response. The goal of this question is to describe changes in viewers’ personal meaning of nanotechnology as a result of seeing the segments.

The pre and post data sets were sorted into categories and sub-categories, as presented in Table 4.⁶ The “% Pre” column shows the percent of the sample whose responses fall into the category; for example, 25% noted that nanotechnology is in many scientific fields and applications. The “% New at Post” column shows the percent of the sample whose post-viewing responses fall into the category and whose pre-viewing responses were not in the category; thus, this column shows people with new awareness of the category; for example, after viewing the segments, 50% of the sample acquired an awareness of the many fields and applications of nanotechnology.

Viewing the *Sci•Tech Today* segments increased the audience’s awareness that nanotechnology is in many scientific fields and applications; that it is the future and that future is here now; and that nanotechnology is both everyday and cutting edge. More viewers voiced positive emotions in association with nanotechnology after seeing segments, but there was a slight increase in those concerned about the risks involved. Finally, associations with science fiction did not increase, and awareness of the scale and unique properties of nanotechnology did not increase much.

Table 4. Categories and subcategories of associations with the term nanotechnology (N = 16)

Categories, Subcategories + example responses	% Pre	% New at Post
I. What nanotechnology is and what it involves as a science		
a. Microscopic or larger scale ; e.g., “tiny” “small”	25%	6%
b. Molecular, atomic scale ; e.g., “on the molecular scale”	6%	0%
c. Manipulation at small scale ; e.g., “alteration on the molecular scale”	6%	6%
II. Nanotechnology is in many scientific fields and applications ; e.g., “Nanotechnology is used in many areas currently in research. Nanotech can be used in many many fields that impact science.” “Very important in many fields, medical (most important), fuel and water.”	25%	50%
III. Nanotechnology is the future and the future is here now ; e.g., “Everywhere in the next couple of years. Sooner than I thought.” “Nanotech seems to be the wave of the future.”	0%	44%
IV. Positive affect ; e.g., “cool,” “fascinating” “really impressed”	6%	38%
V. Nanotechnology is both everyday and cutting edge		
a. Everyday; e.g., “solving modern everyday problems; “will be everyday technology”	0%	19%
b. Cutting-edge; e.g., “cutting edge research;” “high-tech” “breakthrough”	13%	19%
VI. Risks of nanotechnology ; e.g., “dangerous;” “concerned with safety”	6%	13%
VII. Science fiction ; e.g., “strong science fiction connection;” “truly sci-fi”	25%	0%

⁶ Tables 12, 13, and 14 in the Appendix present the pre and post verbatim responses for the categories of those who reported having “heard some,” “heard a little” and “heard nothing at all” about nanotechnology.

RESULTS: SEGMENTS OVERALL

After viewing each segment, respondents rated the segment on five-point scales. Table 5 presents the mean rating for the six segments. On average, viewers thought the topics were interesting, liked the segments, found the content generally clear, felt their curiosity was increased and learned a moderate amount. The sample was neutral in terms of the density of information they perceived in the segments. Liking a segment was highly correlated with topic interest ($r = .67$) and learning ($r = .59$); so appeal ratings increased as viewers felt their interest in the topic increase and their learning increase.

Those who had “heard some” about nanotechnology felt the segments’ contents were clearer than those who had heard “a little” or “nothing at all.”⁷ Those who visited the Museum of Science more than one year ago felt the segments increased their curiosity more than those who visited within the previous year.⁸

Table 5. Mean Ratings of Six Segments (N = 16)

	1	2	3	4	5	
Uninteresting topic	4.16					Interesting topic
Disliked the segment	4.03					Liked the segment
Generally confusing content	3.94					Generally clear content
Decreased my curiosity	3.91					Increased my curiosity
Learned nothing	3.84					Learned a lot
Too little information	3.16					Too much information

There were no significant differences between mean ratings of the two segments with no support feature (see Table 1) and mean ratings of the four segments with a support feature.

After viewing all six segments, half (50%) of the sample reported that it’s “very important” and half (50%) that it’s “fairly important” that a local newscast presents current science news like *Sci•Tech Today*. Also, more than half (56%) of the respondents said they were “more interested in visiting the Museum of Science,” more than one third (37%) noted “no change” in their interest in visiting, and 6% felt “less interested.” Segment impact on interest in visiting was not related to when viewers last visited the museum.

In group discussions after viewing the segments and answering the survey questions, the moderator asked which segment viewers remember the best and why. Intriguingly, no one segment was outstandingly memorable; all six were mentioned by individuals in each of the two groups.

⁷ $t(12)=2.538$ $p=0.0257$. Clarity mean of “heard some” group = 4.2; mean of “heard a little/nothing at all” = 3.5.

⁸ $t(10)=2.728$ $p=0.0204$. Curiosity mean of > 1 yr group = 4.1; mean of ≤ 1 yr group = 3.6.

There were four main reasons behind viewers' choices as to which segment was memorable:⁹

1) *Viewers noted that they could connect to the segment topic or were familiar with the topic; e.g.,*

"The desalination membrane, mainly because I deal with membranes, well, I used to deal with them in my job, and so I had the strongest connection to what he was talking about. It was the easiest to consider what they were trying to do."

"I think Lisa with the anthrax. . . . With my background in the post office, we have in our machines in Boston a way to detect if it has anthrax in it. So it is just something that interests me, like, they must be thinking that there are going to be more problems with it down the road."

"I liked the hydrogen. I just read an article about hydrogen fueling cars, and I know the crisis we're having, so I am not sure I understood everything he said, but that was very interesting to me, using hydrogen energy."

2) *In contrast, other viewers chose segments as memorable because they not know anything about the topic. The information they learned was surprising or novel; e.g.,*

"I liked the cleaning paintings. That was the one that I knew the least about, and it was explained very well, and I didn't know that they were able to do that."

"I liked the basic explanation about nanotechnology. I am familiar with the term but previously just from science fiction stories. And it was interesting to realize how deep a base it had in reality. I didn't know that."

"The stretchy one, the nano-tech, Spiderman stuff is really cool. I can imagine it going everywhere. They hit on several areas where it could go, but that is cool."

3) *Respondents also remembered best segments based on positive reactions to the presenters; e.g.,*

"I thought the one, which I can never pronounce, the water, the salt out of the water. I thought he was very good. I thought he was very enthusiastic and knew what he was talking about. I think he demonstrated, just using his hands how the process was going to happen, talked about it. I just like his presentation."

"I liked both of Lisa's because she was precise and concise. I thought she explained them pretty well, and she used props when necessary. She sort of just let us in, let the lay people in on the science behind all of this. So it made it more accessible to the people."

4) *Finally, viewers also chose those segments as memorable to which they had a strong negative response because they did not understand the segment content; e.g.,*

"The very first one. She was going all over the place and never really focused centrally and explained to you what she was talking about. She was, I don't know, just all over the place. I couldn't follow her."

"Lisa, on the cleaning one, the paintings. She lost me. She was, I just couldn't get it. Between the different products that they were using. And it just, she just sort of just rambled and rambled."

⁹ Note that the illustrative quotes are taken from both groups and not consecutive in a conversation, even though they may appear to be so.

Assuming that most of the sample would respond to the question above with the segment that they like the best, the moderator followed with a question about which segment was liked the least and why. There were three main reasons behind viewers' choices as to which segment was least liked:

1) *Viewers noted that they could not connect to the segment topic and did not become interested in the segment topic; e.g.,*

"I think for me it was the anthrax. For some reason, after 911, it was very prominent and worrisome, but I can't see who would want to get this vaccine. I mean, I just don't see it relating to me personally, so I wasn't that interested in it."

"For me, it was personal. I think the anthrax one, just because, for me, it doesn't have an everyday application."

"The least interesting one was the nanofiber fabric, simply because I don't think it warranted an entire segment. That's very interesting to a small portion of the population, but not to people in general. It doesn't fall in the same category of importance, to me, as hydrogen energy or anthrax vaccines."

"I didn't like the nanofiber one. I wasn't getting a connection to everyday, at all, in it, so I kind of drifted off. It wasn't something that I could think about how to use."

2) *Other viewers liked least those segments that were most confusing to them; e.g.,*

"Mine was probably the cleaning of the paintings because I didn't think it was clear enough. I would like to have seen the painting and see the gel put on a painting and taking off. Just that little tube with it moving, well how did it take it off the painting? I didn't think it was clear at all."

"Mine was the first one. Unfortunately, when they explained, I didn't get that at all...because I am visual, it was just all this information, and I couldn't make a picture of it. It was too much for me."

3) *Respondents also liked segments least based on negative reactions to the presenters; e.g.,*

"I actually think my least favorite was the introduction [segment 1]. I think it had to do with Amy, and it wasn't what I learned. I just didn't like her presentation."

"The nanofabric one. I just felt that she was struggling throughout the whole thing. The question and answers back and forth between the reporter and the presenter, it just didn't even seem like she could answer the reporter's questions."

In relation to both of these open-ended questions, both viewing groups brought up the issue of length of segment and depth of information. While they recognize the limitations of news television, they perceived that they needed more time to process the novel information they were hearing; e.g.,

"These are professionals, and they are not used to breaking it down for laymen, so I found that sometimes I was just losing track of what they were saying. I wrote in one of my comments that there is only so much you can do in the time that you are given and only so far that you can break complicated material down for a mass audience, so I don't fault them for that, but when it comes to television it might be offputting."

"Actually for all of them, it would have been nicer to have 6 minutes, as opposed to 3 minutes for information...The information that they pounded into the 3 minutes was, in some instances, to me, overwhelming."

The group discussions also considered whether there was anything in the segments that particularly helped them understand the content, including the specific support features of photo, demo, prop, and video. All agreed that the more you support the explanations visually on television, the more likely the audience will understand your segment.

- People noted, however, that verbal explanations could be effective if they included analogies or elicited images or were well-structured for the listener; e.g.,
 - “The hydrogen one, the way he described the panels. I don’t think there was a prop or anything, but just the way he described it. He used an analogy of a flat panel; that really, that worked for me.”
 - “Tim on his first segment had something about tubes, and he kept talking about the tubes, and that helped me because I was visualizing what it was rather than have an actual picture, and that even helped that he was doing that.”
 - “Even Tim, doing the water going through, and his palm was the permeating [sic]. It was just, it made a difference, even something like that helps...I thought Tim’s hands were as good as any photo or video.”
 - “I just thought the first segment, the basic nanotechnology gave me a very good overview, helped me separate fact from fiction. And I think it was interesting that she laid out that nanotechnology may very well be the next moral, legal battlefield in science, up there with stem cell technology. I am coming in a novice. I don’t know a lot about science, and I found the general overview very helpful.”
- Some respondents felt that the spider web photo in Nanofibers was not useful because “everyone knows what a spider web looks like;” on the other hand, the photo was valued by a few: “The fabric one, with the spider web, and showing that. I thought it was pretty fascinating that it was a protein. I thought that was nice to show it and explain it was a protein that they were trying to copy.”
- Those unfamiliar with “emulsion” were appreciative of the salad dressing prop, whereas those who already understood the concept felt it “took too long.”
- Most were supportive of using video and encouraged more; e.g.,
 - “The video for me in the cleaning, showed how the nanotechnology would be attracted to the magnet, and I wanted to see the other video that they talked about, which was the cleaning of the picture, which would have helped understand it even better. So for me it was video demonstration of how it worked. I could see the stuff move in the vial.”
 - “I thought the best demonstration was definitely on the nanogel and the magnet, showing how it moved. Trying to describe that would have been difficult. You could see very easily, very plainly in a few seconds there.”
 - “I think the visual aids are huge, especially with the magnets drawing, you could just really understand it more.”
 - “Because I am visual, I think because they had that visual aid [video], it was easy to follow. So even though she [Lisa] wasn’t my favorite presenter, that was my favorite one to watch.”
 - “I wish, for the fabric one, they had had a video showing how strong it could be, showing it being really stretched or holding something heavy, rather than just the spider web photo, which I agree was kind of not necessary.”

One group veered off into a tangent of what visuals distracted them from understanding the segment content, focusing on movement in the museum background:

M5: "I noticed somebody was walking in the background. They do that in the news all the time. I realized that I don't like that at all. On the news, I guess it gives you some feeling that they are up to minute getting the stuff. For this stuff with the Museum of Science, I didn't see any reason for anyone walking around in the background. Science is changing fast, but it is not so fast that you have to hand someone the update. I found that a little bit distracting."

M6: "I agree. I like a blank background."

M7: "I didn't get until the second or third segment that they were at the Museum of Science and that was a hallway. I thought they were in a news conference area. I don't mind people walking back and forth, because you are used to it on the news, as you said, but there I just saw some girl jump, and I thought, 'what is going on there?'"

M5: "I know. It was a scientific subject, and it is tough. You miss a beat, and you can be out of the whole conversation."

RESULTS: AMY SWINT'S SEGMENTS

In the order of the six *Sci•Tech Today* segments presented, Amy Swint's segments were viewed first (Nanotechnology Basics with no support feature) and fourth (Nanofibers, with photo).

Nanotechnology Basics [segment 1]

Ratings. Table 6 presents the mean ratings of the first segment viewed. Respondents indicated a high interest in the content and presentation but appeared to want more information and more clearly presented information to introduce them to this new topic of science.

Table 6. Mean Ratings of Nanotechnology Basics (N = 16)

	1	2	3	4	5	
Decreased my curiosity	4.50					Increased my curiosity
Disliked the segment	4.13					Liked the segment
Uninteresting topic	4.06					Interesting topic
Generally confusing content	3.56					Generally clear content
Learned nothing	3.56					Learned a lot
Too little information	2.81					Too much information

Half (50%) of our sample felt the science was “very relevant” to issues that concern them, 44% felt the science “fairly relevant,” and 6% responded with “not particularly relevant.”

Presenter. Viewers were asked what they liked or did not like about the museum presenter. The strengths and weaknesses were sorted into categories, as indicated below:

- Content explanation:
 - 56% liked the content explanation commenting that it was “concise, to the point,” “informative,” “used common everyday language,” and that Amy “seemed knowledgeable,” “well informed.”
 - 19% gave poor reviews on the presentation:
 - “Repeated herself, unclear as to how the technology affects consumer.”
 - “Talked too much compared to question rate.”
 - “Beat around the bush and said nothing, open with a clear explanation.”
- Speech:
 - 31% gave positive comments suggesting that Amy is “pleasant, articulate,” “personable,” “spoke clearly,” with “confidence.”
 - 13% felt “her speech/way of speaking not professional as expected for a Dr.” and she “talked too fast.”
- Tone
 - 19% thought Amy was “upbeat,” and “enthusiastic for the topic.”

- Appearance
 - 6% thought Amy “appears like a neighbor, trustworthy.”
 - 25% complained about the microphone as “somewhat distracting” and “odd.”
- Movement
 - 6% felt Amy’s “movement was somewhat distracting.”

Distractions. One-quarter (25%) of the viewers were bothered by the “busy non-related background, person waving.” Also, 13% noted that the weather, time and so forth at the bottom of the screen distracted them from Amy’s presentation. One respondent commented on the “lack of excitement from the reporter.”

Main messages. Viewers took away three main messages after viewing this segment:

- One-third of the sample noted that nanotechnology is a new and growing field with great future potential.
- One-third took away the message that nanotechnology has many applications.
- One-third of respondents interpreted the main message to be about the safety of nanotechnology and unknown potential risks. No one mentioned local legislation regarding nanotechnology.

Nanofibers [segment 4]

Ratings. Table 7 presents the mean ratings of the fourth segment viewed. Respondents revealed a moderate interest in the topic, although it did not foster their curiosity much. The amount of information was acceptable but could have been presented in a clearer and more appealing manner. This segment, in particular, uses a good deal of undefined jargon; e.g., “Spider silk has tiny nanocrystals throughout a rubbery polymer matrix made of strands of protein... disburse tiny discs of clay throughout a rubbery polyurethane polymer, a synthetic polymer...” Those who had “heard some” about nanotechnology felt this segment content was clearer than those who had heard “a little” or “nothing at all.”¹⁰

Table 7. Mean Ratings of Nanofibers (N = 16)

	1	2	3	4	5	
Uninteresting topic	3.63					Interesting topic
Generally confusing content	3.56					Generally clear content
Disliked the segment	3.38					Liked the segment
Decreased my curiosity	3.31					Increased my curiosity
Learned nothing	3.31					Learned a lot
Too little information	3.0					Too much information

Only 19% of our sample felt the science in this segment was “very relevant” to issues that concern them, 50% felt the science “fairly relevant, 25%, “not particularly relevant,” and 6%

¹⁰ $t(12)=3.319$ $p=0.0061$. Clarity mean of “heard some” group = 4.2; mean of “heard a little/nothing at all” = 2.7.

chose “not at all relevant.” The relevance rating is significantly associated with the learning rating in Table 7.¹¹ As ratings of relevance increased, so did ratings of learning.

Presenter. Viewers’ descriptions of what they liked or did not like about the museum presenter were sorted into categories, as indicated below:

- Content explanation:
 - 56% liked the content explanation commenting that it was “professional and clear,” “very informative, clear, nice presentation,” “clear and interesting” and that Amy was “knowledgeable.”
 - 31% voiced confusion about the content explanation; e.g., “Presenter seemed to pop from one issue to the next, was confusing to follow.” “It began interesting but quickly became too much to follow.” “I liked what she thought the fibers could do but was lost in her explanation of how these would be made.” “She kind of lost me.” “Going around in circles.”
- Tone
 - 12% thought Amy was “happy,” and “seems enthusiastic about her work, which drew me in.”
 - 6% commented on her “bland delivery at times.”
- Movement
 - 12% felt Amy had “too much body movement,” “kept nodding her head.”
- Appearance
 - 6% disliked Amy’s “casual appearance.”

Distractions. Two people commented on issues that bothered them: “a person walking in the background” and “lighting and color seemed off kilter on museum side.”

Support feature. This segment twice showed a photo of a spider web to support the presentation. Viewers commented on how using a photo affected their understanding of the segment’s content:

- 44% did not feel that the photo helped their understanding; e.g., “Didn’t think they were very clear or helpful, her explanation was better.” “Didn’t appeal to me or help me understand the subject.” “Felt presenter made segment content clear. Photo not as clear.” “By the time of the photo I’d already lost interest because of too much info.”
- 31% did not feel the photo was helpful because a spider web is already familiar; e.g., “Most of us know what a web looks like.” “Photo did not help as we just saw a web.” “Just remember a photo. It was slightly helpful, but I know what a spider web looks like.” “Not very much. Photo was nice, but we have all seen webs before.”

¹¹ A 4 x 3 chi-square test indicated that the relationship between relevance and learning was significant, $\chi^2(6, N=16)=14.24, p=0.0271$; however, our sample is small making this test result somewhat unreliable.

- 13% felt that different photos would be more appropriate to illustrate the talk:
 “Helped visualize the content, but different photos would be useful to show progress of actual nanotech, not same photo.”
 “Photo was helpful. It would be better to use a second photo when discussing the small beads on the web instead of using the same photo again.”

Main messages. Viewers described two main messages after viewing this segment:

- Two-fifths of the sample noted something along the lines that researchers are trying to make a new material that will replicate the strength and flexibility of spider web material.
- One-third focused on the message that the new material will have many applications including clothing, military and medicine.

The remaining respondents (25%), who also rated the segment low in clarity, described other less mainstream ideas:

- “Thought segment was going to be about membranes but felt segment had more to do with clay.”
- “That this technology will not affect me in my daily life.”
- “Nanotechnology is being heard more often in these segments.”
- “Do not know, maybe spider webs.”

Presenter Style. As the groups discussed presenter style, they simultaneously considered clarity of content with style. Difficulties in understanding Amy’s segments influenced responses to her “style” of presentation; e.g.,

- ““I thought Amy was a little sort of, a bit stand-offish, sort of ‘I’m brighter than you are.’ Sort of didn’t understand that not everyone understands what you are talking about.”
- “Both of her presentations, neither one, I didn’t think, was very good presentation wise. The content was good. She didn’t seem very excited about any of her topics.”
- “She seemed to be scripted...I didn’t even get the feeling that, she is a scientist so she probably does know exactly what she is talking about, but I almost get the feeling that she was just giving this information, and to me it meant nothing.”
- “My order of preference of presenters was Amy tops ...she was smiling, right off the bat. Happy, appeared excited about the field that she was describing.”

References to local research organizations. As part of the groups’ discussion, the moderator asked if anyone recalled anything being said about local Massachusetts’ research organizations. At least one in each of the two groups recalled mention of a Massachusetts’ institution. When asked if reference to a local research group made them feel more connected to the story, all but one of the not-college-educated group agreed; e.g., “In one of my answers [on the survey], I put down that it is happening here in Massachusetts, so that came across. California does what they want, but when it is happening here, I pay more attention.” In contrast, the college-educated group was not so influenced, with five of the eight saying being local had no effect on them.

RESULTS: TIM MILLER'S SEGMENTS

Tim Miller's *Sci•Tech Today* segments were viewed second (Hydrogen, with no support feature) and fifth (Desalination, with demo).

Hydrogen [segment 2]

Ratings. Table 8 presents the mean ratings of the second segment viewed. Respondents showed a high interest in the topic and presentation, and they felt the content was clear and informative. In terms of density of information, this segment was rated as slightly towards the end of “too much.” Those who visited the Museum of Science more than one year ago felt this segment increased their curiosity more than those who visited more recently.¹²

Table 8. Mean Ratings of Hydrogen (N = 16)

	1	2	3	4	5	
Uninteresting topic	4.31					Interesting topic
Disliked the segment	4.19					Liked the segment
Decreased my curiosity	4.19					Increased my curiosity
Generally confusing content	4.13					Generally clear content
Learned nothing	4.13					Learned a lot
Too little information	3.38					Too much information

One-third (31%) of our sample felt the science was “very relevant” to issues that concern them, and 68% felt the science was “fairly relevant.”

Presenter. Viewers described what they liked and did not like about the museum presenter, as follows:

- Content explanation:
 - 63% liked Tim’s content explanation, describing him as “very clear, knowledgeable;” “clean, concise, knew his topic;” “knowledgeable, tried to relate topic to average viewer so I could feel it applied to me.”
 - 38% had more difficulty with the explanation; e.g., “Not the level for the ordinary person.” “There was too much information, did not get any connection to nanotechnology.” “Too technical at times.”
- Tone
 - 50% thought the presenter conveyed his “passion” for the topic and was “relaxed” and “friendly.”

¹² $t(7)=2.935$ $p=0.0203$. Curiosity mean of > 1 yr group = 4.5; mean of ≤ 1 yr group = 3.6.

- Appearance
 - 25% did not like Tim’s casual appearance and microphone; e.g., “open tie looked sloppy;” “did not like the mic piece.”
- Speech
 - 19% were concerned about Tim’s speech; e.g., “Had sentences that he had to start over. Begins to appear like an unprofessional, unreliable source.” “Sounded scripted...said ‘uh’ a lot;” “Talked too fast.”
 - 6% liked that Tim “spoke clearly.”

Distractions. Two people were bothered by the NECN anchor’s behavior: “NECN reporter did not seem prepared and not able to converse with museum person;” “lack of interest from news anchor, had a bored look on her face, looked like she just wanted the segment to be over.” One viewer felt distracted by “the lite [sic] in the top left corner.”

Main messages. Viewers took away three main messages after viewing this segment:

- One-third suggested that using nanotechnology will help produce hydrogen for use as a fuel.
 - One-third noted that hydrogen can be an alternative fuel but did not mention nanotechnology’s role in its development or potential.
 - One-fifth took away the idea that people are looking for/working on alternative fuels.
- And one viewer (6%) was unable to describe a main message.

Desalination [segment 5]

Ratings. Table 9 presents the mean ratings of the fifth segment viewed. Respondents liked this segment and its topic very much. They felt the content was clear, informative and stimulated their curiosity, but slightly too much information was presented. Those who visited the Museum of Science more than a year ago rated this segment as more appealing and this topic as more interesting than those who visited more recently.¹³

Table 9. Mean Ratings of Desalination (N = 16)

	1	2	3	4	5	
Disliked the segment	4.63					Liked the segment
Uninteresting topic	4.50					Interesting topic
Generally confusing content	4.44					Generally clear content
Decreased my curiosity	4.40					Increased my curiosity
Learned nothing	4.25					Learned a lot
Too little information	3.31					Too much information

¹³ $t(7)=2.639, p=0.0329$, Appeal mean of > 1 yr group = 4.8; mean of \leq 1 yr group = 4.2.
 $t(7)=4.346, p=0.0032$, Topic interest mean of > 1 yr group = 4.8; mean of \leq 1 yr group = 3.8.

One-half (50%) of our sample felt the science was “very relevant” to issues that concern them, and the other half felt the science was “fairly relevant.” The relevance rating is significantly associated with the learning rating in Table 9.¹⁴ Higher ratings of relevance related to higher ratings of learning.

Presenter. Viewers’ written responses about what they liked or did not like about the museum presenter were sorted into categories, as indicated below:

- Content explanation:
 - 56% liked Tim’s content explanation, describing it as “clear and concise;” “clear, concise, presented info very well. He really increased my interest in the subject.”
 - 6% felt that Tim got “a little too technical.”
 - 6% felt the explanation “seemed too cursory.”
- Speech
 - 31% wrote positive comments about Tim’s speech patterns; e.g., “liked his voice;” “liked that he had a strong voice;” “his speech pattern was easy to follow.”
- Tone
 - 25% thought the presenter was “friendly,” “comfortable,” and showed “his enthusiasm about the subject.”
- Demo
 - 25% liked Tim’s demonstration technique; e.g., “prop and hand gestures using his fist against his hand to represent pump vs. membrane;” “great use of props including his hand.”
- Appearance
 - 19% commented that Tim “looked professional” and “appeared neat.”

Distractions. Two people were distracted by the NECN anchor’s behavior: “NECN reporter not looking at screen;” “at one moment they showed the anchor who appeared distracted and that could cause a viewer to also lose interest by association.” One viewer was bothered by “the lights in the top left corner.”

Demo. This segment showed boiling red water changing to clear water to illustrate a thermoprocess technique of desalination. Viewers commented on how using demonstrations affected their understanding of segment content:

- 63% felt the demo aided their understanding; e.g.,
 - “Demos are always helpful to me when dealing with tech (esp when presenter must get point across within limited time frame)”
 - “Reminded me of my chemistry class. It helped me understand.”
 - “Helped show current method. Simplistic yet just enough to remind you what distillation is.”
 - “Helped me understand what he was talking about. knew process but was lost when he gave the technical name of that process (then proceeded to show that process).”
- 19% liked the thermoprocess demo but recommended a demo of the nano process, possibly not accepting Tim’s hand action for reverse osmosis as a demo for the nanotechnology

¹⁴ A 2 x 3 chi-square test indicated that the relationship between relevance and learning was significant, $\chi^2(2, N=16)=9.50, p=0.0087$; however, our sample is small making this test result somewhat unreliable.

technique:

“Liked demo of current practice, needed demo of nano.”

“Loved demo. How about showing one of an osmosis system also.”

“Helped me see the easy old way but it was too costly, however this segment really dealt with the new way, should have had a demo of this.”

- 13% did not need the thermoprocess demo:

“I didn't need it but it would help average viewer with the evaporation concept.”

“Demo of current process was not really needed. The demonstration with his hand and membranes was more helpful to main topic.”

Main messages. Viewers took away three main messages after viewing this segment:

- Two-fifths of the sample noted that nanotechnology is being used in desalination.
- One-quarter mentioned the idea of desalination without noting nanotechnology's role.
- One-fifth took away the idea that researchers are working on ‘water filtration.’

Two viewers (12%) suggested that nanotechnology can solve ongoing world problems.

Presenter style. In their discussion, groups were asked about presenter styles. They frequently overlapped style with clarity of message. Both groups were very supportive of Tim's presentation “style,” e.g.,

“He just seemed very comfortable in talking about it and I could relate to him. He seemed to want to reach lay people; even those parts of it that were a bit too technical for me. I just liked the way he presented things. It was clear as he could be. Had good examples.”

“Tim definitely had a better sense of using technical words and then being able to explain them very quickly in a way that people would understand it. So, I thought that was a good way to pull people in.”

“I thought Tim was technical, yet he was very casual and he pulled you in, brought you into it.”

“The segments with Tim seemed to move along, and they didn't just get stuck on something that was more or less obvious [like emulsion, which this respondent noted earlier].”

“He was almost like another reporter, almost. He was professional. He sounded like he knew what he was talking about but wasn't making it sound too dumb for the average person.”

“I liked Tim, because I felt he was down, not at a professional level, so people could understand the concept. I really felt he put it across much better.”

“He has a good strong voice. He just seemed like a guy that you could talk to regularly. He seemed to explain things to the common man.”

“I also found Tim very enthusiastic about what he was talking about. He sort of had a vested interest in this. And that also sticks out that he enjoyed doing this, he enjoyed talking about this and that makes a difference when someone is presenting me something.”

RESULTS: LISA REGALLA'S SEGMENTS

Lisa Regalla's *Sci•Tech Today* segments were viewed third (Anthrax, with prop) and last (Cleaning art, with video).

Anthrax [segment 3]

Ratings. Table 10 presents the mean ratings of the second segment viewed. Respondents showed a high interest in the topic and presentation and felt the content was clear, informative and sufficient.

Table 10. Mean Ratings of Anthrax (N = 16)

	1	2	3	4	5	
Uninteresting topic	4.13					Interesting topic
Generally confusing content	4.00					Generally clear content
Disliked the segment	3.94					Liked the segment
Learned nothing	3.81					Learned a lot
Decreased my curiosity	3.75					Increased my curiosity
Too little information	3.19					Too much information

One-quarter (25%) of our sample felt the science was “very relevant” to issues that concern them, 56% felt the science was “fairly relevant,” 13%, “not particularly relevant,” and 6% “not at all relevant.” The relevance rating is significantly associated with the topic interest rating in Table 10.¹⁵ Higher ratings of relevance related to higher ratings of topic interest.

Presenter. Viewers were asked what they liked or did not like about the museum presenter. The strengths and weaknesses were sorted into categories, as indicated below:

- Content explanation:
 - 31% liked Lisa’s content explanation, describing it as “fairly straightforward;” “very informative;” “informative, prepared, good pacing.”
 - 31%, in contrast, felt that Lisa’s explanation was “a bit too detailed;” “too involved,” “had technical terms.”
- Prop
 - 38% liked the use of the prop; e.g., “presented ‘visual aid’ of the salad dressing smoothly;” “she illustrated her point with salad dressing that helped clarify one technical aspect of her presentation.”
 - 19% felt that Lisa’s emulsion explanation was “a little too much” or “too wordy.”

¹⁵ A 4 x 5 chi-square test indicated that the relationship between relevance and topic interest was significant, $\chi^2(9, N=16)=22.38, p=0.0077$; however, our sample is small making this test result somewhat unreliable.

-
- Tone
 - 31% thought the presenter was “friendly,” “at ease with topic and camera,” and “appeared to be very passionate about the subject matter.”
- Appearance
 - 13% commented on appearance noting “the microphone” and “too much jewelry.”

Distractions. One viewer felt distracted by “the lite [sic] in the corner.”

Prop. Viewers were asked how the prop of salad dressing affected their understanding of the segment’s content:

- 44% were quite positive and felt the prop helped them “a lot,” “a great deal.”
- 44% noted that the prop helped them understand the process; e.g., “it made her point more readily understood;” “somewhat helpful;” “helpful.”
- 13% did not need the prop: “I did not need it, distracting to me;” “already knew what an emulsion was, so felt it was too simplistic for me, but may help others understand it.”

Main messages. Viewers described three main messages for this segment:

- One-third noted that nanotechnology/nanoemulsion is involved in developing a better anthrax vaccine.
- One-third pointed out that the anthrax vaccine is being improved but did not mention nanotechnology’s role in its development.
- One-fifth took away the idea that nanotechnology is working in medical field.

One viewer (6%) described that anthrax is still a threat, and one (6%) stated that nanotechnology is protecting us from terrorists.

Cleaning art [segment 6]

Ratings. Table 11 presents the mean ratings of the final segment viewed. Respondents liked this segment and its topic very much. They felt the content was informative, clear, and sufficient.

Table 11. Mean Ratings of Cleaning art (N = 16)

	1	2	3	4	5	
Uninteresting topic	4.31					Interesting topic
Learned nothing	4.00					Learned a lot
Disliked the segment	3.94					Liked the segment
Decreased my curiosity	3.94					Increased my curiosity
Generally confusing content	3.94					Generally clear content
Too little information	3.25					Too much information

One-quarter (25%) of our sample felt the science was “very relevant” to issues that concern them, 50% felt the science was “fairly relevant,” 19%, “not particularly relevant,” and 6% “not at

all relevant.” The relevance rating is significantly associated with the learning¹⁶ and curiosity¹⁷ ratings in Table 11. Higher ratings of relevance related to higher ratings of learning and curiosity.

Presenter. Viewers described what they like and did not like about the museum presenter, as follows:

- Content explanation:
 - 56% liked Lisa’s content explanation; e.g., “clear, knew her topic and demonstrated process clearly;” “excellent explanations, good use of props and video, good camera presence, well paced and timed;” “very concise.”
 - 19% felt that Lisa’s explanation was “unclear” and had “too much info.”
- Tone
 - 44% thought the presenter was “friendly,” “at ease,” and “passionate about subject.”
 - 19% felt Lisa seemed “rattled;” “worried” “a bit too animated.”
- Photo
 - 44% expressed disappointment that the before/after photo was not shown.
- Appearance
 - 6% commented about Lisa’s “hair.”

Distractions. One viewer felt that the video was “too busy in the background.”

Video. This segment used a video to show iron nanoclusters reacting to a magnet. Viewers commented on how using the video affected their understanding of segment content:

- 31% were quite positive about the ferrofluid video; e.g.,
“Video was a great help in understanding this particular application of nanotechnology.”
“Very helpful.”
“Helped very much.”
- 38% noted that the video helped them understand the process; e.g.,
“Video was helpful and the most interesting section of that segment.”
“Video of how the magnet can move the iron nanotechnology was useful to understanding the topic.”
“Somewhat helpful because they showed how they can attract.”
- 6% did not feel that the video clarified their understanding:
“Not clear how it removed the gel.”
- 25% thought the “video” in the survey question referred to the missing before/after pictures.

¹⁶ A 4 x 5 chi-square test indicated that the relationship between relevance and learning was significant, $\chi^2(9, N=16)=21.14, p=0.012$; however, our sample is small making this test result somewhat unreliable.

¹⁷ A 4 x 5 chi-square test indicated that the relationship between relevance and curiosity was significant, $\chi^2(2, N=16)=23.02, p=0.0061$; however, our sample is small making this test result somewhat unreliable.

Main messages. Most viewers reported one main message after viewing this segment:

- Two-thirds noted that nanotechnology has developed a better/safer way to clean art. Two viewers (13%) pointed out that nanotechnology has many uses. Two viewers (13%) extolled the general benefit of science; e.g. “wonderful world of science.” One viewer (6%) was unable to respond because the presentation was “confusing.”

Presenter style. In discussing presenter styles, the groups overlap style with content clarity. Lisa was mentioned positively; e.g.,

“She came off as sort of, kind of, down to earth. She helped me understand it better and her using props, and her wanting to show videos at any opportunity during that time. That kind of struck me as something that was all right.”

“I liked the girl who did the anthrax. I liked the way that she talked with her hands and showed you with her hands what they were doing.”

“In her second segment, she was much more interesting, friendlier. She seemed to be able to talk to the camera better. She just seemed to explain it very well.”

“She was enthusiastic and sometimes enthusiasm is enough to draw me in and I will pay attention. Sometimes if you take a purely scientific, dry approach, you end up chasing people away from it. So I liked her presentation style.”

“For Lisa, she definitely had energy and definitely was personable and friendly, but I also felt like she was trying to sell it, like an infomercial.”

DISCUSSION

Viewers' responses to the *Sci•Tech Today* nano-topic segments on the whole were quite positive. They thought the topics were interesting and generally felt that the presentations were clear and informative. Based on the survey and group discussions, the following should be considered as you proceed to produce new segments.

- Topic choice. Across the six segments, the topic of nanotechnology was rated as interesting, but individual topics varied in their ability to elicit viewer interest. Viewers noted that they were interested in a topic both when they could connect to it and already knew something about the general subject but also when the topic was surprising or novel and they learned something. So, for example, anthrax as a topic was interesting to someone who worked in the post office but less so to others, whereas hydrogen as an alternative fuel was interesting to most viewers because everyone is experiencing the fuel crisis. The topic of cleaning paintings was not so much interesting because people could connect to it in their everyday lives but was interesting because the solution to the problem was surprising, novel or unexpected. Yet even though the combination of rubbery and strong might be novel, the nanofiber topic was not interpreted as relevant to everyday concerns when presented through military applications. Additionally, it is important for presenters to choose topics that they are excited about themselves and able to present clearly; viewers noted what they interpreted as presenters' passion for and knowledge about the topic.
- Clarity of presentation. The clarity of presentation can make or break an interesting topic. Nanofibers could have been considered an interesting topic if the presentation had stayed at the level of the lay viewer instead of moving into scientific jargon of "nanocrystals" and "polymers." Viewers liked least those segments that were most confusing to them; however, most of the presentations managed to communicate at the level of the uninformed viewer. Those without a college education or without a familiarity with nanotechnology did not feel significantly overwhelmed by the presented information. However, the fact that viewers described more than one main message in a 3-minute segment suggests that segments could be more focused. And the fact that viewers described main messages without mentioning nanotechnology's role suggests that there need to be closing statements reinforcing that role. Meeting both of these suggestions is obviously difficult in a live back-and-forth newscast.
- Support features. Everyone agreed that the more you support the explanations visually -- whether with hands, props, demos, photos, or videos -- the more likely the audience will understand the information. Viewers did not feel that the appeal of the segment was influenced necessarily by these support features but that clarity of communication was. On the other hand, a visual can be a negative if it is seen as not contributing to learning, like the twice-shown spider web photo in Nanofibers. In addition to visuals, viewers appreciated the use of verbal analogies and explanations that helped them conceive an image for themselves.

- Presenters themselves. When asked to discuss the museum presenters, viewers initially focused on the content explanation and the clarity of the segment message. All the presenters received positive comments about professionalism, passion, confidence, friendliness, and so forth, but being concise, clear and using everyday language won the day for a segment.
- Distractions. The viewers learned that *Sci•Tech Today* segments are a product of the Museum of Science by the reporter's introduction, onscreen captioning, and the reporter's close. The background of moving visitors did not add significantly to viewers' understanding that the interview is occurring live at the museum but instead created a distraction from the main science story and an annoyance for some. Additionally, viewers were initially distracted by the presenters' head mic.
- Local interest. The non-college educated group, in particular, felt they would pay more attention to a presentation that had a local flavor; however, the college-educated group was neutral. To the extent that there is interesting and easily communicated work going on in the six-state area to which NECN is broadcast, then local flavor will be a plus for the segments.

APPENDIX

Table 12. Associations with the term nanotechnology by those who “heard some” (n = 9)

Previewing Responses	Postviewing Responses
<p>MALE:</p> <p>1) Micromachinery, alteration on the molecular scale, strong science fiction connection - as method for internal medical modifications</p> <p>2) Previously I believed nanotechnology to be pure science fiction. I am aware that research is being done, but I am unaware of any results of that research.</p> <p>3) Science fiction, computers, medicine</p> <p>4) What is it? How used? How small? Who is studying it?</p> <p>5) Cool, dangerous</p> <p>6) I don't know</p> <p>7) I don't know</p>	<p>1) Processes that deal with the nanoscale; currently starting to be used in many areas of cutting edge research; soon may see many products resulting from such research.</p> <p>2) I was not aware of all the applications for nanotechnology. These segments have greatly increased my awareness of nanotechnology, as well as my interest in the subject.</p> <p>3) Science fact. I was truly unaware that nanotechnology was that involved in solving modern everyday problems. NT is alot more than med+sci applications. I am truly encouraged by all the work being done in this field.</p> <p>4) Nanotechnology is used in many areas currently in research. Nanotech can be used in many many fields that impact science.</p> <p>5) Everywhere in the next couple of years. Sooner than I thought.</p> <p>6) Nanotechnology is an important part of our future, will be the most influential science in creating new breakthroughs.</p> <p>7) The technology in developing tiny particles used in processes in science + developing use for everyday life. Amazing that particles this small can be regulated & developed into consumer ready products.</p>
<p>FEMALE:</p> <p>1) Tiny particles, chips, precision</p> <p>2) High-tech, miniature, small</p>	<p>1) Interesting, useful, practical applications, functional, accessible, suspension/emulsion, microscopic, high tech, modern, cutting edge</p> <p>2) This technology will be everyday technology, beyond small, the 'future' is here now.</p>

Table 13. Associations with the term nanotechnology by those who “heard a little” (n = 2)

Previewing Responses	Postviewing Responses
<p>MALE:</p> <p>1) What breakthrough in technology has made nanotechnology research possible? computers, small (super small), what are the uses? Who is leading the field? Will it be used for medical research?</p>	<p>1) Not just medical.</p>
<p>FEMALE:</p> <p>1) I don't know.</p>	<p>1) Nanotech seems to be the wave of the future but as stated in the intro, I wonder about the long term effect of new technology, yet its possibilities seem endless, esp in medicine.</p>

Table 14. Associations with the term nanotechnology by those who “heard nothing at all” (n =5)

Previewing Responses	Postviewing Responses
<p>FEMALE:</p> <p>1) Nano sounds like something from Star Wars.</p> <p>2) I don't know.</p> <p>3) I don't know.</p> <p>4) I don't know.</p> <p>5) I don't know.</p>	<p>1) Fascinating – truly scifi. I loved the varied ways that nanotechnology is being used. How would it be used in the medical field in the human body. It was alluded to but not explained. I would have liked to see the desalination being done. The taking of hydrogen from water was good. This was a very interesting topic.</p> <p>2) Nanotech is a whole new world. Amazing how this field can impact so many different topics/needs in our world. Really impressed. Somewhat concerned with safety, but don't feel I'm very knowledgeable about it.</p> <p>3) Nanotechnology now has a face. Very important in many fields, medical (most important), fuel and water.</p> <p>4) After the viewing, I realized that nanotechnology is involved in so many areas and may be useful in the future.</p> <p>5) Information supplied was for a classroom NOT segment info.</p>