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Program Evaluation • Consultation • Market Research

NOVA scienceNOW Season Two Summative Evaluation

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EXECUTIVE SUMMARY

WGBH received funding in 2005 from the National Science Foundation and the Howard Hughes Medical Institute, among others, for the production of NOVA scienceNOW (NSN), a science news and magazine television series airing five times a year. In addition to the TV series, WGBH has also developed the following:

- a companion Web site for the show, which features individual segments from each show that can be streamed for viewing in multiple formats;
- a series of high school classroom activities that focus on biomedical science; and
- a Science Café outreach initiative, designed to discuss, in non-academic environments, the latest developments in science

All NSN offerings share the common goals of (a) increasing public awareness and understanding of cutting edge science content, and (b) increasing public engagement in science-related activities.

Goodman Research Group, Inc. (GRG), a research firm specializing in the evaluation of educational programs, materials, and services, has served as the summative evaluator of NSN for both the first and second seasons. This summary presents the methods, key findings, and recommendations from the Season Two evaluation.

METHODS

To evaluate the series, GRG conducted a pre-post study with 65 viewers who watched the first two episodes from Season Two. Fifteen of the 29 participants from the Season One evaluation (63%; referred to as Follow-Up Viewers) completed a brief survey to measure whether they had continued to watch the series and the extent to which they had continued to engage with NSN content.

Thirteen teachers completed the classroom activity study in which they used two Season Two bioscience activities with their students and then provided feedback about the activity. A total of 329 students participated in a pre-post study of the activities. Four of the five teachers from the Season One evaluation were also surveyed to learn their long-term use and impressions of the activities.

The Web site was evaluated through a survey of 794 visitors. Several months after completing this initial evaluation, a sub-set of visitors from both seasons' evaluations (752 of 1,122 (67%); referred to as Follow-Up Visitors) completed a survey to document their continued interactions with NSN and other science content.

Each of the three key groups of informants evaluated the Science Café. Attendees (n=149) reported how the cafes had influenced them. Café Organizers (n=20; 74%) and Scientists who had served as Café presenters (n=51; 58%) provided both formative and summative feedback.

KEY FINDINGS

The Series

NSN presents information in a way that is accessible to viewers. Respondents believe that the program is successful in making science content approachable for all viewers. They found each episode's content to be very or extremely clear overall, and more than 90% rated the series content as either *fairly easy* or *very easy* to understand.

Science content knowledge increases as a result of watching NSN, and knowledge gains remain over time. Viewer Study participants believed that they had learned information about each topic featured in NSN, and the majority were able to provide one fact they had learned about each story several weeks after viewing. Furthermore, their knowledge of overall content and content in each episode significantly increased. The Follow-Up Survey results demonstrated that these types of gains persist over a two year time period.

NSN is effective at encouraging viewers to continue interacting with science. Most Viewer Study participants had completed at least one activity to extend their engagement with science as a result of watching NSN. The results from Follow-Up Survey showed that viewers continued to engage with this content.

The topics featured in NSN often lead to later conversations with friends, family, or colleagues. During the three month Viewer Study, almost all participants discussed at least one NSN topic with a friend, family member, or colleague. Results from the Follow-Up Survey indicated that these types of conversations are likely to continue after the evaluation has ended.

NSN programs include a mix of both familiar and new topics. While respondents had heard news stories about some NSN topics in the past or seen other TV programs that featured NSN topics, in most cases NSN was the first time that viewers had learned about or watched a program about the topics featured.

Viewers find NSN highly appealing. Almost all rated the series as either *very good* or *excellent*,. The visual appeal, the presentation, and the learning that results from watching were also rated positively. Follow-Up Viewers also reported the appeal of the program by stating the positive qualities that had encouraged them to continue watching.

Viewer Study participants responded positively to NSN's new host, Neil deGrasse Tyson. Most respondents felt he was a consistently good host across the two episodes viewed. They also gave positive feedback about the Cosmic Perspective in which he provides commentary and a broader perspective of how each show's topics fit together.

The Classroom Activities

Students' knowledge of science content increased as a result of participating in the NSN activities. Students believed that they learned *more* or *about the same amount* from NSN activities compared to typical science activities. Their increase in activity-related content knowledge was statistically significant.

Interest in both biomedical topics and careers were positively influenced by the NSN activities. While most students were already interested in biomedical topics prior to using the NSN activities, many also became more interested in these topics after using the activities. Students showed a statistically significant increase in their interest in biomedical careers after using the activities.

NSN activities encouraged students to continue engaging with science content. As a result of completing a NSN activity, most students had a conversation with either a friend or family member, or read a newspaper story about a NSN topic. Most students also planned to complete at least one additional activity in the future.

Teachers believe that NSN activities are comparable to or slightly better than typical science activities. Season Two Teachers believed that students' level of participation in, enjoyment of, and learning from NSN activities was equal to or greater than with typical activities, although students seemed equally or more confused and frustrated. Teacher said their preparation time was comparable to that of other activities. At the time of the Follow-up, all four teachers had continued to use NSN activities and all four had recommended the activities to colleagues.

NSN activities were used primarily to enhance existing science topics featured in a curriculum rather than to add new and related topics that aren't already covered in the curriculum. The majority of the teachers used each activity to enhance their curricular content. Obesity was used with curricular topics such as the endocrine system, genetics, and diet and nutrition. The Flu activity was used to enhance curricular topics such as the 1918 flu, viruses, and the relationship between seasonal change and illness.

The Web Site

The NSN Web site attracts both traditional and non-traditional visitors, and has a loyal following. Approximately half of visitors to the NSN Web site were aged 35 or younger, a demographic known to be a difficult age group to reach through science programming. Visitors also included both first-time and regular visitors to the site, as well as those who had watched the NSN program and those who had not. Regardless of demographic, many respondents reported that they visit the site regularly, plan to return to the site, and would recommend the Web site to others.

The NSN Web site is effective at encouraging visitors to continue engaging with science. Season Two Survey respondents indicated that they planned to do several NSN-related activities as a result of visiting the site. First-time visitors

indicated that the site had increased their interest in continuing to watch the program *a great deal*. The Follow-Up Survey confirmed that visitors continued to engage with NSN content after leaving the site.

Parents and teachers use NSN as a way to engage with children about science. Parents who participated in the Season Two survey said that they planned to direct their children to the NSN Web site, and the majority of teachers reported that they will recommend the site to their students. Most parents and teachers who completed the Follow-Up Survey had engaged in at least one NSN related interaction with their children/students.

Television broadcasts bring many visitors to the Web site. Broadcasts motivate people to visit the Web site in many ways, such as following up on a topic featured in the episode, or in order to see part of the show they missed, or because the recent broadcast piqued their interest in seeing which topics and features the site had to offer. They also came to the site because they had missed an entire show.

Visitors like the NSN site, are particularly interested in being able to watch the program online, and would like more of these features added to the site. Watching the program online was listed as the favorite aspect of the site, the biggest benefit of the site, and the primary reason people will visit again. Over half of the Follow-Up Visitors had been back to the site to watch additional segments since completing their initial survey. The most often cited request for changing the Web site focused on adding more video segments.

Web site visitors respect and trust the information provided on the NSN Web site. Visitors reported that one of the greatest benefits of the NSN site is the information that it provides. Many came to the Web site because they were looking for particular information, and over half reported that they will visit the site again to help them learn, teach, or stay up to date on science news.

Visitors were pleased with the level of detail included in NSN features. Almost all NSN Web site visitors found the information they wanted on the site. Similarly, at least half of the visitors felt the detail in the interactive features, interviews and articles, and Pod casts was *just right*.

Feedback about the organization of the NSN site was mixed. The organization of the Web site received both positive (16%) and negative (11%) ratings. Visual appeal of the site was high and some visitors found it very user friendly and easy to navigate. Others had a difficult time navigating the site or wanted to have more video viewing options.

Stories that feature topics related to *health and bioscience* as well as *physics and space science* are of interest to Web site visitors. Seven of the top ten stories viewed by survey respondents featured topics related to these two categories. These categories also represented the stories that respondents were most interested in watching on a return visit to the site.

The Science Cafés

People attend Science Cafés because they are interested in the topics covered and enjoy having the opportunity to interact with a Scientist. Organizers reported that the topics covered and Scientists featured are the primary reasons that attendees return to their Science Café. Follow-Up Attendees also reported that these were the primary reasons that they chose to attend.

Cafés were viewed as beneficial by Organizers and Scientists alike. The majority of the Organizers who have hosted a NSN Café considered the use of NOVA scienceNOW video to be *very good* or *excellent* at engaging audiences, providing background information, setting the mood, and encouraging audience involvement. The vast majority of Scientists surveyed said would present at a Science Café again, and some noted that the experience had changed how they think about presenting to the general public.

Science Cafés encourage Attendees to continue pursing science topics. The vast majority of Follow-Up Attendees reported that they had completed at least one activity related to a Café topic after attending an event.

Organizers and Scientists are interested in the resources that will be available on the WGBH Science Café Web site. Café Organizers were particularly interested in a logistical checklist for organizing a Café, a guide to starting a Café, and a list of other Cafés in the United States. Scientists' top choices were a list of tips for engaging Café audiences, tips for working with the general public, and an introduction to the Café environment.

Organizers and Scientists suggest that Science Café presentations be interactive in nature and provide direct contact between Scientists and Attendees. Organizers recommend dynamic presentation formats and some forbid lecture or PowerPoint presentations at the Café. While most Scientists surveyed did use lecture or PowerPoint for their presentation, many suggested that they would change future presentations to be more interactive. Both groups recommended that Q and A sessions be included in Cafés.

An important next step for the Science Café movement is reaching out to new audiences. Organizers and Scientists agree that the Café format is effective for engaging members of the public who attend events, but that most attendees have an existing interest in science. Both groups believe that the Café format will be more effective at engaging the public in science if they reach out more.

CONCLUSIONS AND RECOMMENDATIONS

The results from this report indicate that each component of the NSN initiative has been successful at meeting its stated goals. As in Season One, each Season Two component has (a) increased the audience's awareness of a topic, and/or (b) increased their audience's knowledge of science topics. Further, results showed that NSN has been effective at increasing public engagement with science; people continue to pursue NSN topics on their own after experiencing one of the program's offerings.

Moreover, the various NSN offerings allow the initiative, as a whole, to reach different audiences. **The series** reaches both the traditional NOVA viewership and a slightly younger audience. **The Web site** also reaches a younger audience than that typically engaged with science; in addition, it reaches people who do not watch TV and who prefer online program viewing. Parents and teachers use the program and Web site as a way to interact with youth about science. The NSN **bioscience classroom activities** reach high school students who report that they do not typically watch NOVA programming. Finally, the **Science Cafés** reach a younger audience and more females compared to those who typically engage with science programming. This multi-pronged approach maximizes the reach of the NSN program. ***GRG's primary recommendation is that WGBH continue producing each offering in future seasons. Further, we recommend that the general formula for each remain unchanged.***

Based on the results from both the evaluation of the series and the Web site, ***GRG recommends that WGBH continues to include stories on physics/space science and health/bioscience in future seasons.*** These types of stories received the highest ratings in both the Viewer Study and Web site survey, and were considered most personally relevant and of most interest to Viewers. Based on audience interest in space science and the positive feedback received about his skills as host, ***GRG recommends that Neil deGrasse Tyson continue to host the program in Season Three.***

Web site visitors appreciate being able to watch the program online, and want more of these options. ***GRG recommends that the WGBH team: (1) continue to develop new clips related to NSN topics, and (2) add full-segment viewing to the site***. These actions should increase the amount of video available to visitors and the number of viewing options, without sizeable extra production costs. If WGBH's budget allows only one of these steps to be taken, GRG suggests that WGBH pursue the first rather than the second recommendation.

The bioscience classroom activities developed by the NSN team were successful in increasing students' content knowledge, interest in biomedical careers, and continued engagement with science content. ***GRG recommends that the NSN team continue to follow the model they use for developing bioscience activities.***

The results from this evaluation support WGBH's role in the Science Café movement. ***GRG recommends that WGBH use the formative feedback provided by Organizers and Scientists to help develop the Science Café Web site. GRG also recommends that WGBH take the lead in developing strategies that can be used by Café Organizers to increase the reach of the Science Café movement.***

Finally, this evaluation has demonstrated how different offerings from the same initiative can bolster one another. Visitors to the Web site, for example, visited primarily to watch program segments or to learn more about a topic they had heard about through the program. The bioscience classroom activities and a sub-set of Science Cafés also reinforced the program by building on NSN segment content. This intersection of initiative offerings provides the general public with multiple ways to continue engaging with science, in general, and with NSN topics, in particular. ***GRG recommends that the WGBH team continue to***

explore new ways to create synergy between initiative offerings as a way to leverage and perpetuate the influence of NSN on the public.

INTRODUCTION

In 2005, WGBH received funding from the National Science Foundation and the Howard Hughes Medical Institute, among others, for the production of NOVA scienceNOW, a science news and magazine show. In addition to the television series, WGBH has also developed a companion Web site for the show, a series of classroom activities that focus on biomedical science, and a Science Café outreach initiative. All NOVA scienceNOW offerings share the common goals of (a) increasing public awareness and understanding of cutting edge science content, and (b) increasing public engagement in science-related activities. Each component is described below.

- The NOVA scienceNOW **series** airs five times per year, and highlights the latest developments in science by featuring several short science segments per episode. The first season of the series aired in 2005 and 2006. Season Two began airing in October 2006 and is continuing in 2007.

- The NOVA scienceNOW **Web site** features individual segments from each show that can be streamed for viewing in multiple formats. Reading material, interviews and Q and A's with scientists, interactive features, podcasts, and links to related resources are also provided. The Web site is updated after each new episode to provide visitors with the latest NOVA scienceNOW stories as well as additional information about each segment topic.

- As in Season One, the Season Two NOVA scienceNOW **classroom activities** were designed for high school science teachers to use as a way to extend the content featured in the biomedical science segments from the broadcast. Activities are available online through the NOVA science NOW Web site, and new classroom activities are added to the site with each new episode.

- The final component of NOVA scienceNOW is the **Science Café** outreach initiative. NOVA scienceNOW Science Cafés are hosted around the country and based on Café Scientifique, which began in the UK in 1998. Science Cafés gather groups of people in non-academic environments such as a local bar or café to discuss the latest developments in science. Each NOVA scienceNOW Science Café features a local scientist presenting information on his or her latest work.

EVALUATION

Goodman Research Group, Inc. (GRG), a research firm specializing in the evaluation of educational programs, materials, and services, has served as the summative evaluator of NOVA scienceNOW for both the first and second season. During the first program year, GRG evaluated the series, Science Cafés,

and classroom activities. In this second year of the program, GRG continued to evaluate these three offerings and focused on the Web site as well.
For the series, GRG's evaluation focused on the first two episodes from Season Two. The purpose of the evaluation was to:

- provide additional feedback about NOVA scienceNOW,
- measure the effectiveness of NOVA scienceNOW at increasing understanding of cutting edge science topics, and
- measure the effectiveness of the series at increasing engagement with science-related activities.

GRG's evaluation of the Web site was designed to gather information about how the site was used, to learn visitors' impressions of the site, and to determine the extent to which the site encouraged visitors to continue engaging with science-related activities.

The overall goal of GRG's classroom activity evaluation was to assess the usefulness and educational influence of the lessons on teachers and students. More specifically, the purpose was to:

- assess short-term change in student attitudes, interest, and knowledge as a result of taking part in NOVA scienceNOW classroom activities, and
- gather information from teachers about their use and perceptions of NOVA scienceNOW activities.

GRG's evaluation of the Science Cafés focused on three key groups of informants: Café Organizers, Scientists who had served as Café presenters, and Café Attendees. Summative feedback about the influence of the Cafés on the public was gathered from all three groups. Attendees also reported how the Cafés had influenced them. Café Organizers and Scientists also shared the lessons they have learned from their Café experiences to date, and provided formative feedback on new resources that WGBH may produce.

ORGANIZATION OF THIS REPORT

The purpose of this report is to present findings from the evaluation of each NOVA scienceNOW component. Each chapter of the report is devoted to a NOVA scienceNOW offering: Series, Classroom Activities, Web site, and Science Cafés. Each chapter presents the methods used to evaluate the offering, results, and conclusions. Some chapters also include a section that compares the current results with those from similar, earlier evaluations. The final section of the report presents GRG's recommendations for the NOVA scienceNOW team to consider as they move in to Season Three.

EVALUATION OF THE NOVA SCIENCENOW SERIES

THE SERIES: VIEWER STUDY

To assess the influence of the NOVA scienceNOW series, GRG conducted a Viewer Study. Seventy NOVA viewers (defined as people who watch NOVA once a month or more) were recruited to participate. The Viewer Study began in early November 2006 and continued into February 2007. As part of their participation, viewers agreed to complete a Pre- and Post-Program Survey, watch the first two episodes from NOVA scienceNOW Season Two, and complete a Feedback Survey after watching each episode. Participants had the option of viewing the NOVA scienceNOW episodes on DVD or VHS. WGBH provided copies of the show that GRG mailed to participants. Episodes One and Two from Season Two were used.

INSTRUMENTS AND PROCEDURES

Pre-Program Survey

Upon agreeing to participate in the Viewer Study, each participant was required to complete a Web-based Pre-Program Survey prior to watching their first episode of NOVA scienceNOW. The Pre-Program Survey included demographic questions, as well as questions designed to learn about participants' engagement in science-related activities during the three-month period prior to the study. Eighteen multiple choice questions were also included to assess viewers' prior knowledge of the content covered in the two episodes (see Appendix A).

Feedback Surveys

Participants were instructed to contact GRG to receive a Feedback Survey after they had watched each NOVA scienceNOW episode. GRG requested that they complete this survey within 48 hours of watching each episode. Each episode's Feedback Survey included both closed- and open-ended questions to learn respondents' impressions of both the episode overall and the individual stories included in the show. Participants also reported whether they had any prior learning experiences with each story topic, and their perceptions of how much they learned from each story (see Appendix B for a sample Feedback Survey).

Post-Program Survey

Two weeks after watching the second episode of NOVA scienceNOW, participants completed a Post-Program Survey that included questions to measure participants' engagement in science-related activities during the three-month Viewer Study. Participants were also asked to write one thing they learned from each NOVA scienceNOW story, provided additional feedback on their impressions of the series as a whole, and answered the 18 content questions from the Pre-Program Survey (see Appendix C). Sixty-five participants completed the Viewer Study, each of whom received a $75 stipend.

VIEWER STUDY RESULTS

PROFILE OF RESPONDENTS

The sample for this study was younger than typical NOVA viewers, while the gender and race/ethnicity distribution of the sample was similar to that of NOVA's viewership. Table 1 shows the demographic profile of Viewer Study participants compared to the demographic profile of NOVA's viewership.

Table 1
Comparison of Viewer Study Participants to the NOVA Viewing Population

		% Respondents	% NOVA Viewers
Age	18 – 34 years old	25%	13%
	35 – 49 years old	34%	22%
	50 – 64 years old	29%	27%
	65 and older	12%	31%
Race	African American	6%	6%
	Asian	6%	--
	Hispanic/Latino	5%	9%
	Native American	2%	--
	White	83%	85%
Gender	Male	57%	56%
	Female	43%	44%

N=65; Note that data were not available on the percentage of NOVA viewers who are Asian or Native American.

Viewer Study participants varied in their education level. When asked to share the highest level of education they had completed:

- 3% of the Viewer Study participants reported having a high school degree,
- 20% reported they had completed some college,
- 37% had a college degree,
- 9% had completed some graduate or professional school, and
- 31% had earned a graduate or professional degree.

Finally, participants were asked to share their job title, which GRG then coded based on whether or not the job was related to science, technology, or engineering. The majority of Viewer Study participants (77%) were *not* employed in a field related to any of these disciplines.

- 14% (n=9) were employed in a science-related job; these included nurses, three science teachers, a retired medical librarian, a research assistant, and a medical transcriptionist.
- 8% (n=5) were employed in jobs related to IT, such as software developer, and IT consultant.
- 1% of the sample (1 person) was employed as a design engineer.

Participants' Science Viewing Habits and Related Understanding of Current Events in Science

Given the fact that Viewer Study participants are regular NOVA viewers, it is not surprising that 40% rely on science documentaries and programs to get information on the latest advancements in science. One in four (25%) rely on online new sources or science-based Web sites to stay up to data on science news, and 15% get their science news from national news broadcasts.

Viewer Study participants also engaged with science in other ways. When presented with a list of seven science-related activities, participants reported that they had engaged in between three and four of those activities, on average, in the three months prior to the study. Table 2 presents the specific ways in which participants had engaged with science.

Table 2
Percentage of Respondents Who Had Engaged in Science-Related Activities in the Three Months Before the Viewer Study

	% respondents
Discussed science-related current events with friends, family, or colleagues	95%
Watched science-related television programs	92%
Visited a Web site to learn about a scientific topic	79%
Read a book about a science topic	49%
Visited a science museum or science center	35%
Attended a science lecture or presentation	23%

N=65

Respondents compared their own interest in and knowledge about science to that of the average person. Comparisons were made on a five-point scale of *much less interested/knowledgeable* to *much more interested/knowledgeable*. Overall, participants considered themselves to be more interested in science than the average person.

- 35% believed they were *much more interested* in science than the average person,
- 49% believed they were *more interested*,
- 14% believed they were *no more or less interested* than the average person, and
- 2% believed they were *less interested* in science than the average person.

Respondents also compared their knowledge of the latest developments in science to that of the average person. Here too, respondents compared themselves favorably.

- 20% reported that they were *much more knowledgeable* than the average person about the latest developments in science,
- 45% reported being *more knowledgeable* than the average person,
- 34% reported that they were *no more or less knowledgeable* than average, and

- 1% reported that they were *less knowledgeable* than the average person about the latest developments in science.

Although they believed themselves to be knowledgeable about the latest in science news, many participants had not heard any recent new stories about NOVA scienceNOW topics. As shown in Table 3:

- As a group, participants had not heard recent news related to Apophis, creating new elements for the periodic table, and the study of papyrus.
- Approximately one-third were unaware of any news stories in recent months focusing on mass extinction.
- Participants were aware of recent news about two NOVA scienceNOW topics; the vast majority had heard at least one story about both obesity research and the Avian flu in the three months prior to the Viewer Study.

Table 3
Percent of Respondents who Had Not Heard Any Recent New Stories about NOVA scienceNOW Topics

		% Respondents
Episode One	The asteroid, Apophis	43%
	Creating new elements to add to the periodic table	46%
	Obesity research	12%
Episode Two	Research on mass extinction	32%
	The Avian flu	8%
	The study of papyrus (ancient scrolls)	45%

N=65

97% of NOVA scienceNOW viewers rated the series as very good or excellent, the top two options on the scale

THE APPEAL OF THE NOVA SCIENCENOW SERIES

Respondents were asked to rate each episode directly after viewing it and then they rated the series as a whole at the end of the Viewer Study. Ratings were provided on a scale from 1 (*Poor*) to 5 (*Excellent*).

- Both individual episodes were rated similarly with average ratings of *very good*; Episode One was given a mean rating of 4.17, while Episode Two received an average rating of 4.23.
- When asked to rate the series overall, 97% rated the series as *very good* or *excellent* (mean rating = 4.45).

Viewers also shared their positive feedback about the program when asked to describe their first impressions after watching Episode One. The majority (85%) shared feedback about what they liked about the show. Comments included:

> *"I was really impressed with the episode. What I liked best is the fact that the program highlighted real scientist*[s] *showing their passion for doing their work."*

> *"I thought it was very informative and I did learn several new things by watching it."*

"Very interesting episode, with [touch] *of science person* [portrait]*."*

"Informative and easy for a non-scientist to understand."

"Wow is all I can say…I thought it was so interesting that I could not believe an hour had passed."

The comments shared directly after watching Episode Two continued to praise the show but, compared to the comments from Episode One, were more focused on the learning that occurred as a result of watching. For example, viewers wrote:

"I like the episode. It was educational, as expected from this program."

"It was very good, I liked it very much. I learned some new things."

"I found this episode informative and educational."

"Super informative and well made; made subjects I would not normally be interested in very interesting."

"*Very very interesting and full of facts I didn't know or have* [never] *heard before on any other channel."*

The rest of this section presents feedback and ratings provided by viewers on different characteristics of each episode and the individual segments within each episode. The presentation of these results is organized by the characteristic rated. For a side-by-side comparison of episode segment ratings across characteristics, see Appendix D.

Visual Appeal

On each Feedback Survey, participants rated the visual appeal of the entire episode as well as the individual stories within each episode, on a scale from 1 (*Not at al*l) to 5 (*Extremely*), as displayed in Table 4. Episode One was rated as *very visually appealing* overall, with a mean episode rating of 4.06. The story on Apophis received the highest ratings for visual appeal (mean=4.46): *very* to *extremely visually appealing*. The remaining three stories were rated as *generally* to *very visually appealing*.

Table 4
Visual Appeal of Stories from Episode One

		Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
The asteroid, Apophis	mean=4.49	0%	2%	6%	34%	58%
Creating new elements to add to the periodic table	mean=3.83	0%	6%	26%	46%	22%
Obesity research	mean=3.55	3%	6%	42%	31%	18%
Profile of scientist and author, Karl Iagnemma	mean=3.45	3%	15%	34%	29%	18%
The episode, overall	mean=4.06	0%	0%	18%	57%	25%

N=65

NOVA scienceNOW was rated as very visually appealing, on average.

Participants rated the visual appeal of Episode Two slightly higher than that of Episode One, with a mean rating of 4.22. The story on mass extinction received the highest ratings for visual appeal, with three-quarters rating it as *very* to *extremely visually appealing*. The segment on the study of papyrus received the lowest ratings and was considered *generally* to *very visually appealing* on average. See Table 5.

Table 5
Visual Appeal of Stories from Episode Two

		Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
Research on mass extinction	mean=4.28	0%	3%	20%	23%	54%
The Avian flu	mean=4.15	0%	5%	21%	28%	46%
The study of papyrus (ancient scrolls)	mean=3.69	3%	5%	38%	28%	26%
Profile of robot scientist, Breazeal	mean=4.14	0%	3%	15%	46%	36%
The episode, overall	mean=4.22	0%	0%	20%	38%	42%

N=65

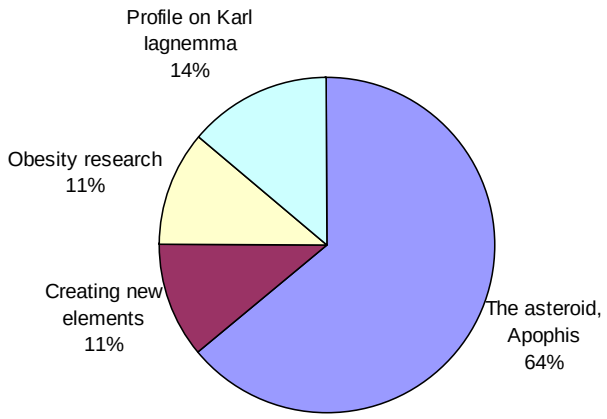
Favorite and Least Favorite NOVA scienceNOW Stories

After watching each episode, participants were asked to select their favorite and least favorite stories, then explaining why they had made each selection. Results are presented below, by episode.

Episode One

For Episode One, approximately two-thirds of the viewers selected the story on Apophis as their favorite (see Figure 1). The remaining stories were selected as favorites by a similar number of participants.

Figure 1
Favorite Story Selections - Episode One



The segment about the asteroid, Apophis was the overwhelming favorite from Season Two, Episode One.

Viewers selected their favorite story for a variety of reasons, though for many this choice was based on a personal connection to or interest in the topic. For example, these types of responses included:

> *"I have a particular interest in Astronomy."*
>
> *"Physics, particularly BIG PHYSICS (particle accelerators and the like) is always interesting to me."*
>
> *"I have people in my family who are obese and some have done everything they can to lose weight but it hasn't worked."*
>
> *"Because I have attempted to write fiction myself and was encouraged to see that others struggle with the solitude and detachment from your family and friends that is seemingly required to complete the task."*
>
> *"As a scientist, it is great to see someone in a similar situation balancing different goals so well."*

Those who chose the story about Apophis as their favorite also said that they picked this story for other reasons. Viewers noted that this topic was new to them, said they were impressed with the science and technology used, and mentioned the direct consequences that this work can have on the planet. Representative responses included:

> *"I was intrigued by the ability of scientists to calculate the travel path of asteroids."*
>
> *"Science in the making. It's proof that applied science can have immediate benefits to mankind."*

"I just had no idea that we were on a collision course with an asteroid and that they are able to predict when this event will take place."

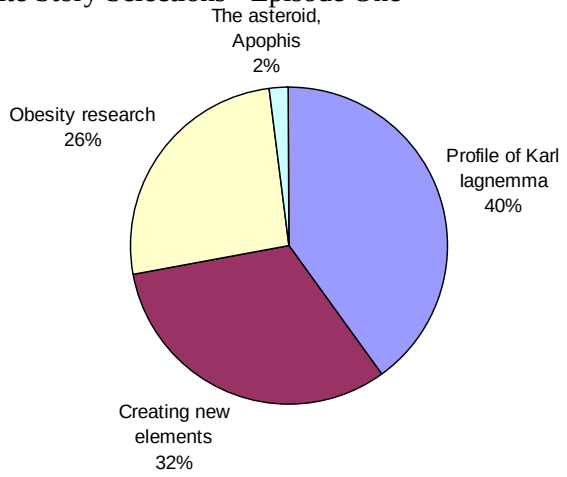
"It had my attention because of the effect of many people on earth and since it's our home, our living quarters, it's a lot to look and think about."

"I found this very interesting. It is incredible to learn what can happen if [Apophis] *hits us. Wow, I also didn't know that asteroids had a hand in the demise of the dinosaurs."*

In contrast to the majority of viewers agreeing on a favorite story, the choices for least favorite story were more evenly split between the profile of Karl Iagnemma (40% said this was their least favorite), the segment on creating new elements to add to the periodic table (32%), and obesity research (26%). See Figure 2.

- Those who chose the profile of Karl Iagnemma as their least favorite story did so because "*there was no new scientific information* or because *he wasn't very interesting*" to them. Others noted that they were "*just more interested in the preceding stories*."
- Viewers who chose the segment on creating new elements for the periodic table as their least favorite admitted that "*the periodic table never did excite* [them]," or stated that while this story was interesting, "*the others were even more interesting*."
- Viewers who picked the obesity research story reported that they thought this story was *"always on the news"* and thus wasn't of interest, or that it *"just did not peak* [their] *interest."*

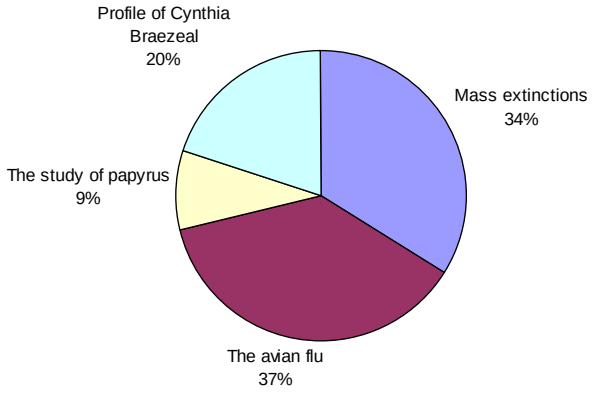
Figure 2
Least Favorite Story Selections - Episode One



Episode Two

For Episode Two, the Avian flu and Mass Extinction segments were the stories selected most often (37% and 34% chose these stories as their favorite, respectively). See Figure 3.

Figure 3
Favorite Story Selection - Episode Two



The stories on Mass Extinction and the Avian Flu were the favorite segments from Season Two, Episode Two.

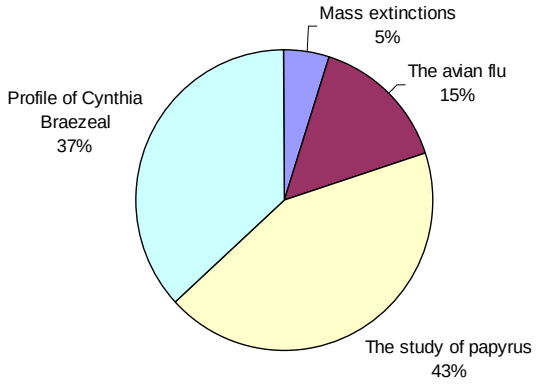
As with the favorite story selected for Episode One, many respondents picked their favorite Episode Two story based on prior interest. Viewers also named segment-specific reasons.

- Those who selected the story on mass extinction did so because they are "*really into this subject*" or because "*they never knew about the Permian period*."
- Viewers who selected the Avian flu story as their favorite reported that "*the story told* [them] *things* [they] *didn't hear before and didn't know*." Some also reported specific facts they learned while others cited the relevance of this story with comments such as "*because it is currently very important*."
- Those who selected the study of papyrus as their favorite story noted the intersection of history and new technology with statements such as "*I am very interested in learning about our past and found this new technology to be very exciting*."
- Viewers who selected the profile of Cynthia Breazeal as their favorite stated that "*the robots were extremely appealing*." A sub-set also reported being impressed with Cynthia and her work.

Viewers' two least favorite story from Episode Two were the study of papyrus (43%) and the profile of Cynthia Breazeal (37%), as shown in Figure 4.

- Viewers selected the study of papyrus as their least favorite because "*it was not as interesting as the other subjects*" or because this segment "*was a little dry.*" Others mentioned that this story was "*okay*" but that it was their least favorite of the four.
- Viewers chose the profile of Cynthia Breazeal did so because "*it just wasn't as interesting to* [them] *as the other* [stories]," or because they "*aren't much of a believer in AI*."

Figure 4
Least Favorite Story Selections - Episode Two



The vast majority of respondents noted that at least one NOVA scienceNOW segment was of particular significance to them.

Stories Viewers Believed to be of Particular Significance

In addition to providing information on their favorite and least favorite stories, viewers were also asked which story (if any) was particularly significant to them, and why.[1] Sixty-four of the 65 participants chose a story that was significant to them; the remaining viewer indicated that none were particularly significant.

A slightly larger group of viewers found a segment from Episode Two to be particularly significant compared to Episode One (n=30 and n=24, respectively). Several stories were considered particularly significant, including Apophis, obesity research, mass extinction, and the Avian flu (see Table 6). In addition to the results reported in the table, 7% chose more than one story.

Table 6
Stories of Particular Significance to Viewers

		% Respondents
Episode One	The asteroid, Apophis	22%
	Creating new elements to add to the periodic table	9%
	Obesity research	29%
Episode Two	Research on mass extinction	26%
	The Avian flu	31%
	The study of papyrus (ancient scrolls)	6%

N=65

GRG also compared these results to the stories that viewers selected as their favorites from each episode. The stories on Apophis, the Avian flu, and mass extinctions were chosen as viewers' favorite stories overall and they were the stories selected most often as particularly significant. The story on obesity

[1] This question provided respondents with a list of six options; the profile segments were not included.

research was also considered significant, though it was not often cited as a favorite story.

Even though several stories were picked as being most significant, the reasons that visitors selected them were similar. For example, at least one person selected each topic because they work, teach, or study in a related field. Others selected the story that provided them with the most new information. Several people picked a story as significant because they have a personal interest in or connection to the topic. Examples of these responses included:

Viewers made personal connections with several NOVA scienceNOW segment topics.

> *"We were studying elements in the classroom so it was a help to show the kids the show."*
>
> *"I have worked in the biomedical industry and have been briefed and updated on epidemics, etc."*
>
> *"I'm a history minor and I find any historical information significant."*
>
> "[Apophis] *is something I learned a lot about as I had very little information on the subject."*
>
> *"I learned things I did not know before* [about mass extinction]."
>
> *"My current exploration of science topics is quantum theory."*
>
> *"Just fascinating! Anything about outer-space has always been interesting to me…"*
>
> "[I was interested in the story on obesity research] *because I am a personal trainer."*

Both the story on Apophis and the Avian flu were viewed as particularly significant by a number of people because of their relevance to current events and/or because of the threat they represent.

> *"Well the meteorite that just hit New Jersey has brought Apophis to my attention."*
>
> *"Mainly because* [Apophis] *is a current situation that affects all of us and we must find ways to avoid this asteroid or any other that endanger*[s] *our planet."*
>
> *"Its significance was pronounced when considering the global warming which threatens mankind."*
>
> "[Mass extinction] *is very significant because it is something that science may be able to stop from happening again, unlike the ice age."*

The story on Obesity was particularly significant to many who chose it because of a personal connection to or struggle with weight-related issues. A few selected the story because of the larger societal implications. Responses included:

"This is an issue that affects nearly every American today – either by having the problem of obesity or knowing someone that does."

"There is obesity in my family so it's a big concern."

"It is such an important health issue – one that I myself am beginning to struggle with."

"I think mainly because it is such a concern in our society and that a few members of my extended family suffer in that condition. I'm always looking for ways to combat the problem with my students and family members."

The Appeal of Neil deGrasse Tyson and the Cosmic Perspective

Viewers responded positively to the series' new host, Neil deGrasse Tyson.

Viewers were asked to rate Neil deGrasse Tyson's narration in the Season Two episodes overall and then they were asked to report whether they preferred his narration from Episode One compared to Episode Two. Overall, viewers thought deGrasse Tyson was a *very good* host for the show. Eighty-three percent rated his narration as *very good* or *excellent*. Much smaller numbers rated the narration as *good* (14%) or *fair* (3%).

Over half the viewers (55%) did not have a preference for deGrasse Tyson's narration across the two episodes viewed. Of those who did indicate a preference, some preferred the narration in Episode One (26%) and a slightly smaller percentage preferred Episode Two's narration (19%).

Regardless of the episode selected, visitors cited similar reasons for preferring one or the other. Some said that the information or topics presented in the episode selected was just "*more interesting*" to them. Others thought that deGrasse Tyson "*sounded more interested in the material himself*" or was a more "*credible*" source for the topics presented in one episode compared to the other. Three viewers felt that the narration was "*too over the top*" in general, and the same number commented that his presentation style was "*more adult-focused*" and involved less "*showmanship*" in Episode Two (which they preferred).

WGBH was particularly interested in learning viewers' opinions about a brief new segment added to Season Two called The Cosmic Perspective. In this segment, deGrasse Tyson summarizes some of the content presented in the episode segments by sharing a broad perspective on how they fit together. GRG asked viewers to share their opinions of this segment after watching each episode.

On the first Feedback Survey, viewers were reminded that the Cosmic Perspective could be summarized with the statement, "*Asteroids – can't live with them and can't live without them.*" When asked to share their opinions of this segment:

- 38% provided positive feedback about the host, the Apophis segment, the Cosmic Perspective, or a combination of these program elements.

- A small portion of respondents (11%) provided negative feedback about one of these program elements mentioned above, and 6% provided mixed feedback.
- Six percent admitted that they did not recall this segment of the show.
- A number of respondents (35%) summarized deGrasse Tyson's perspective in their own words without offering an opinion.

Examples of some of the positive feedback and summary statements provided include:

> *"I think it was a good closing statement for the show, and he was a good host for the show also."*
>
> *"This was a perspective which I had not heard expressed before; it certainly is thought-provoking".*
>
> *"It was okay, kind of all things will pass and one death leads to one birth kind of thing. Did give some perspective to ongoing change."*
>
> *"It gets you to think that asteroids are part of the big picture of life. That not only things here on earth guide the evolving of living things but that things perhaps beyond our control have a hand also."*
>
> *"Meaning you have to live within their means and stay out of their way or do something to reduce their potential. They can be so detrimental to outer space and to earth and any other object it may hit."*

Viewers were also asked to share their opinions of Episode Two's Cosmic Perspective. Compared to their responses to Episode One, participants were more focused in their responses. Many believed deGrasse Tyson's statements were "*thought-provoking*," though a few found them *alarmist*. Most shared their original impressions of the segment and then added their own ideas about global warming, the planet, human extinction, and/or the next mass extinction. For example, participants wrote:

> *"I thought the presentation was very thoughtfully phrased. It really made you stop to thing about what we are contributing (global-warming wise) in addition to what the earth itself is doing."*
>
> *"I do think the earth has reached the end for the most part. We have covered almost every habitable spot on earth, and its resources are starting to deplete. I think life on Planet Earth will continue but I don't know for how long."*
>
> *"I think Tyson had some good points but the questions were a bit alarmist…global warming is a real problem and we need to work on it."*
>
> *"Life on planet Earth definitely has a future, but it may not be with the Human Race. I enjoyed this part of the show."*

"I thought it was over exaggerated. I think the earth goes through cycles. We are at the global warming. 30 years ago we were at a cold phase."

"It did give you pause to think about what he was saying…"

Clarity of NOVA scienceNOW Content

Participants rated both the overall clarity of each episode and the clarity of the individual stories included in each episode. Ratings were made on a scale from 1 (*Not at All*) to 5 (*Extremely*).

Viewers rated the overall clarity of Episode One between *very* and *extremely* clear with an average rating of 4.34. As seen in Table 7, approximately three-quarters of respondents rated each segment as *very* or *extremely* clear. The segment on Apophis received the highest clarity rating.

Table 7
Clarity Ratings for Episode One

	Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
The asteroid, Apophis mean=4.58	0%	0%	3%	35%	62%
Creating new elements to add to the periodic table mean=3.95	0%	6%	22%	43%	29%
Obesity research mean=4.09	0%	2%	17%	52%	29%
Profile of scientist and author, Karl Iagnemma mean=4.17	0%	3%	15%	43%	39%
The episode, overall mean=4.34	0%	0%	5%	57%	38%

N=65

The information presented in NOVA scienceNOW was considered very or extremely clear, on average, and almost all viewers reported that the content presented in the show was fairly or very easy for them to understand.

Participants gave similar ratings when asked their impressions of Episode Two (mean rating for the clarity of Episode Two = 4.43). As shown in Table 8, over three-quarters of the respondents rated three of the four stories as either *very* or *extremely clear*. Although the study of papyrus received the lowest rating of the four, the mean was still 4.03 (*very clear*).

Table 8
Clarity Ratings for Episode Two

	Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
Research on mass extinction mean=4.37	0%	0%	11%	41%	48%
The Avian flu mean=4.42	0%	0%	12%	34%	54%
The study of papyrus (ancient scrolls) mean=4.03	0%	5%	21%	40%	34%
Profile of robot scientist, Cynthia Breazeal mean=4.29	0%	3%	9%	43%	45%
The episode, overall mean=4.43	0%	0%	4%	48%	48%

N=65

A final measure of clarity was collected on the Post-Viewing Survey. Participants were asked to rate how difficult or easy it was to understand the content

presented in the series. Over 90% found the content in NOVA scienceNOW to be *very easy* or *fairly easy to understand*.

- 41% of participants found the series content *very easy to understand,*
- 51% thought *it was fairly easy to understand* the content,
- 5% indicated that *it was neither easy nor difficult to understand,* and
- 3% felt that it was f*airly difficult to understand* NOVA scienceNOW content.
- None of the participants rated the content as *very difficult* to understand.

Sustaining Viewer Interest

Viewers used the same five-point scale described above to rate the effectiveness of each episode at sustaining their interest. Episode One was considered *very effective* at sustaining their interest overall, with an average rating of 4.18. The segment about Apophis received the highest rating overall, with 94% of viewers rating this segment as either *very* or *extremely effective* at maintaining their interest. Each of the remaining segments was considered *generally* to *very effective* at sustaining their interest, on average (see Table 9).

Table 9
Effectiveness of Episode One at Sustaining Viewer Interest

	Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
The asteroid, Apophis mean=4.62	0%	0%	6%	26%	68%
Creating new elements to add to the periodic table mean=3.82	0%	5%	32%	40%	23%
Obesity research mean=3.83	3%	5%	26%	38%	28%
Profile of scientist and author, Karl Iagnemma mean=3.45	3%	17%	29%	34%	17%
The episode, overall mean=4.18	0%	0%	11%	60%	29%

N=65

Participants also reported that Episode Two was *very* to *extremely* effective at sustaining their interest throughout (mean=4.30). The stories on mass extinction and the Avian flu received the highest ratings. See Table 10.

Table 10
Effectiveness of Episode Two Stories at Sustaining Viewer Interest

	Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
Research on mass extinction mean=4.28	0%	3%	14%	35%	48%
The Avian flu mean=4.22	0%	5%	15%	34%	46%
The study of papyrus (ancient scrolls) mean=3.46	7%	6%	37%	31%	19%
Profile of robot scientist, Cynthia Breazeal mean=3.88	2%	6%	25%	38%	29%
The episode, overall mean=4.25	0%	0%	12%	51%	37%

N=65

The Perceived Purpose of NOVA scienceNOW

At the conclusion of the Viewer Study, participants were provided with a list of six purpose statements and asked to select the two they would use to describe the show to someone who had never seen it. As seen in Table 11, most viewers believed the purpose of the show was *to make science approachable for all viewers*. Approximately half believed that the purpose of the show was *to introduce viewers to cutting edge science topics*, and just under one third believed the purpose was *to encourage engagement with science*.

Viewers believed that NOVA scienceNOW was meant to make science approachable to all viewers and to introduce viewers to cutting-edge science topics.

Table 11
The Perceived Purpose of NOVA scienceNOW

	% Respondents
To make science approachable for all viewers	74%
To introduce viewers to cutting edge science topics	49%
To encourage viewers to engage with science	32%
To demonstrate the importance of staying up-to-date about science research	22%
To demonstrate the various implications of science	17%
To combat negative stereotypes about scientists	3%

N=65

SCIENCE ENGAGEMENT ASSOCIATED WITH NOVA SCIENCENOW

Projected Influence of the NOVA scienceNOW Series on Science Engagement

At the conclusion of the Viewer Study, participants were asked to indicate how effective the series was at increasing their interest in science and their engagement with science:

- Two-thirds of the viewers believed that NOVA scienceNOW had been *very* or *extremely effective* at increasing their interest in science.
- Just under three-quarters believed that the program has been *generally* or *very effective* at motivating them to learn more about current events in science.
- The series was rated, on average, as *generally effective* at increasing the extent to which participants had sought out science-related experiences (see Table 12).

Table 12
Perceived Effectiveness of NOVA scienceNOW at Increasing Engagement with Science

	Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
Increasing your interest in science mean=3.82	0%	9%	25%	41%	25%
Increasing how motivated you have felt to learn more about current events in science mean=3.82	0%	5%	32%	40%	23%
Increasing the extent to which you have sought out science-related learning experiences mean=3.38	0%	17%	45%	21%	17%

N=65

Reported Engagement with Science

Participants reported their engagement with content related to the series by choosing the option that best described their engagement with each of six activities, shown in Table 13. The options included, *Yes, I Have Done This*; *Not Yet, but I Plan To*; and *No and I Don't Plan To*. The majority of viewers had already recommended NOVA scienceNOW to others, tried to stay more up-to-date on science, and watched more science television programming as a result of watching the series. Viewers were also interested in reading a book and visiting a Web site related to one of the topics, but most had not yet carried out these activities.

Table 13
Additional Engagement with NOVA scienceNOW Content

	% who have done this activity	% who plan to do this activity	% who don't plan to do this activity
Recommended the NOVA scienceNOW program to others	85%	15%	0%
Tried to stay more up-to-date on science topics in general	72%	25%	3%
Watched science-based television programs more often	63%	28%	9%
Visited a Web site to learn about a NOVA scienceNOW topic	37%	48%	15%
Read a book/part of a book about a topic from NOVA scienceNOW	8%	66%	26%
Attended a NOVA scienceNOW Science Café event or another presentation on a science topic	5%	43%	52%

N=65

In addition to the activities listed above, 62% of Viewer Study participants visited the NOVA scienceNOW Web site during the three-month Viewer Study. They also reported that they had shared content from NOVA scienceNOW with a

NOVA scienceNOW segments encourage viewers to have follow-up conversations with friends, family, and/or colleagues.

friend or family member while participating in the Viewer Study. Almost all participants (92%) reported that they had participated in at least one conversation related to the series' content, and they reported having conversations on about three different topics, on average (mean=2.98).[2]

The specific topics viewers discussed are presented in Table 14.[3] Approximately two-thirds of the Viewer Study participants discussed with friends and family the stories on obesity research and the Avian flu. Each of the other NOVA scienceNOW segments was the topic of conversation for approximately half of the participants. The only exception was the story on the study of papyrus, which was discussed about one quarter of participants.

Table 14
Discussion of NOVA scienceNOW Content, by Topic

		% Respondents
Episode One	The asteroid, Apophis	51%
	Creating new elements to add to the periodic table	43%
	Obesity research	62%
Episode Two	Research on mass extinction	52%
	The Avian flu	66%
	The study of papyrus (ancient scrolls)	25%

N=65

LEARNING EXPERIENCES WITH NOVA SCIENCENOW CONTENT PRIOR TO VIEWING

Some NOVA scienceNOW stories are familiar to viewers while others are new.

In order to assess the effectiveness of the NOVA scienceNOW series at presenting viewers with new science content, GRG asked participants to describe their prior learning experiences with each series topic. As displayed in Table 15, at least half of the viewers learned about three of the four Episode One topics for the first time as a result of watching NOVA scienceNOW. Many viewers were familiar with recent developments in obesity research, but over half of them had never seen a program on the subject.

[2] Note that the participants were not asked if they had engaged in conversation about either profile piece.
[3] This question provided respondents with a list of six options; the profile segments were not included.

Table 15
Previous Learning Experiences with Episode One Content

	This was the first time I learned about this topic.	I had some knowledge about this topic, but this was the first time I watched a program on the subject.	I had watched a program on this topic before.
The asteroid, Apophis	51%	49%	0%
Creating new elements to add to the periodic table	54%	45%	1%
Obesity research	32%	54%	14%
Profile of scientist and author, Karl Iagnemma	88%	9%	3%

N=65

Viewers were more familiar with the topics included in Episode Two than they had been with the topics in Episode One. Most had heard about mass extinctions and the Avian flu prior to watching the episode, though they had never seen a program on either subject. Approximately half of the participants learned about the study of papyrus and the work of Cynthia Breazeal for the first time as a result of watching the show (see Table 16).

Table 16
Previous Learning Experiences with Episode Two Content

	This was the first time I learned about this topic.	I had some knowledge about this topic, but this was the first time I watched a program on the subject.	I had watched a program on this topic before.
Research on mass extinction	31%	48%	21%
The Avian flu	20%	60%	20%
The study of papyrus (ancient scrolls)	49%	40%	11%
Profile of robot scientist, Cynthia Breazeal	59%	32%	9%

N=65

Perceived Knowledge Gains from Watching NOVA scienceNOW

Viewers rated how much knowledge they gained about topics reported in each NOVA scienceNOW segment using a scale from 1 (*Not at All*) to 5 (*A Great Deal*). In Episode One, viewers reported that they learned *quite a bit* to *a great deal* from the story about Apophis. They learned *a moderate amount* to *quite a bit* from the remaining three stories.

Table 17
Perceived Knowledge Gains Associated with Stories from Episode One

	Not at All 1	A Little 2	A Moderate Amount 3	Quite a Bit 4	A Great Deal 5
The asteroid, Apophis mean=4.28	0%	6%	14%	26%	54%
Creating new elements to add to the periodic table mean=3.86	3%	6%	26%	31%	34%
Obesity research mean=3.94	2%	2%	29%	36%	31%
Profile of scientist and author, Karl Iagnemma mean=3.68	11%	6%	24%	22%	37%
The episode, overall mean=4.12	0%	3%	15%	48%	34%

N=65

Average ratings indicated that participants felt they had learned *quite a bit* from three of the four stories from Episode Two (see Table 18). Participants felt they learned the most from the story on the Avian flu and least from the story on papyrus.

Table 18
Perceived Knowledge Gains Associated with Stories from Episode Two

	Not at All 1	A Little 2	A Moderate Amount 3	Quite a Bit 4	A Great Deal 5
Research on mass extinction mean=4.05	1%	5%	20%	35%	39%
The Avian flu mean=4.18	1%	3%	14%	39%	43%
The study of papyrus (ancient scrolls) mean=3.62	3%	15%	29%	22%	31%
Profile of robot scientist, Cynthia Breazeal mean=3.97	1%	8%	19%	37%	35%
The episode, overall mean=4.15	0%	2%	15%	49%	34%

N=65

Viewers believed they had learned quite a bit from NOVA scienceNOW, on average, and two weeks after watching almost all viewers could still recall one fact learned from each story.

RECALL OF NOVA SCIENCENOW STORIES, SHORT AND LONGER TERM

Within one to two days of watching each NOVA scienceNOW episode, participants were asked to share one new thing that they had learned from watching the episode as part of the Feedback Survey. Two weeks after watching the second episode, participants' longer-term retention was measured on the Post-Viewing Survey, at which time they were asked to share one thing that they learned from each of the stories featured.

Recall of Episode One Stories

When asked to recall one thing they learned from Episode One, most viewers (83%) shared a fact they had learned from one particular segment. The remaining

participants shared a fact from either two or three segments. The majority of participants (61%) shared something they had learned from the segment that featured the asteroid, Apophis. Some learned of the asteroid for the first time as a result of watching the program, while others cited the possible effects of the asteroid hitting Earth, and the ways that scientists might try to change the asteroid's path. Responses included:

> *"I learned that it may be possible to divert and change the orbit of an asteroid to avoid a direct collision with the earth."*
>
> *"I learned that there was a possibility of an asteroid coming very close to the Earth in 2029."*
>
> *"The danger that would take place in it landing on our earth. That it would act as 100 atom bombs…"*
>
> *"I learned how they are developing a gravitational pulling rocket to deflect the asteroid."*

Several (32%) also recalled a fact they had learned from watching the story on obesity research. Most of these responses focused on the understanding that obesity can be biologically-based and several recalled learning about leptin and its role. Facts learned from this segment included:

> *"I learned about Leptin, the hormone produced by fat cells."*
>
> *"The part on obesity was shocking to me. I had no idea that your weight is in part genetically determined".*
>
> *"That obesity may be because of a genetic mutation missing Leptin in some cases."*
>
> *"Obesity may very well be linked to the lack of a brain chemical."*

A few respondents shared something learned about creating new elements or mentioned the profile of Karl Iagnemma. These responses included:

> *"New elements can be created. New elements have already been created."*
>
> *"Learned of attempts to create new heavy elements such as 114."*
>
> *"I learned that creating a new element is very difficult and I appreciate better the amount of time involved. I also learned that there are people out there that are both good at science and literacy (language)."*
>
> *"I viewed a scientist who has become a successful writer."*

Recall that, for these short-term responses, viewers were only asked to share one fact learned from the entire episode. On the Post-Viewing Survey, viewers were

asked to share one fact they recalled from each segment featured in the episode.[4] Sample responses are provided in Table 19, and a summary of the kinds of responses provide for each segment is provided below.

- For the story on Apophis, the majority of viewers reported learning about the existence of the asteroid and its possible path toward Earth, or they recalled ways to prevent a collision. Several noted that blowing the asteroid up was not a good option. Others wrote about the effects of a collision, described a characteristic of Apophis, or shared a general fact learned from the story.
- Almost half of the viewers reported learning that new elements could be created and/or that there were still new elements to discover from watching the second segment of Episode One. Others recalled how difficult it is to create a new element, the fact that new elements are unstable, or reported learning about the process used to create elements.
- The fact recalled most often about the Obesity story focused on learning about a genetic cause. Others focused on how pervasive this issue is in the world or in America. A small number of respondents mentioned leptin or the brain research featured in the segment.

Table 19
Sample Statements of Longer-Term Recall of Stories from Episode One

The asteroid, Apophis	▪ *Simply that the threat of a collision is very real.* ▪ *Became aware of the fact that there is such an asteroid.* ▪ *About the gravitational tractor that call pull the asteroid out of it's orbit; fascinating!* ▪ *That it would not be wise to blow up an asteroid before it reached Earth.* ▪ *We are always at risk from an asteroid.* ▪ *The asteroid is H-U-G-E.* ▪ *Scientists are able to precisely track asteroids.* ▪ *That scientists are debating how to nudge it into another path.*
Creating new elements to add to the periodic table	▪ *Element 114 should be possible.* ▪ *That scientists are always trying to create new elements.* ▪ *It's not an easy task to create new elements.* ▪ *The missing elements that are yet to be named are very unstable.* ▪ *Learned about island of stability, etc.*
Obesity research	▪ *That obesity can be caused by something in our "makeup" and not necessarily from just eating [too] much, but why we have that urge to eat even when we may be full and not realize it.* ▪ *Some cases of obesity may be explained in terms of biological inheritance.* ▪ *Too many youngsters are headed toward future heart disease.* ▪ *Problems with brain receptors and effects of weight.* ▪ *There may be a drug theapy that helps control overeating in some cases.*

Participants were also asked to share their lasting impressions of Karl Iagnemma. Almost half of the respondents (43%) mentioned his dual careers of robot scientist and fiction writer. A small portion mentioned one of his two careers (6%

[4] The majority of respondents recalled something from each story; 64 recalled something from the Apophis segment, 60 shared something they learned from the story on creating new elements, and 60 reported a fact learned from the story on obesity research.

mentioned his science career and 7% mentioned his career as a writer). Over one quarter of the respondents (29%) reported that they could not remember anything about him.

Examples statements from those who remembered both careers included:

> *"Has combined love of writing and love of science in his job. He is both a writer and an engineer designing robots that will explore other planet."*
>
> *"Not many can be successful in both being a scientist and a fiction author, but he has done it."*
>
> *"He is able to pursue careers in both science and writing."*
>
> *"He is a science oxymoron – he is both a diligent scientist and a very creative writer."*
>
> *"He was an award winning scientist & also a fiction writer."*
>
> *"He's a super-genius who is better than me because he can be an artist and a scientist all at once. Go Karl!"*

Recall of Episode Two Stories

When asked to recall one thing they learned from Episode Two, most respondents (88%) shared a fact they had learned from one of the four segments included in the program. The remaining participants shared a fact from either two or three segments. Just over half of the respondents (52%) shared something they had learned from the segment on mass extinction. Many reported learning that something other than external forces (like meteors) could lead to such an event. Others shared that they did not know there had been multiple mass extinctions before watching the show, or wrote about the gases that eventually led to the Permian extinction. Responses included:

> *"That mass destruction of life attributed to gas coming from the sea, and not as the result of a celestial body colliding with the earth was a revelation."*
>
> *"That volcanoes could be the cause of major extinctions."*
>
> *"99% of all species that have ever existed are now extinct."*
>
> *"Never knew there was a Permian period and that there were 5 major times of major extinction."*
>
> *"I learned that mass extinctions have been the result of global warming."*

A number of participants (42%) recalled a fact they had learned about the Avian flu. Some focused on the 1918 flu while others mentioned learning about the H and N system used to categorize flu viruses. Others learned about the origin and transmission of flu viruses. Facts learned from this segment included:

> *"I learned more than one new thing but the segment on flu stands out. The explanation of the virus tags Hi-N1 and H5-N1 is something new to me."*
>
> *"I was not aware that geneticists could bring back the 1918 virus that killed millions of people. The genetics involved is fascinating."*
>
> *"That the flu in 1918 wiped out 50 million people."*
>
> *"That the Avian flu cannot be transmitted from human to human."*
>
> *"I learned how viruses spread."*

As with Episode One, the Post-Viewing Survey prompted viewers to share one fact they learned from each of the segments featured in Episode Two.[5] Examples are presented in Table 20. In summary:

- Viewers' recall of the segment on mass extinction focused on the role that volcanoes and gases may have played, the number of mass extinctions that have occurred, and the number of species that have become extinct over time. Others provided general statements such as "*what happened in the past*."
- When asked about the Avian flu segment, viewers recalled facts related to transmission of the flu, or shared concerns about a possible pandemic. Others focused on the research being conducted to prevent an outbreak, the number of people killed in the 1918 epidemic, or the role that birds play in the flu.
- Most who recalled a fact about the segment on papyrus mentioned the use of new technology that has allowed researchers to read stained papyri. A small number mentioned how papyrus was made or when it was used, and a similar number recalled the number of papyri still waiting to be read for the first time.

[5] The majority of respondents recalled something from each story; 59 recalled something from the segment on mass extinction, 63 shared something they learned from the story on the Avian flu, and 52 reported a fact learned from the story about papyrus.

Table 20
Sample Statements of Longer-Term Recall of Stories from Episode Two

Research on mass extinction	▪ *How global warming brings on mass extinction by releasing methane in the ocean.* ▪ *That volcanoes and the ocean were to blame.* ▪ *I was aware of only two periods of mass extinction prior to watching the program.* ▪ *That there were several periods of extinction.* ▪ *99% of all species that have ever lived on earth are now extinct.*
The Avian flu	▪ *Avian flu currently cannot pass from one person to another…yet.* ▪ *They are trying to learn how the bird flue goes from the bird to the humans and how to avoid this.* ▪ *The 50,000 lives that were lost in the pandemic from 1918 and that could happen with the bird flu that threatens us today.* ▪ *Hopefully, that by studying the flue from 1918, we may be able to prevent deaths from the avian flu.* ▪ *It's coming.* ▪ *1918 flu took 3 times as many lives [as] all of WWI.*
The study of papyrus (ancient scrolls)	▪ *With NASA's technology, historians can read thousands [of] papyrus that are eligible or soiled.* ▪ *Scientists use a special filter to read 2nd & 3rd century papyrus.* ▪ *That papyrus is a plant.* ▪ *There are tons of papyrus documents waiting to be read and recently there has been a breakthrough.* ▪ *By use of special photography more can be read on deteriorated scolls.*

When asked to share what they remembered about Cynthia Breazeal, over half recalled something about her work with robotics (52%) and an additional 8% mentioned both her work and her family. Others (14%) mentioned that she had always been interested in robotics or recalled some of the early inspiration for her work. Seven viewers (11%) reported that they could not recall anything from this segment.

Responses included:

"This incredible mother is at the cutting edge of artificial intelligence."

"She creates robotic lifelike robots in MIT."

"Brazeal grew up as a Star Trek and Star Wars fan, and early on in her life wrote a story about machines that could feel emotions. Since then, with a few detours here and there, Brazeal has been working on getting to that point on making robots more humanoid."

"Bringing the rise of affective computing through robotics."

"She's been building robots since childhood and is on the cutting edge of robotics."

"Talking robot that expresses feeling."

ASSESSMENT OF KNOWLEDGE GAINS

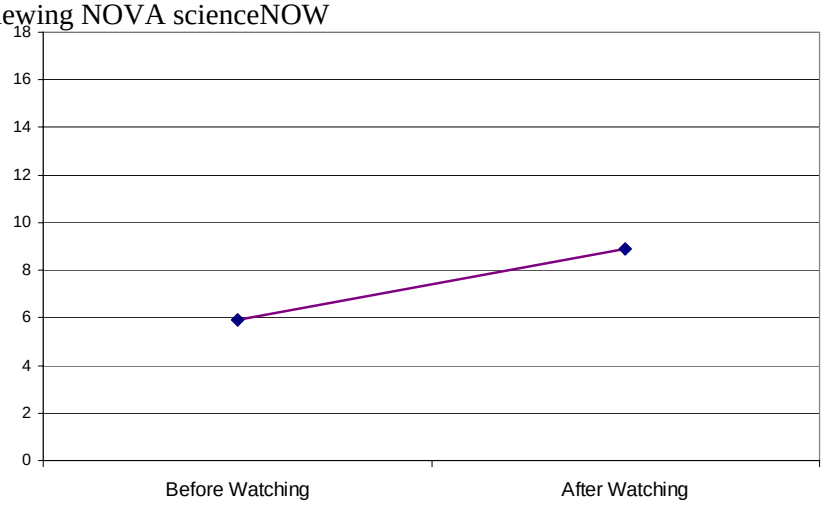
Content knowledge of NOVA scienceNOW topics increased at a statistically significant level as a result of watching the series.

Knowledge gains were assessed by having participants answer 18 content-based multiple-choice assessment questions both before and after watching NOVA scienceNOW. Participants' scores on the multiple choice questions prior to watching the series confirmed that they were not familiar with the details of the topics included in the series; of the 18 questions, participants correctly answered 5.9 on average, with a range of two to ten.

Two weeks after watching the second episode in the series (over two months weeks after the pre-assessment), participants were asked to complete the content questions again. The average number of questions that participants answered correctly increased to 8.9, with a range of four to 15 correct answers.

Using a paired-samples t test, GRG assessed the overall gains in knowledge associated with watching NOVA scienceNOW. Results indicated a statistically significant increase in content knowledge after watching NOVA scienceNOW ($p<.01$; see Figure 5).

Figure 5
Average Number of Correct Content Questions Answered Before and After Viewing NOVA scienceNOW



GRG also analyzed the changes in viewers' content knowledge related to each episode. Viewers' knowledge of the content presented in each episode increased at a statistically significant level after watching NOVA scienceNOW. See Table 21.

Table 21
Increases in Content Scores, by NOVA scienceNOW Episode

	Before Watching	After Watching
Episode One	2.20	3.28**
Episode Two	3.64	5.58**

N=65; **p<.01

A COMPARISON OF SEASON ONE AND SEASON TWO FINDINGS

GRG's Season One and Season Two evaluations of the NOVA scienceNOW series used similar methods to gather feedback about the show and to assess the influence that the series has on viewers. The Season One sample consisted of 29 participants, while the Season Two sample had 65 viewers. Both samples consisted of regular NOVA viewers, but they included a greater number from 18-35 year olds compared to NOVA's regular viewership. The Season Two sample was a better match than was the Season One sample to the gender and racial/ethnic distribution of NOVA's viewership.

The results from these two evaluations are quite consistent. Both found that the series has high appeal, presents a variety of topics that are both familiar and unfamiliar to viewers, and presents science content in a way that viewers find accessible. Participants in both studies were able to identify with NOVA scienceNOW stories, and many noted a personal connection to or interest in at least one topic featured. The profile segments continued to receive mixed feedback in Season Two, with a small number of viewers choosing them as favorite segments and a larger group selecting these pieces as their least favorite.

Compared to Season One, viewers were more familiar with the content featured in Season Two prior to watching the program. Even still, content assessment scores from both years indicated that viewers were not knowledgeable about the details of the topics presented when they began the study, and that their knowledge increased at a statistically significant level after watching the series. Results from both seasons also indicate that the program encourages viewers to continue engaging with NOVA scienceNOW topics by having conversations with others or seeking out other science-related resources.

The host of the series shifted from Robert Krulwich in Season One to Neil deGrasse Tyson in Season Two. Viewer study participants reacted positively to deGrasse Tyson and to his Cosmic Perspective segment. Both hosts received similarly high ratings from viewers.

In summary, the findings from both evaluations indicate that the series is appealing and of interest to viewers, and that it is successful at achieving it intended outcomes of increasing understanding of and engagement with science.

SERIES: FOLLOW-UP SURVEY

In February 2007, GRG contacted each of the participants from our Season One evaluation of NOVA scienceNOW, and invited them to complete a Follow-Up Survey. The purpose of the survey was to learn whether participants had continued to watch the program, the extent to which they had retained the knowledge gained from watching the program, and whether they have continued to engage with NOVA scienceNOW-related content (see Appendix E).

Of the 29 viewers who participated in the Season One evaluation, GRG was able to contact 24. Each of these Follow-Up Viewers received an initial invitation to complete the survey as well as up to two email reminders. Data were collected during a three-week period. During that time, 15 Season One participants (63%) responded to the Follow-Up Survey. Each respondent received a $10 gift certificate the Amazon.com for completing the survey.

FOLLOW-UP VIEWER SURVEY RESULTS

PROFILE OF RESPONDENTS

Table 22 presents the demographic profile from 15 Follow-Up Viewers. As with the original sample of 29 respondents, slightly more Follow-Up Viewers were men than women. The majority of participants in both surveys were White; the original sample included a small number of Hispanic participants who did not complete the Follow-Up Survey. Follow-Up Viewers were also slightly younger than the original sample.

Table 22
Profile of Follow-Up Viewer Participants

		# Respondents
Age	18 – 34 years old	3
	35 – 49 years old	5
	50 – 64 years old	6
	65 and older	1
Race	African American	1
	White	14
Gender	Male	9
	Female	6

N=15

FOLLOW-UP VIEWERS' CONTINUED NOVA SCIENCENOW VIEWING

Respondents reported whether they had continued to watch NOVA scienceNOW after participating in the evaluation and why or why not. Of the 15 respondents to the Follow-Up Viewer Survey, 10 had continued to watch the program.

- When asked to share why they had continued watching, most responded that they found the program *fun*, *interesting*, and/or *informative*. Two mentioned their appreciation for the program's format.
- Those who did not continue to watch indicated that they either do not watch much television overall (n=2), or that they were not clear about when [or if] it is on in their local area (n=3).

Two-thirds of Follow-Up Viewers reported that they have continued to watch NOVA scienceNOW.

A total of six new NOVA scienceNOW episodes have aired since the Season One Viewer Study. Follow-Up Viewers who had continued to watch the program were asked to report which of these episodes they had seen. Because these episodes aired over a two-year time period, a description of each episode was provided. Participants were then given the option of reporting whether they had seen some or all of an episode, whether they might have seen an episode, or that they had not seen an episode.

Seven Follow-Up Viewers reported that they had definitely seen all or part of at least one episode, and an additional three thought they had seen an episode but were not sure. More specifically,

- Of the seven Follow-Up Viewers who had definitely seen an episode since the Season One Viewer Study, two had watched one episode, four had watched two episodes, and one had seen three episodes.
- Those who thought they had seen the program (but weren't sure) included Viewers who may have seen one, two, or three episodes since completing the Season One evaluation.

Follow-Up Viewers were slightly more likely to watch portions of NOVA scienceNOW rather than watching the show in its entirety. Four viewers had seen pieces of new NOVA scienceNOW episodes, one had watched new programs in their entirety, and two had watched some programs in their entirety and portions other episodes.

FOLLOW-UP VIEWERS' CONTINUED ENGAGEMENT WITH NOVA SCIENCENOW CONTENT

Follow-Up Viewers continued to engage with NOVA scienceNOW content after completing the initial evaluation of the program.

In addition to reporting whether they had continued to watch the show, Follow-Up Viewers also shared other ways that they had extended their NOVA scienceNOW experiences. First, respondents reported whether they had visited the NOVA scienceNOW Web site. Two of the 15 Follow-Up Viewers had visited the site. Neither had watched an episode segment as part of their visit.

Next, respondents selected from a list of seven NOVA scienceNOW-related activities, those they had completed since the Season One Viewer Study. Table 23 shows the number of Follow-Up Viewers who have completed each. In summary:

- All (100%) of the Follow-Up Viewers had discussed NOVA scienceNOW topics with others since completing the Season One Viewer Study,
- Most had read a newspaper article about a NOVA scienceNOW topic and tried to stay more up-to-date on science news, and

- Approximately one-quarter had visited Web sites to learn about a NOVA scienceNOW topic.
- None of the Follow-Up Viewers had read a book about or attended an event featuring a NOVA scienceNOW topic.

Table 23
Continued Engagement with NOVA scienceNOW Content

	# who have done this	# who have not done this
Discussed NOVA scienceNOW topics with family, friends, or colleagues	15	0
Read a newspaper article about a NOVA scienceNOW topic	12	3
Tried to stay more up to date on cutting edge science topics in general	9	6
Read a science magazine about a topic from NOVA scienceNOW	6	9
Visited Web sites other than the NOVA scienceNOW site to learn about a NOVA scienceNOW topic	4	11
Read a book about a topic from NOVA scienceNOW	0	15
Attended a NOVA scienceNOW Science Café event in your local area	0	15

N=15

Five of the items included in Table 23 are similar to those used for the Season One evaluation. On the original Post-Survey, participants were asked if they had completed these activities or had plans to complete them in the future. GRG compared the original responses from those questions to the activities that Follow-Up Viewers had completed two years later.

Discussing NOVA scienceNOW with topics was an activity that all participants had completed by the end of the Season One evaluation, and, based on the data above, Follow-Up Viewers have continued to have those conversations. Similarly, Season One data indicated that over two-thirds of the participants either already had or planned to read newspaper articles to learn more about a NOVA scienceNOW topic. Two years later, 12 of the 15 Follow-Up Viewers reported that they have done this since completing the original study.

Follow-Up Viewers were less likely to extend their NOVA scienceNOW experiences by visiting other Web sites or by reading a book than they predicted at the end of the Season One evaluation. Most predicted that they would use Web sites to learn more about a topic and about half originally said they planned to read a book about a NOVA scienceNOW topic. In contrast, participants' predictions about whether they would attend a Science Café or other presentation on NOVA scienceNOW topics were accurate. Few planned to attend a Café and none of the Follow-Up Viewers had extended their interaction with the program in this way.

As an additional measure of continued engagement, respondents were asked whether they have recommended NOVA scienceNOW to others. Ten of the 15 Follow-Up Viewers reported that they had recommended either the program or the Web site to others since completing the Season One Viewer Study.

FOLLOW-UP VIEWERS' AWARENESS OF NOVA SCIENCENOW STORIES IN THE NEWS

14 of the 15 Follow-Up Viewers surveyed reported that they have noticed NOVA scienceNOW stories in the news since completing the evaluation

Follow-Up Viewers were asked to report whether they had noticed any of the eight NOVA scienceNOW topics from the Season One Viewer Study in the news since completing the evaluation: 14 of the 15 indicated doing so. For each of the topics they had noticed, Follow-Up Viewers were asked to share the new story that had reminded them of that particular topic.

Each of the Season One topics, with the exception of the North American tree frog, had been noticed in the news by at least one Follow-Up Viewer. Viewers had noticed between two and three NOVA scienceNOW topics in the news, on average, with a range of zero to five topics. Table 24 presents the number of Follow-Up Viewers who had noticed each topic in the news, and the science news stories that had reminded them of each.

Table 24
NOVA scienceNOW Stories that Follow-Up Viewers Noticed in the News, by Season One Topic

Mirror Neurons (n=1)	▪ *An article about an autistic child (I think it was on Dateline or MSNBC).*
Advancements in Hurricane Research (n=13)	▪ *Most newspapers and informational T.V. shows have had several shows with this information because of Katrina.* ▪ *Cannot say specifically, but have watched a news show about how to judge hurricane activity from an airplane.* ▪ *Any hurricane stories I see.* ▪ *A show on the weather channel that was called It Could Happen Tomorrow.* ▪ *Hurricanes Katrina, Rita; the ScienceNOW episode segment was eerily prophetic.* ▪ *Various articles on the Weather Channel.*
Deserts with singing sands (n=2)	▪ *Yes, one article.* ▪ *Sand storms.*
Kinetic Sculpture (n=1)	▪ *A show on discovery that showed how people can be of* [genius] *level.*
The recent discovery of small human-like fossils in Indonesia (n=4)	▪ *A National Geographic article, unsure of the date or exact subject.* ▪ *I remember seeing a story. I recall they were* [surprised] *and that the humans were so small.* ▪ *Radio article about a Creation Museum named "Answers in Genesis."* ▪ *Several articles in Science magazine.*
Determining the age of Tyrannosaurs when they died (n=4)	▪ *Local area find of* [fossil]. ▪ *I believe it was a newspaper article which touched on this subject.* ▪ *Radio article about a Creation Museum named "Answers in Genesis."* ▪ *An article in Science magazine.*
Embryonic stem cell research (n=13)	▪ *Stem Cell research is on the news regularly, especially in WI since our governor is in support of it. I feel like I have a better understanding of what it is since viewing that episode.* ▪ *Political rhetoric and campaigns to promote it.* ▪ *Many articles and discussions, especially around the election dealing with embryonic stem cell research.* ▪ *Death o f Ronald Reagan.* ▪ *I saw* [something] *on stem cell research but not Embryonic stem cells.* ▪ *I've read several newspaper articles, heard several debates, and listened to at least two professional presentations on this subject. The UW Madison is a hotbed of information on this subject, with the Wisconsin Alumni Research Foundation supporting stem.*

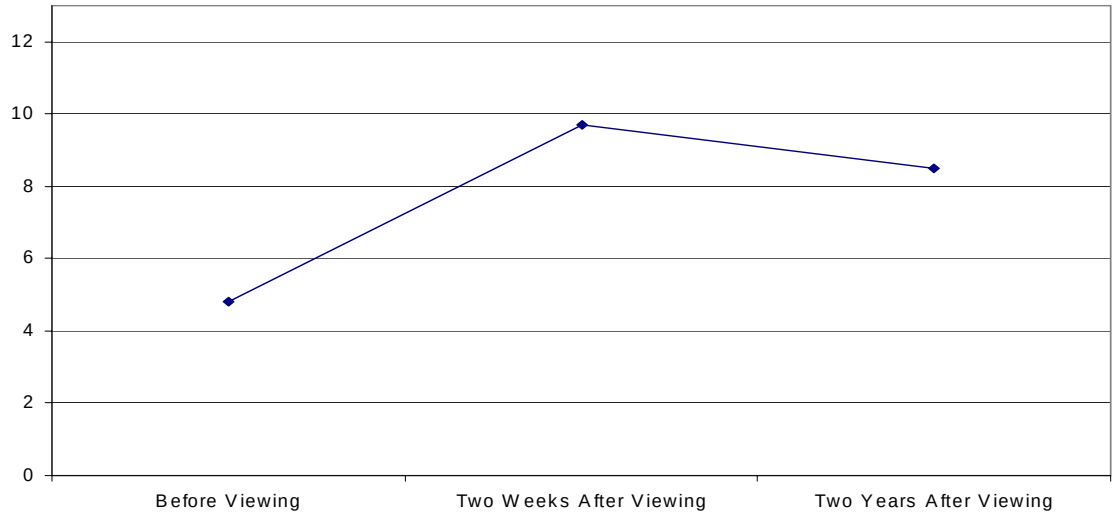
LONG-TERM RETENTION OF NOVA SCIENCENOW CONTENT

The final section of the Viewer Follow-Up Survey asked participants to answer the same 13 multiple-choice questions that we used for the Season One evaluation. Each question focused on content featured in the three Season One episodes that participants viewed in Spring 2005. GRG totaled the number of correct answers given by each of the Follow-Up Viewers and then compared the totals to those from the Season One evaluation.

Two years after completing the evaluation, Follow-Up Viewers had retained much of the knowledge gained from watching NOVA scienceNOW.

Figure 6 presents the average number of correct responses that Follow-Up Viewers provided before viewing NOVA scienceNOW, two weeks after viewing (on their original Post Survey), and two years after viewing when they completed the Follow-Up Survey. While the sample for these data was too small to conduct statistical analyses (n=15), Figure 6 shows that Follow-Up Viewers' knowledge doubled from before to after watching the program (means = 4.8 and 9.7, respectively). Two years later, Follow-Up Viewers' knowledge had decreased slightly (mean = 8.5 correct responses), but was still much higher compared to their knowledge before watching the program.

Figure 6
Follow-Up Viewers' Long Term Retention of NOVA scienceNOW Content



SERIES: CONCLUSIONS

NOVA scienceNOW presents information in a way that is accessible to viewers.

Making science content approachable for all viewers was rated by Viewer Study participants as the primary purpose of the program. Importantly, viewers rated the program as successful in this area. They found the content presented in each episode to be very or extremely clear overall, and when asked to rate the series, more than 90% reported that it was fairly or very easy to understand the content presented.

Science content knowledge increases as a result of watching NOVA scienceNOW, and knowledge gains remain over time.

Viewer Study participants believed that they had learned information about each topic featured in NOVA scienceNOW, and the majority was able to provide one fact they had learned about each story several weeks after viewing. An assessment of viewers' content knowledge confirmed that their knowledge had significantly increased overall and in relation to the content presented in each individual episode. The Follow-Up Survey results demonstrated that these gains are likely long term. While Follow-Up Viewers showed a slight decline in their knowledge of NOVA scienceNOW content two years after participating in the evaluation, they had retained much of the knowledge gained.

NOVA scienceNOW is effective at encouraging viewers to continue interacting with science.

Viewer Study participants believed the program was generally effective at increasing the extent to which they sought out science-related learning experiences, most had completed at least one activity to extend their engagement with science as a result of watching NOVA scienceNOW. For example, approximately two-thirds had tried to stay more up to date on science, watched more science-based programming, and visited the NOVA scienceNOW Web site. The results from Follow-Up Survey demonstrated that viewers are fairly accurate in their predictions for how they would extend content in the future as well.

The topics featured in NOVA scienceNOW often lead to later conversations with friends, family, or colleagues.

During the three month Viewer Study, almost all participants discussed at least one NOVA scienceNOW topic with a friend, family member, or colleague. The stories on the Avian flu and obesity research were the topic of conversation for approximately two-thirds of viewers and the other topics were discussed by just under half of those who participated. Results from the Follow-Up Survey confirmed that viewers continue to discuss NOVA scienceNOW topics.

NOVA scienceNOW programs include both familiar and new topics.

Most Viewer Study participants reported that they had heard new stories about several NOVA scienceNOW topics in the past, and in some cases viewers had seen other television programs that featured NOVA scienceNOW topics. In most cases, viewers learned about a topic for the first time while watching NOVA scienceNOW or it was the first time they watched a program about the topic.

Viewers find NOVA scienceNOW highly appealing.

Almost all Viewer Study participants rated the NOVA scienceNOW series as either very good or excellent, and individual ratings received quite positive ratings as well. The visual appeal of each episode was also rated positively, and viewers provided positive feedback about the show, its presentation, and the learning that results from watching it in their open-ended feedback. Follow-Up Viewers also reported the appeal of the program by stating the positive qualities of the program that had encouraged them to continue watching.

Viewer Study participants responded positively to NOVA scienceNOW's new host, Neil deGrasse Tyson.

Neil deGrasse Tyson was considered a very good host and most felt that he was consistently good across the two episodes viewed. Positive feedback was also provided about the Cosmic Perspective in which he provides commentary and a broader perspective of how each show's topics fit together. Several viewers described this segment as thought-provoking.

EVALUATION OF THE NOVA SCIENCENOW BIOSCIENCE CLASSROOM ACTIVIITES

BIOSCIENCE CLASSROOM ACTIVITIES: CLASSROOM STUDY

GRG's evaluation of the NOVA scienceNOW classroom activities included two data collection efforts. The first and larger of these efforts consisted of a study of two Season Two classroom activities. This study was designed to gather feedback from teachers and students about the NOVA scienceNOW bioscience activities, and to assess the extent to which they influence students' knowledge of and interest in bioscience topics.

The first two bioscience activities created for Season Two were used for the study. The classroom activity for Season Two, Episode One featured the hormone leptin, which research has demonstrated is related to obesity in both rats and humans. The activity encouraged students to create a number of hormone-receptor models, discuss how these systems work, and explore how different mutations affect the body's ability to produce and/or receive hormones.

The 1918 Flu segment from Season Two, Episode Two explained the origin and spread of different types of flu viruses, with a particular focus on the similarities between the deadly 1918 flu and today's Avian flu virus. The classroom activity for this segment included a series of games that students played as a class to demonstrate how the flu virus spreads and how inoculation impacts the spread of a disease. Students also graphed data they recorded throughout the games to demonstrate further the different ways that disease spreads.

GRG's second data collection effort collected follow-up survey data from teachers who participated in the Season One evaluation. The purpose of this survey was to learn whether and how teachers had continued to use NOVA scienceNOW activities after completing the Season One evaluation.

This section presents the results from each of these evaluation activities. The methodology and results from the classroom activity study are presented first, followed by the methods and results from the Season One Follow-Up Survey. Conclusions from both pieces of work are presented at the end of the chapter.

INSTRUMENTS AND PROCEDURES

GRG recruited a total from 15 high school science teachers from around the country to participate in the Season Two classroom activity evaluation. This study was conducted in two identical phases. The first phase required teachers to use the activities and complete the evaluation in November and December 2006. GRG found it difficult to recruit teachers to participate according to this schedule, in part because of the extra school activities that typically occur during the holiday season. As a result, GRG added a second phase of the study to increase the number of teachers and students included. Teachers and students in this second phase participated in January and February 2007.

In both phases of the evaluation, participating teachers were asked to do the following: administer a Pre-Viewing Assessment to their students, use the first

two NOVA scienceNOW bioscience activities from Season Two and their corresponding video segments, administer a Post-Viewing Assessment to students, and complete an online tracking sheet to share information on how they implemented the activities.

The design used for this evaluation was a replication of the study conducted in Season One. In both seasons, teachers were instructed to use the NOVA scienceNOW materials as they would use any supplemental activity. For the current study, teachers were given up to four weeks to use the two activities. Before they agreed to participate in the study, teachers were given the opportunity to review the activity content and confirm that they could use them in the time frame specified.

WGBH provided GRG with DVD copies of each episode, which were then given to teachers for the purposes of the evaluation. Teachers accessed the classroom activities via the NOVA scienceNOW Web site.

Pre- and Post-Viewing Assessment Surveys

Students completed a Pre-Viewing Assessment Survey prior to using any NOVA scienceNOW activities and a Post-Viewing Assessment Survey two weeks after completing the second classroom activity.

Both surveys were based on the instruments used in the Season One classroom activity evaluation. As with this prior study, the Pre-Viewing Assessment included questions designed to learn the extent to which students were familiar with the bioscience topics featured in NOVA scienceNOW, their impressions of a typical science activity, their attitudes about science, and their interest in biomedical topics and careers. The survey also included ten multiple choice questions (five questions for each activity) designed to assess their knowledge of the bioscience content covered in the NOVA scienceNOW segments. See Appendix F for a copy of the survey.

The Post-Viewing Assessment Survey measured students' attitudes about science, their interest in biomedical topics and careers, and their knowledge of NOVA scienceNOW content. In addition, students were asked to provide feedback on each NOVA scienceNOW lesson and to report their participation in a number of activities related to lesson content (see Appendix G).

Two of the 15 teachers who originally agreed to participate in the study dropped out mid-way through the evaluation. A total of 493 students from 13 different classroom teachers completed the Pre-Viewing Survey. Of those, 329 (67%) completed the Post-Viewing Survey.

Teacher Tracking and Feedback Form

After using both NOVA scienceNOW activities with their students, the teachers completed a Web-based tracking form. Hosted on the GRG survey Web site, the form included questions designed to assess the number and grade level of

students with whom each teacher used the materials, the amount of time teachers spent preparing and implementing the activities in class, their impressions of each activity, and their perceptions of the influence that the NOVA scienceNOW lessons had on their students (see Appendix H). Thirteen of the 15 teachers completed the Tracking and Feedback Form.

CLASSROOM ACTIVITY STUDY RESULTS

Table 1 presents the grade levels and numbers of students who used the NOVA scienceNOW bioscience lessons, by subject area. Teachers used the activities in a variety of subject areas to reach a total of 550 students in each of the four high school grade levels. The majority of the students reached (72%) used the activity as part of their Biology class, and an additional 7% used the activities as part of Anatomy and Physiology.

Table 1
Number of Students Reached by Grade Level and Class Subject

		# Students
General Science	10th grade	55
Biology	9th grade	89
	10th grade	131
	11th grade	121
	11th and 12th grade	54
Anatomy and Physiology	11th and 12th	38
Physics	10th grade	25
Inter-coordinated Science[6]	9th grade	37

N=13

TEACHERS' USE OF THE NOVA SCIENCENOW ACTIVITIES

As previously stated, teachers were instructed to use the NOVA science NOW activities as they would any supplemental science lesson. This section provides information to describe how teachers prepared for and used the activities with students.

Preparing to Teach NOVA scienceNOW Lessons

The topics covered in the two NOVA scienceNOW lessons used in the evaluation were new to some of the teachers who participated in the study. Five of the 13 had taught lessons on Obesity in the past and seven had taught about the Flu.[7]

[6] This multi-disciplinary class covers topics from Earth Science, Chemistry, Physics, and Biology.
[7] The terms Obesity and Flu were used throughout the survey to reference the two general topic areas featured in the NOVA scienceNOW lessons. Teachers' responses

Regardless of their past experience with the content, most teachers believed that the NOVA scienceNOW lessons prepared them to teach these topics. As shown in Table 2, most teachers felt *generally* to *very prepared* to teach the Obesity lesson. The majority felt *very* to *extremely prepared* to teach Flu.

Table 2
Preparedness Ratings for Teaching NOVA scienceNOW Lessons, by Activity

	Not at All	A Little	Generally	Very	Extremely
Obesity	0	1	6	5	1
Flu	0	0	3	5	5

N=13

Eleven of the 13 teachers spent the same amount of time preparing for each NOVA scienceNOW lesson.

- Four teachers spent *less than 30 minutes* preparing for each of the lessons,
- One spent *30-45 minutes* preparing for each,
- Three teachers spent *46-60 minutes* preparing, and
- Three spent between *61-75 minutes* preparing to teach each lesson.
- Of the remaining two teachers, one spent more time preparing for the Obesity activity and the other spent more time preparing to teach about the Flu. Both spent either *less than 30 minutes* or *30-45 minutes* in preparation.

The time teachers spent preparing for and implementing NOVA scienceNOW lessons was consistent across lessons.

The amount of time needed to prepare for the NOVA scienceNOW lessons was about *the same* (n=8) or *less* (n=4) compared to the amount of preparation needed to lead typical science activities. One teacher felt that the NOVA scienceNOW activities required *more* preparation time.

Implementing NOVA scienceNOW Lessons

Teachers devoted between one and four class periods to each of the NOVA scienceNOW lessons. Nine teachers spent the same number of class periods on each activity. Of the four remaining teachers, two spent more time on Obesity and two spent more time teaching Flu.

Teachers also reported their use of the activities in minutes. Including the amount of time spent viewing the NOVA scienceNOW programs (described in more detail below):

- Two teachers spent between *30-45 minutes* teaching each NOVA scienceNOW lesson.
- Four devoted *46-60 minutes* to each,
- Two spent between *61-75 minutes* teaching each, and
- Three spent *76-90 minutes* teaching each NOVA scienceNOW lesson.
- Two teachers spent more time doing the Flu activity. One spent *less than 30 minutes* on the Obesity activity and then *30-45 minutes* on Flu, and

to how the NOVA scienceNOW lessons enhanced their curriculum (pages 45 and 46 of this report) may provide insight into the topics teachers were referencing here.

the other devoted *76-90 minutes* to the Obesity activity and *more than 90 minutes* to the Flu lesson.

As part of their lesson implementation, each teacher used the corresponding NOVA scienceNOW video clips. Teachers used the video in the same way for both lessons; one used a portion of the related clip as part of both lessons, ten used the related clip in its entirety, and two teachers showed the entire episode.

Two teachers also used the NOVA scienceNOW Web site as part of their lesson. One used the Web site with both activities and one used it with the Flu activity only. All teachers were asked to share why they did or did not use the Web site. Responses are presented in Table 3.

Table 3
Rationale for Using the Web site as Part of NOVA scienceNOW Lessons

Used the Web site as part of their lesson	▪ *To* [incorporate] *technology into the lesson via computer interaction.* ▪ *I thought it would provide useful information that would hold the students interest.*
Did not use the Web site as part of their lesson	▪ *The lessons did not really require the students to use the website.* ▪ *We don't have computers in the classroom.* ▪ *I didn't see the [Web site] info in the activity at all!* ▪ *Time constraints.* ▪ *I didn't realize that was an option, but we have a lack of resources for all students to be able to use the website at the same time.* ▪ *There are not enough computers in my classroom. Also, I did not feel the need to extend the lesson into a second day to facilitate computer use.*

N=13

Teachers were asked to describe their use of the NOVA scienceNOW lessons as either an *enhancement activity* that built on material already included in their curriculum, or as an *enrichment activity* that focused on topics outside of their regular curricular content. Once they had made this determination, they shared the details of how each lesson fit with their curriculum.

In most cases, NOVA scienceNOW lessons were used to enhance curricular material.

Nine teachers believed that the Obesity activity enhanced their curriculum by building off existing curricular content. Many noted that the Obesity activity was a nice extension of topics that they were already covering with their students. Teachers linked the Obesity activity to curricular concepts such as the endocrine system, genetics, the study of enzymes, and the human body. When asked to explain how the activity fit with their curriculum, teachers replied:

> *"I arranged my lesson plan to incorporate these topics into our lessons a little earlier and referenced the changes to things happening in the community (*[i.e.,] *cold and flu season, obesity among teens)"*
>
> *"I will cover the whole endocrine* [system] *in the spring."*
>
> *"We were studying genetics and the obesity unit was incorporated as a genetic disorder."*
>
> *"Students* [discussed] *diet and nutrition and how they can improve their diet practices."*

"Used the genetics connection."

"It was added to new material in standards that deals with homeostasis and the effects of hormones and enzymes."

"We were in the middle of human body concepts and both activities were very appropriate."

"We finished talking about enzyme /receptor models."
"We talk about receptors and enzymes, so this was a nice complement to that same idea."

The four teachers who used the Obesity lesson as an enrichment activity shared how the activity enriched their regular curriculum. Most focused on how the topic was different from those they usually cover in science class. They replied:

"*It brought in an area that had not been stressed in this course."*

"U*sually I teach chemistry and physics but I enriched my curriculum to include the NOVA* [scienceNOW] *programs which help students understand genetics which is very much related to chem* [sic] *and physics."*

"Obesity is a topic that affects many of my students, but it is not covered in the curriculum. Also, my students do not need to know so much detail about receptors for the state test."

"It is current research and my students do current events every week."

Teachers used the Flu activity primarily as an enhancement activity. Table 4 presents ways that this activity was used to both enhance and enrich teachers' existing curricula. Most of those who used the activity to enhance their curriculum noted that they had just studied the flu, viruses, or the human body with their students.

Table 4
Ways that the Flu Activity Was Used to Enhance and Enrich Existing Curricula

Flu activity – Enhanced curriculum (n=10)	▪ *We had just completed a detailed study of the 1918 pandemic flu as it affected our community, county and state. This activity reinforced and enhanced the material that the students had studied and it provided an excellent bridge to the next* [phase] *of our study which will be the threat of avian influenza.* ▪ *The students must learn about viruses; this activity was an additional piece that matched perfectly to the curriculum.* ▪ *We discussed seasonal changes and why it appears that most individuals seem to become sick in the winter-time. We discussed several types of illness which are commonly associated with winter.* ▪ *We discuss disease and how it is spread, and the flu is one of the diseases we focus on. I've used different activities to show this spread before, so it made a nice change to that usual component.* ▪ *We were studying viruses & bacteria in Biology II & the immune system in Anatomy & Physiology* ▪ *Again, related indirectly to standards that relate to homeostasis and the human body.* ▪ *Discussing cell concepts and the human body. We also discuss sexually transmitted infections along with this.* ▪ *It* [expanded] *the topic to give the students a greater knowledge of the subject.* ▪ *The idea of public health enhanced the study of individual diseases covered in class.* ▪ *It related to past lessons on how bacteria/viruses are able to mutate and affect humans.*
Flu activity – Enriched curriculum (n=3)	▪ *Usually I teach chemistry and physics but I enriched my curriculum to include the NOVA* [scienceNOW] *programs which help*[ed] *students understand genetics and the building blocks of life which is very much related to chem* [sic] *and physics.* ▪ *Discussing the immune system and the ability for viruses to have different genetic make-ups.* ▪ *All my students have experienced the flu so now they can learn about it.*

In a final question about activity implementation, teachers were asked whether they revised either activity before using it with their students. Three teachers responded in the affirmative. When asked to share her revisions, they replied:

> "*There wasn't time in the hormone lab for students to build their own models. I also read them the background materials and explained a little about the endocrine system and how hormones work.*"

> *"I added an extension exercise in the Biology classes of having them create an activity to model the spreading of the flu. I also gave both classes quizzes over the material and created guided worksheets for them to fill out as they watched the videos."*

> *"I did not have students create their own models for the obesity lesson. Also in that lesson, each group member in a team of 3 made one model. I did not have the students participate in small group discussions at the end of the Flu lesson."*

TEACHERS' FEEDBACK ABOUT NOVA SCIENCENOW ACTIVITIES

Teacher Ratings of Activity Characteristics

Teachers rated the likelihood of using each NOVA scienceNOW activity in the future on a scale from 1 (*Not at all*) to 5 (*Extremely*). The full range of responses was received for the Obesity activity with the largest group of teachers reporting that they were *somewhat likely* to use this activity again. The majority of teachers reported begin *very* or *extremely likely* to use the Flu activity again in the future. See Table 5.

Table 5
Likelihood of Using NOVA scienceNOW Activities Again Next Year

	Not at All	A Little	Somewhat	Very	Extremely
Obesity	1	3	4	3	2
Flu	0	0	2	6	5

N=13

Teachers rated the Obesity activity as good or very good in many areas: ease of use, clarity of writing, quality of content, time estimates, and the match with their grade level.

Teachers rated seven characteristics of each lesson using a scale of *Poor* to *Excellent*. Table 6 presents the ratings given to each characteristic.

Teachers believed that the Obesity activity was *good* or *very good* in many areas including: *ease of use, clarity of writing, quality of content, time estimates*, and the *match with their grade leve*l. Mixed feedback was provided for the *design and format* of this activity and the extent to which the activity was a good *fit for their curriculum*.

The Flu activity was rated positively, with most teachers providing ratings of *very good* or *excellent* on each characteristic. This activity was rated highest for *quality of content* and *match with grade level*. Mixed though still positive ratings were provided for the extent to which this activity *fit their curriculum*.

Table 6
Teachers' Ratings of Activity Characteristics

		Poor	Fair	Good	Very Good	Excellent
Obesity	Ease of use	0	2	3	7	1
	Clarity of writing	0	1	5	7	0
	Quality of content	0	3	6	4	0
	Time estimates given for activities	1	0	5	5	2
	Match with grade level of students	0	1	4	6	2
	Design and format	1	3	3	4	2
	Fit with your curriculum	2	1	4	5	1
Flu	Ease of use	0	0	3	9	1
	Clarity of writing	0	0	4	7	2
	Quality of content	0	0	1	7	5
	Time estimates given for activities	1	0	1	8	3
	Match with grade level of students	0	0	1	8	4
	Design and format	0	0	2	8	3
	Fit with your curriculum	1	0	4	4	4

N=13

Most teachers rated the Flu activity as very good or excellent on each characteristic rated.

Teachers Perceptions of Students' Experiences with NOVA scienceNOW Activities

To share their perspectives on students' experiences with the NOVA science NOW activities, teachers were first asked to rate how effective the activities were at increasing students' interest in and knowledge of each activity topic. Ratings were provided on a five-point scale from 1(*Not at All*) to 5 (*Extremely*). As shown in Table 7, the majority reported that the Obesity activity was *generally effectiv*e at increasing students' interest in the topic and *very effective* at increasing their understanding of it. For the Flu activity, the majority of teachers believed it was *very effective* at increasing interest in the topic, and they were divided about the extent to which the activity increased students' understanding with the same number rating the activity as *generally* and *very effective* in this area.

Table 7
Perceived Effectiveness of Each Lesson in Increasing Students' Interest and Knowledge

		Not at All	A Little	Generally	Very	Extremely
Obesity	Increasing students' interest in the topic	0	3	7	2	1
	Increasing students' understanding in the topic	0	3	1	7	2
Flu	Increasing students' interest in the topic	0	0	4	7	2
	Increasing students' understanding in the topic	0	0	5	5	3

N=13

Teachers believed that the level of student participation, enjoyment, interest, and learning were about the same or higher for NOVA scienceNOW activities compared to a typical activity.

Teachers were also asked to compare their perceptions of students' experiences with the NOVA scienceNOW activities to their experiences with a typical science activity along six dimensions (see Table 8). Compared to a typical activity, the majority of the teachers rated NOVA scienceNOW activities as *about the same* or *higher* in each characteristic rated.

- Teachers believed that the level of student participation, enjoyment, interest, and learning were *about the same* or *higher* than with a typical activity.
- The level of student frustration and confusion with NOVA scienceNOW activities was also rated as *about the same* or *higher* than that of a typical activity.

Table 8
Teacher's Comparisons of Students' Experiences with NOVA scienceNOW Activities and Typical Activities

	Much Lower than with Typical Activities	Lower than with Typical Activities	About the Same as with Typical Activities	Higher than with Typical Activities	Much Higher than with Typical Activities
Participation	0	1	6	6	0
Enjoyment	0	2	5	5	1
Frustration	0	2	7	4	0
Confusion	0	2	7	4	0
Interest	0	1	7	5	0
Learning	0	0	8	5	0

N=13

Influence of the NOVA scienceNOW Activities on Teachers

Using the scale described in the previous section, teachers also reported the extent to which the NOVA scienceNOW activities had increased their own interest in and knowledge of each activity topic. As seen in Table 9, most teachers believed that both NOVA scienceNOW activities were either *generally* or *very effective* at increasing both their interest in and knowledge of topics featured.

Table 9
Perceived Effectiveness of Each Lesson in Increasing Teachers' Interest and Knowledge

		Not at All	A Little	Generally	Very	Extremely
Obesity	Increasing their own interest in the topic	1	1	3	8	0
	Increasing their own understanding in the topic	0	2	3	7	1
Flu	Increasing their own interest in the topic	0	0	5	6	2
	Increasing their own understanding in the topic	0	1	3	7	2

N=13

The rest of this chapter describes the students who participated in this study as well as the demonstrated influence that the activities had on their attitudes, interests, and knowledge.

PROFILE OF STUDENT RESPONDENTS

A total of 329 students completed both the Pre- and Post-Viewing Assessment Surveys; Table 10 displays demographic information to describe these students. The sample included students in each of the high school grade levels and was equally divided between male and female students. The sample was also racially/ethnically diverse.

Table 10
Profile of NOVA scienceNOW Student Participants

		% Respondents
Gender	Female	51%
	Male	49%
Grade	9th	26%
	10th	30%
	11th	27%
	12th	16%
Race/Ethnicity	African American	29%
	American Indian	14%
	Asian	10%
	Hispanic	17%
	Native Hawaiian	2%
	White	54%

N=329

Student Exposure to Current Events in Science Prior to Using NOVA scienceNOW Activities

To learn more about students' backgrounds and particularly about their familiarity with current events in science, GRG asked students to report on their exposure to science topics both in and out of the classroom.

Students were asked to indicate whether they had ever studied either of the NOVA scienceNOW activity topics in school.

- 52% of students reported that they had studied Obesity before, and
- 51% reported that they had studied Flu viruses in the past.

Students were also exposed to current events in science through media-based stories they encountered outside of the classroom. Using a scale of *None* to *More than Five*, the majority of students reported that they had heard at least one media-based story about both NOVA scienceNOW activity topics since the beginning of the school year. See Table 11.

Table 11
Number of Media-Based Stories Students Have Heard on NOVA scienceNOW Topics Since the Beginning of the School Year

	None	One	Two or Three	Four or Five	More than Five
Obesity	18%	18%	30%	14%	20%
Flu	17%	19%	30%	13%	22%
Other current events in science	16%	12%	27%	17%	29%

Number of respondents ranged from 322-325 across items.

One of the most obvious ways in which students could have learned about these topics is by watching NOVA and/or NOVA scienceNOW prior to beginning the study. Students reported their NOVA viewing habits on a scale of *Never* to *Once a Week*. The majority of students (67%) reported that they *never* watch NOVA. Of the remaining students, 22% reported that they watched NOVA between *once* and *a few times a year* and 11% reported that they watched *once a month* or more.

Students also reported whether they had watched NOVA scienceNOW either on television, on the Web site, or both. Because this series airs on a quarterly basis, GRG used a *Yes/No* scale to measure viewing. Seventeen percent of the students had seen NOVA scienceNOW prior to beginning the study. These included:

- 18% who had watched the program on television,
- 3% who had watched the program by visiting the Web site, and
- 2% who had seen the program both on TV and on the Web site.

Students' Attitudes about Science

As part of the Pre-Viewing Assessment Survey, GRG gathered baseline data about students' science attitudes. Students rated the extent to which they agreed with nine statements using a scale from 1 (*Completely Disagree*) to 6

(*Completely Agree*). Students' ratings indicated that they had fairly positive attitudes about science. As seen in Table 12:

- The highest rated items related to science labs; just under two-thirds of students *agreed* or *completely agreed* with a statement about enjoying labs and a similar percentage used these ratings to indicate that they would like to do more lab work in class.
- The majority also agreed that they like science, they enjoy learning science, think they are good at science, and plan to take science in college.
- Students disagreed, as a group, with both of the negative statements.

Table 12
Students' Science Attitudes before Using the Classroom Activities

	Completely Disagree 1	Disagree 2	Somewhat Disagree 3	Somewhat Agree 4	Agree 5	Completely Agree 6
I enjoy doing science labs in school. mean=4.70	1%	5%	8%	23%	36%	27%
I would like to do more lab work in science class. mean=4.54	4%	7%	9%	21%	33%	27%
I like science. mean=4.25	5%	7%	9%	32%	31%	16%
I enjoy learning science. mean=4.16	5%	8%	13%	31%	28%	15%
I think I will take science classes in college. mean=4.03	9%	12%	10%	26%	24%	20%
I am good in science. mean=4.03	3%	11%	13%	35%	26%	11%
Science is useful for solving everyday problems. mean=3.98	3%	10%	17%	37%	20%	13%
Science is boring. mean=2.74	18%	31%	24%	18%	6%	4%
The things you learn in science class have nothing to do with the real world. mean=1.99	42%	35%	11%	8%	3%	2%

Number of respondents ranged from 318-329 across questions.

STUDENT FEEDBACK ABOUT NOVA SCIENCENOW ACTIVITIES

To provide their overall feedback about the NOVA scienceNOW activities, students indicated whether their teacher should use each activity with next year's class. As seen in Table 13, 38% of the students believed that the Obesity activity should *definitely* be used again. Just over half of the students indicated that their teacher should *definitely* use the Flu activity again.

Table 13
Student Opinions about Whether NOVA scienceNOW Activities Should be Used Again

	Definitely	Maybe	No
Obesity	38%	53%	10%
Flu	54%	38%	8%

N=325-329

Student Comparisons of NOVA scienceNOW Activities and Typical Science Activities

Students believed that they learned a comparable amount of information from NOVA scienceNOW activities and typical science activities.

GRG compared students' responses to NOVA scienceNOW activities and typical science activities in two ways.[8] First, students were asked to rate how much they learned from the NOVA scienceNOW activities compared to what they learn from other science activities. The majority of students compared the activities favorably to typical science activities by indicating that they learned *more* or *about the same amount* from the NOVA scienceNOW activities (see Table 14).

Table 14
Learning Associated with NOVA scienceNOW Activities Compared to Typical Science Activities

	More	About the Same	Less
Obesity	35%	47%	18%
Flu	40%	44%	16%

N=322-323

The second method compared a typical science activity to each NOVA scienceNOW activity on six characteristics. As part of the Pre-Viewing Survey, students were asked to describe a typical science activity by rating characteristics on a scale from 1 (*Not at all*) to 5 (*Extremely*). Overall, students gave typical science activities an average rating for each characteristic. As seen in Table 15, on average,

- Students described the typical science activity as *generally* to *very informative*.
- Students provided slightly lower but similar ratings for the extent to which a typical science activity is *related to the real world* and *hands-on*.
- Students felt that the typical science activity was *generally interesting*, *fun*, and *motivating*.

Table 15
Students Ratings of a Typical Science Activity

	Not at All 1	A Little 2	Generally 3	Very 4	Extremely 5
Informative mean=3.48	4%	11%	32%	37%	15%
Related to the real world mean=3.37	5%	16%	34%	25%	19%
Hands-On mean=3.33	5%	21%	27%	31%	16%
Interesting mean=3.14	3%	22%	43%	21%	11%
Fun mean=3.00	6%	29%	35%	20%	10%
Motivating mean=2.90	9%	24%	41%	19%	7%

N=290

[8] Note that students were asked to rate a typical science activity either (a) to serve as a direct comparison to NOVA scienceNOW activities or (b) to provide information about students' overall opinions of science activities. As such, it was not necessary to learn students personal definitions of a typical science activity.

Compared to typical science activities, students believed that NOVA scienceNOW activities were significantly more related to the real world.

On the Post-Viewing Survey, GRG asked students to rate each individual NOVA scienceNOW activity by using this same scale and criteria described above.[9] To learn about differences in how students rated typical activities versus those from NOVA scienceNOW, GRG conducted a series of paired-samples t tests. As seen in Table 16,

- Overall, the Obesity activity was rated lower than typical science activities in most areas.
- Students rated the Flu activity as better than a typical activity for three categories. It was also considered equally *motivating*.
- Both the Obesity and Flu activities were rated as significantly more *related to the real world* compared with typical science activities.
- Each of the NOVA scienceNOW activities was considered significantly less *fun* and *hands-on* than a typical science activity. In addition, the Obesity activity was considered less *interesting* at a statistically significant level.

Table 16
Mean Ratings for a Typical Science Activity Compared to NOVA scienceNOW Activities

	Typical Science Activity	Obesity	Flu
Informative	3.48	3.36	3.54
Related to the real world	3.37	3.96**	3.95**
Hands-On	3.33	2.50**	2.88**
Interesting	3.14	2.95**	3.23
Fun	3.00	2.48**	2.83*
Motivating	2.90	2.83	2.90

N= 290
*p<.05; **p<.01

STUDENTS' CONTINUED ENGAGEMENT WITH NOVA SCIENCENOW CONTENT

GRG ascertained students' personal exploration of NOVA scienceNOW topics by asking whether they had noticed and/or interacted with related content on their own after using the activities in class. First, students were asked whether they noticed either of the activity topics being covered in news stories or science programs after using the activities. The majority answered in the affirmative for each topic; 63% of students noticed coverage of topics related to Obesity and 72% of had seen stories on Flu.

[9] Note that definitions were not provided for any of the characteristics rated. As such, it is not certain how students defined terms such as "related to the real world" and "hands on" when they provided their ratings. We can assume, however, that students used the same personal definition of each of these terms for both the pre- to the post-survey, and the results should be interpreted as such.

Most students had completed at least one activity to continue engaging with NOVA scienceNOW content after completing the classroom activities.

Students reported their additional engagement with content related to the series by indicating which of six activities they had completed or planned to complete in the future (see Table 17).

- Just under one third of the students (62%) had completed at least one activity related to NOVA scienceNOW content during the month of the study. The majority of these had either *had a conversation with a friend or family member* or *read a newspaper article* about content from the show.
- Almost three-quarters of students (72%) indicated that they planned to engage further with NOVA scienceNOW content by completing at least one of the six activities in the future.

Table 17
Additional Engagement with NOVA scienceNOW Content

	Yes	Not yet, but plan to	No, and I don't plan to
Had a conversation with a friend or family member	40%	23%	27%
Read a book/part of a book about a topic from NOVA scienceNOW	19%	27%	54%
Read a science magazine article about a topic from NOVA scienceNOW	21%	26%	53%
Read a newspaper article about a NOVA scienceNOW topic	36%	26%	38%
Visited a Web site to learn about a NOVA scienceNOW topic	21%	28%	51%
Attended a science lecture or presentation about a NOVA scienceNOW topic	11%	20%	69%

N=319-323

THE INFLUENCE OF NOVA SCIENCENOW ACTIVITIES ON STUDENTS' INTEREST IN BIOMEDICAL SCIENCE

Students responded to questions regarding both their interest in biomedical research and careers in biomedicine before and after using NOVA scienceNOW activities.

For these questions, biomedicine was defined for students as: *The field of biomedicine combines biology, biochemistry, and medicine to determine how the human body functions, why diseases occur, and how to treat them. Topics related to biomedicine include human genome research, genetic counseling for expectant parents, cloning, and embryonic stem cell research.*

Student Interest in Topics Related to Biomedicine

On the Pre-Viewing Survey, students reported their level of interest in biomedicine on a five-point scale from 1 (*Not at all*) to 5 (*Extremely*). The

largest group of students reported being *somewhat interested* in the topic, followed by those who were *not at all interested*.

- 7% of students reported that they were *extremely interested* in topics related to biomedicine,
- 20% reported that they were *very interested*,
- 37% of students reported that they were *somewhat interested*,
- 16% were *a little interested*, and
- 21% indicated that they were *not at all interested* in topics related to biomedicine prior to using NOVA scienceNOW activities.

After using both activities, GRG asked students to reflect back on their interest in topics related to biomedicine by indicating on a scale from 1 (*Much Less Interested*) to 5 (*Much More Interested*) how, if at all, their level of interest had changed.

- Just under half (47%) reported that they were *equally interested* in biomedical topics after completing the activities.
- A similar percentage (42%) reported that their interest in biomedicine had increased, with 10% reporting that they were *much more interested* in biomedical topics after completing NOVA scienceNOW activities and 32% reporting that they were *more interested* in these topics.
- 11% of students reported that they were *less interested* in these topics, and none of the students indicated that they were *much less interested*.

Interest in biomedical topics and interest in biomedical careers both increased as a result of completing the NOVA scienceNOW classroom activities.

Student Interest in Biomedical Careers

Students indicated their interest in pursuing a biomedical career on a five-point scale from 1 (*Not at all*) to 5 (*Extremely*) on both the Pre- and Post-Viewing Surveys. GRG assessed differences in students' ratings of their interest in biomedical careers using a paired-samples t test. Results indicated an increase in students' interest in careers in biomedical science after completing the NOVA scienceNOW activities.

- Before the activities, students reported that they were *a little* or *somewhat interested* in biomedical careers, with an average rating of 2.66 out of 5.
- After completing the NOVA scienceNOW activities, the average student rating had increased to 2.79. This increase was statistically significant ($p<.05$).

STUDENT LEARNING ASSOCIATED WITH NOVA SCIENCENOW LESSONS

Learning as Reported by Students

Learning associated with the NOVA scienceNOW lessons was measured by asking students to write a sentence to describe one new thing learned about each activity topic. Responses were categorized as either topical or content-specific.

Topical responses provided general statements that did not include specific content, but that were obviously related to the overall themes of the lesson.

Fewer than one-fifth of the students provided a topical response to describe what they had learned from Obesity; these responses included statements such as *when a person becomes overweight and too big* and *be healthy*. There were no topical responses about the Flu activity.

Content-specific responses were those that included a specific fact that was learned from the lesson. GRG coded the content-specific responses by theme; each response could have yielded up to three codes.

The content-specific responses related to the Obesity lesson mentioned students' understanding that genes influence obesity (24%), that obesity may be beyond a person's control (12%), and the prevalence of obesity (10%). Representative quotes included:

> "[Obesity] *is not always caused by overeating. Genes also play a huge role in overweight people."*
>
> *"Obesity may not occur just because you eat a lot, it may be a part of your genetic make-up."*
>
> *"Obesity can be genetically inherited."*
>
> *"Some people are obese because of genetic mutation."*
>
> *"It is usually genetic."*
>
> *"I learned that sometimes* [it's] *not a person's fault that they're obese."*
>
> "[It's] *not the persons fault sometimes* [it is] *the body that demands to eat."*
>
> *"It's not always a person's fault that they're obese."*
>
> *"It affects a wide range of people now-a-days including children."*
>
> *"That Indians in the U.S. has a higher rate."*
>
> *"That some obesity is genetic, it's not their fault they're overweight."*

Content-based learning from the Flu activity focused on the rate at which the virus spreads from human to human (24%), the fact that flu viruses can be lethal (17%), and how to protect oneself from a virus (15%). Students reported learning the following:

> "[The flu] *can be spread many different ways and can infect a large number of people in a short period of time."*
>
> *"How the virus gets in, takes control, and gets out of cell."*
>
> *"How flu viruses get spread."*

"That [the flu] *is spread from person to person."*

"Can be deadly pandemics and it can happen again at any point in time."

Students' understanding of NOVA scienceNOW topics increased at a statistically significant level after completing the NOVA scienceNOW activities.

"I learned how flu viruses could be contained with vaccinations."

"Economics comes into play when handing out vaccinations."

"You infect people before you show symptoms".

"Past flu epidemics have killed a lot of people."

"Flu viruses can be very deadly. Deadlier than I thought."

"There's not really a way to fight it except by drinking [a lot] *of fluids."*

Learning as Measured through a Content Assessment

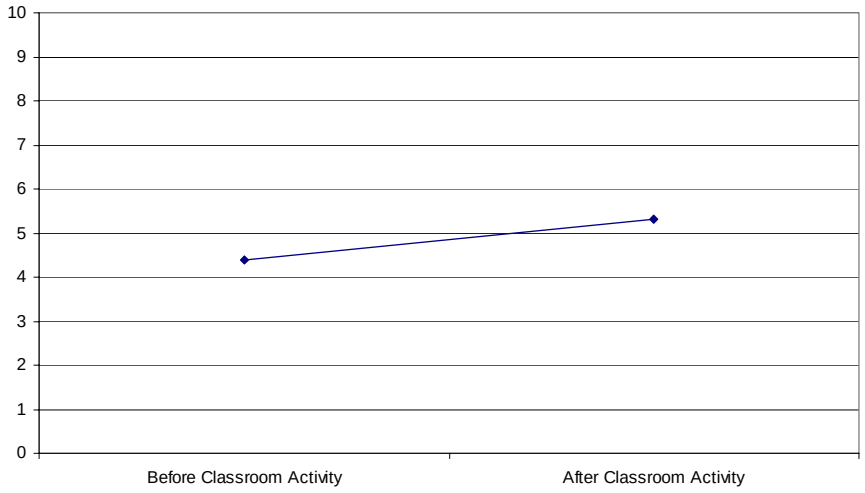
Knowledge gains were assessed by asking students to answer ten content-based assessment questions both before and after using the NOVA scienceNOW activities. Five questions were used for each NOVA scienceNOW topic.

Students' Pre-Survey responses indicated that they were familiar with each of the topics featured in the NOVA scienceNOW lessons. Their content assessment scores from this same survey indicated that while they were familiar with the topics, they did not have a detailed knowledge of either. Of the ten multiple choice questions, participants correctly answered 4.4 on average, with a range of zero to nine (n=252).[10] After completing both NOVA scienceNOW lessons students' scores had increased to 5.3, with a range of one to nine correct answers.

To investigate this change in scores further, GRG conducted a paired-samples t test. Results indicated a statistically significant increase in students' content knowledge after experiencing the NOVA scienceNOW activities ($p<.01$). See Figure 1.

[10] Several students (n=77; 23%) did not complete the assessment questions in their entirety and thus scores could not be calculated and used in this analysis.

Figure 1
Increases in Content Knowledge after Using NOVA scienceNOW Activities



GRG also analyzed changes in students' knowledge related to each individual NOVA scienceNOW activity topic. Recall that the surveys included five content questions for each activity topic. As shown in Table 18, paired samples t tests indicated significant gains in the number of items answered correctly about each content area as a result of using NOVA scienceNOW activities, with larger gains found for the Obesity activity.

Table 18
Increases in Content Knowledge, by NOVA scienceNOW Topic

	Before Using Activities	After Using Activities
Obesity	2.17	2.81**
Flu viruses	2.19	2.35*

Number of respondents ranges from 272-281 across questions.
* p<.05, **p<.01

A COMPARISON OF STUDENT FINDINGS FROM SEASON ONE AND SEASON TWO

Recall that the current evaluation is the second that GRG has conducted of NOVA scienceNOW classroom activities. The first was conducted during Season One and included five teachers and a total from 127 students who completed three NOVA scienceNOW activities. GRG used similar recruitment strategies and instruments in both the Season One and Season Two evaluations of the NOVA scienceNOW activities to allow results to be compared across seasons. This section of the report describes the similarities and differences across these evaluations.

Although similar recruitment procedures were used, the student populations who participated in the evaluation differed across the two seasons. The Season Two

sample was more evenly divided across gender and high school grade level compared to the sample from Season One. Season Two students were also more racially/ethnically diverse.

Perhaps more importantly, Season Two students were more involved with science compared to those from Season One. For example, they reported having greater exposure to NOVA scienceNOW topics in and out of school. Similarly, a greater percentage of Season Two students (though still a minority) reported watching NOVA, and three times as many had seen NOVA scienceNOW.

This trend also continued in students' attitudes about science. Season Two students rated typical science activities more positively than did students who participated in the Season One evaluation, with the greatest differences found in their ratings of the extent to which typical science activities were fun and motivating.

Regardless of their predispositions toward science, all students reacted positively to the NOVA scienceNOW activities overall. At least half of the students believed that their teacher should definitely use four of the five activities again. When asked to rate the specific characteristics of the activities, however, Season One students compared the NOVA scienceNOW activities more favorably to typical science activities compared to students from Season Two.

Consistencies were also found in these ratings across seasons. Students believed that NOVA scienceNOW activities were more relevant to the real world than were typical activities, and they reported that the NOVA scienceNOW activities were less hands-on than a typical activity.

Results from both the Season One and Season Two evaluations indicated that the NOVA scienceNOW classroom activities have a positive influence on students. Results from each year demonstrated that their knowledge of activity content increased at a statistically significant level after using the activities.

Results also showed a positive influence of the activities on students' interest in biomedical science topics and careers. Three-quarters of the Season One students and just under half of the Season Two students reported being more interested or much more interested in these topics after completing the activities. Students' interest in biomedical careers also increased at a statistically significant level after using the activities from both seasons.

Finally, students in both groups indicated that they had extended their experience with NOVA scienceNOW activities outside of the classroom. The majority of students (80% in Season One and 70% in Season Two) had completed at least one activity outside of the classroom related to NOVA scienceNOW topics. Most had either engaged in conversations with friends and/or family about activity topics or read a newspaper article about a topic.

In summary, results from both seasons indicate that NOVA scienceNOW classroom activities are accomplishing their intended learning goals by affecting change in students' attitudes about and interest in science as well as their knowledge of science content.

BIOSCIENCE CLASSROOM ACTIVITIES: SEASON ONE FOLLOW-UP SURVEY

As mentioned previously, the design and methodology used in the Season Two classroom activity evaluation was modeled after GRG's evaluation of the Season One activities. In March 2007, GRG contacted the five teachers who participated in the Season One evaluation to learn if they had continued to use NOVA scienceNOW activities since completing the study. For those who had continued using them, the Teacher Follow-Up Survey was also an opportunity to gather additional feedback about the activities. See Appendix I for a copy of the survey.

Teachers received an initial email invitation to complete the Teacher Follow-Up Survey and up to two email reminders. Four of the five teachers completed the survey; each received a $20 gift certificate to amazon.com for their time and effort.

FOLLOW-UP TEACHER SURVEY RESULTS

Each of the five teachers from the Year One evaluation have continued to use NOVA scienceNOW activities since completing the study.

Each of the four teachers who completed the Teacher Follow-Up Survey taught Biology. As part of the Season One evaluation, each teacher had used the NOVA scienceNOW activities with two upper level classes of Biology students (including students in Honors Biology, Advanced Biology, College Biology, Advanced College Prep Biology, and AP Biology). As a group, these teachers used the NOVA scienceNOW activities with students in each of the four high school grade levels.

TEACHERS' CONTINUED USE OF NOVA SCIENCENOW CLASSROOM ACTIVITIES

As part of the Season One evaluation, teachers reported the likelihood that they would use the three NOVA scienceNOW activities from the evaluation again. Of the four teachers who completed both the Season One evaluation and the Follow Up survey, three reported that they were *extremely likely* to use at least one of the activities again, and one reported being *very likely* to use the activities in the future.

As part of the Follow-Up Survey, GRG asked teachers whether they had, in fact, used each of the activities from the Season One evaluation and whether they had used other NOVA scienceNOW activities. Each of the three teachers who reported being *extremely likely* to use the activities at the end of the Season One evaluation had used at least one of the three activities again at the time of the Follow-Up Survey. The teachers who said she was *very likely* to use the activities again had not yet used one of the three activities, though she had used other NOVA scienceNOW activities since completing the evaluation. More specifically,

- One teacher had used all three activities from the evaluation as well as other NOVA scienceNOW activities since completing the study.
- Two teachers had used two of the three activities from the evaluation again, as well as other NOVA scienceNOW activities.

When implementing these activities, all four teachers used the related video segments, and two had asked students to visit the NOVA scienceNOW Web site as part of an activity.

In addition to continuing to use the activities themselves, all four teachers had also recommended the activities to a colleague. When asked why they recommended NOVA scienceNOW activities, responses included:

> *"The activities and video segments are especially helpful with the new state of Connecticut science content standards. The activities and segments are also enjoyable for both teachers and students."*
>
> *"I found them useful in my own classes and realize that colleagues could also benefit from them."*
>
> *"Something different to try, innovative, fun."*
>
> *"I had used them with my Honors Biology students, but this year suggested we use the activities with all of our General Biology students also."*

SEASON ONE TEACHERS' OPINIONS ABOUT ACTIVITY CHARACTERISTICS

Each NOVA scienceNOW classroom activity offers teachers three types of activities. The Before Viewing Activities provide suggestions for ways to introduce key concepts to students before they watch a segment of the NOVA scienceNOW program. The After Viewing Activities provide suggestions for extending a video segment's content once it has been viewed by the class. The third type of activity is a Stepped-Out Classroom Lesson that builds on the content presented in a specific video segment.

As part of the Follow-Up Teacher Survey, GRG provided teachers with the explanation presented in the above paragraph, and then asked them to rate the extent to which each type of activity had been helpful to them on a five-point scale from 1 (*Not at All*) to 5 (*Extremely*). A Have Not Used option was also provided. As seen in Table 19, all four teachers had used each of the different types of activities and thus were able to provide a rating. The Before Viewing activities received the highest ratings overall, followed by the Stepped-Out Lesson, and After Viewing activities.

Table 19
Helpfulness Ratings for Different Types of NOVA scienceNOW Activities

	Not at All	A Little	Generally	Very	Extremely
Before Viewing Activities	0	0	1	2	1
After Viewing Activities	0	0	3	1	0
Stepped-Out Classroom Lesson	0	1	0	3	0

N=4

Teachers also rated the individual sections included in the Stepped Out Classroom Lesson (see Table 20). Using the same scale described above, teachers indicated that five of the seven sections had been either *very* or *extremely helpful* to them. Ratings for the Answers and Links and Books sections were slightly lower. One teacher had not used the Links and Books section of the activities.

Table 20
Teacher Ratings of the Sections Included in the NOVA scienceNOW Stepped-Out Lessons

	Not at All	**A Little**	**Generally**	**Very**	**Extremely**	**Have not Used**
Overview	0	0	0	3	1	0
Background	0	0	0	2	2	0
Procedure	0	0	0	2	2	0
Terms	0	0	0	2	2	0
Answers	0	0	2	1	1	0
Student Sheets	0	0	0	2	2	0
Links and Books	0	2	0	1	0	1

N=4

BIOSCIENCE CLASSROOM ACTIVITIES: CONCLUSIONS

Students' knowledge of science content increased as a result of participating in the NOVA scienceNOW activities.

Students believed that they learned more or about the same amount from NOVA scienceNOW activities compared to typical science activities, and a statistically significant change in students' content scores confirmed that their knowledge increased after completing both activities. Students' knowledge of content about both Obesity and Flu viruses changed at a statistically significant level.

Interest in biomedical topics and interest in careers in biomedicine were positively influenced by the NOVA scienceNOW activities.

While most students reported an existing interest in biomedical topics prior to using the NOVA scienceNOW activities, many also believed that they were more interested or much more interested in these topics after using the activities. Students' interest in biomedical careers had increased at a statistically significant level after using the activities.

NOVA scienceNOW activities encouraged students to continue engaging with science content.

As a result of completing a NOVA scienceNOW activity, most students had a conversation with either a friend or family member, or read a newspaper story about a NOVA scienceNOW topic. A similar percentage indicated that they planned to complete at least one additional activity in the future to continue interacting with content related to either the Obesity or Flu activity.

Teachers believe that NOVA scienceNOW activities are comparable to or slightly better than typical science activities.

Season Two Teachers believed that students' level of participation in, enjoyment of, and learning from NOVA scienceNOW activities was equal to or greater than with typical activities. Students' level of confusion and frustration was equal to or higher than that for typical activities. They also believed that the amount of time needed to prepare for NOVA scienceNOW was comparable to the amount of time they spend preparing for activities on a regular basis. Teachers' positive impressions of the activities were confirmed through the Follow-Up Survey; all four teachers had continued to use NOVA scienceNOW activities after completing the evaluation and all four had recommended the activities to colleagues.

NOVA scienceNOW activities were used primarily to enhance existing science topics featured in a curriculum rather than to enrich a curriculum by adding new and related topics that aren't already covered.

The majority of the teachers used each activity to enhance their curricular content. Obesity was used with curricular topics such as the endocrine system, genetics, and diet and nutrition. The Flu activity was used to enhance curricular topics such as the 1918 flu, viruses, and the relationship between seasonal change and illness. Those who used these activities as enrichment noted similarities between the NOVA scienceNOW activity topics and their regular science curriculum and/or students' experiences.

EVALUATION OF THE NOVA SCIENCENOW WEB SITE

THE WEB SITE: SEASON TWO WEB SITE SURVEY

GRG conducted its first survey of the NOVA scienceNOW Web site in the Summer of 2006. This survey was administered after all five Season One NOVA scienceNOW episodes had aired, and the survey gathered data from everyday Web site visitors. The results of this survey were reported to WGBH in July 2006.

A second Web site Survey was implemented in late November and early December of 2006 in conjunction with the broadcast of Season Two, Episode Two. The purpose of the Season Two Web Survey was to learn about visitors who come to the Web site as a result of a broadcast, with a focus on why they choose to visit and whether the Web site provided them with the information they were seeking.

Several questions from the July 2006 survey were used again in the Season Two Web Survey, including questions that gathered basic demographic data, information to describe visitors' interest in particular video features on the site, their feedback about the site, and the extent to which they plan to extend their visit to the Web site by participating in a number of related activities. In addition, questions were added to determine whether visitors would prefer more detail, less detail, or the same amount of detail to be presented as part of future offerings. See Appendix J for a copy of the survey.

The Season Two Web Survey was hosted on the GRG survey Web site. NOVA scienceNOW visitors were alerted to the survey by a link on the NOVA scienceNOW home page and a pop-behind message that appeared after visitors had clicked on three different site features. Data were collected during a three-week period starting November 22, the day after Episode Two was broadcast. During that time, a total of 794 visitors completed the survey.

SEASON TWO WEB SITE SURVEY RESULTS

PROFILE OF RESPONDENTS

The demographic profile of the Phase Two Web Survey respondents is presented in Table 1. Half of the respondents were 35 years of age or younger and most visitors were White and male. A large group of respondents (42%) were parents, approximately one in five survey respondents were educators and approximately one-third were students. Approximately one in ten respondents was visiting the Web site from countries other than the Unites States.

Table 1
Profile of NOVA scienceNOW Web site Visitors

		% Respondents
Age	17 and under	7%
	18 – 35 years old	43%
	36 – 50 years old	28%
	51 – 75 years old	21%
	76 and older	<1%
Race	African American	4%
	American Indian	3%
	Asian	11%
	Hispanic/Latino	6%
	Native Hawaiian/Pacific Islander	<1%
	White	77%
Gender	Male	69%
	Female	31%
Groups of Particular Interest	Parent of child under 18	24%
	Parent of child 18 or older	18%
	Teachers	18%
	Professors	5%
	Students	31%
	International audience[11]	14%

Number of respondents ranged from 659-782 across questions.

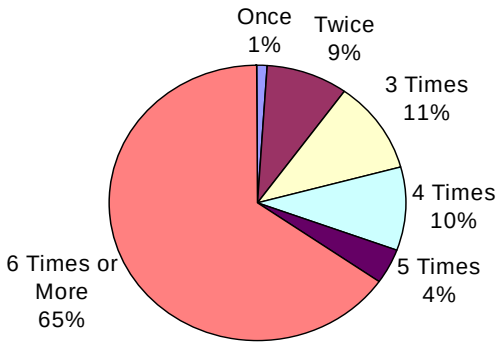
Most NOVA scienceNOW Web site visitors are 35 years of age or younger.

Web site visitors included both those who have seen the NOVA scienceNOW television program (83%) and those who have not. Similarly, respondents included both regular and new visitors to the Web site; 62% of respondents (n=488) reported that they had visited the NOVA scienceNOW site in the past.

The vast majority of those who had visited the NOVA scienceNOW site previously had been to the site on more than one occasion, and almost two-thirds had visited the site six times or more. See Figure 1.

[11] International visitors to the Web site were from Australia, Bangladesh, Brazil, Bulgaria, Canada, Croatia, Finland, France, Greece, Hong Kong, India, Ireland, Japan, Mexico, New Zealand, Peru, Poland, Singapore, South Korea, Spain, Sweden Switzerland, Taiwan, Tanzania, Turkey, United Kingdom, and Vietnam.

Figure 1
Number of Times Returning Visitors Had Previously Visited the NOVA scienceNOW Web site



The NOVA scienceNOW Web site has a loyal following, with most Web site respondents reporting they had visited the site more than six times, the highest option on the list.

Respondents also reported how often they interact with other NOVA offerings, including NOVA Web sites and NOVA broadcasts. The majority (90%) of respondents reported that they had visited a NOVA site in the past, and half reported that they visit a NOVA site a *few times a month* or more. A small group reported that they have *never* visited the site.

- 21% visit *once a week or more*,
- 31% visit *a few times a month*,
- 12% visit *once a month*,
- 19% visit *a few times a year*,
- 7% visit *once a year*, and
- 10% *never* visit the NOVA Web site.

Respondents reported their NOVA viewing habits, including viewing NOVA on television and via NOVA Web sites. As shown in Table 2 below, nearly half of the respondents reported watching NOVA *a few times a month* or more through each medium. About one in five reported that they *never* watch NOVA through either medium.

Table 2
Respondents' NOVA Viewing Habits, by Medium

	Never	Once a Year	A Few Times a Year	Once a Month	A Few Times a Month	Once a week or more
NOVA television broadcasts	17%	4%	22%	12%	25%	20%
NOVA on the Web	22%	5%	15%	15%	26%	17%

N=794

REASONS FOR VISITING THE NOVA SCIENCENOW WEB SITE

Respondents were asked to share how they originally learned about the NOVA scienceNOW Web site by choosing from a list of five options. A sixth category was also provided for respondents to share other ways that they learned of the site that were not included in the list.

- 25% learned about the site through a NOVA scienceNOW broadcast,
- 20% linked to the site from a NOVA Web site,
- 20% found the site through an Internet search,
- 10% linked to the NOVA scienceNOW Web site through another (non-NOVA) site, and
- 1% found it through a Podcast.

The NOVA scienceNOW broadcast prompted visitors to come to the Web site – some came to learn more about a topic and others came to find out what they had missed.

In addition to the options listed above, 17% reported learning of the site in other ways. Of these, the largest group reported learning of the site through a personal contact (including friends, family, colleagues, teachers, and professors). Several learned of the site through promotions in the media or because they were linked to the NOVA scienceNOW site from a different site on the Internet. Approximately one in five learned of the site through PBS programs or from pbs.org.

Respondents also shared their primary reason for visiting the NOVA scienceNOW site. Recall that the Phase Two Web site was launched the morning after Episode Two aired, in part to capture data from those who may have visited the site as a result of watching the show. A total of 343 respondents (43%) had seen the Episode Two broadcast prior to visiting the site. These respondents were asked to select the reason for their visit from a list of five choices. A sixth option was also provided for those who visited the site for other reasons. Of those who watched the Episode Two broadcast and then visited the Web site:

- 36% came to the site to learn more about one of the topics featured in Episode Two,
- 17% came to see what other stories had been featured on past NOVA scienceNOW programs,
- 13% visited to watch a part of the episode they had missed,
- 10% came to watch a previous episode that they had missed, and
- 6% visited to find out when the next broadcast will air.

In addition, 69 of those who visited the site after the broadcast reported visiting for "other" reasons. These included people who came to watch segments (14%), those who were looking for information to share with others (13%), people looking for information about a specific topic (13%), teachers looking for information to use as part of a lesson (12%), and those who visited the site to share a comment (10%).

Respondents who had not seen the November 21 broadcast responded to an open-ended question to share their reasons for visiting. A total of 449 respondents answered this question. GRG coded their responses based on theme. The top five reasons cited for visiting the site and representative quotes are presented below.

- 31% visited the site to watch online programming; respondents in this category provided general statements such as *on-line video*, and *watch online*.
- 17% visited the site specifically to watch and/or learn about a Season Two broadcast. These visitors wanted to *watch* [the] *flu segment*, learn *about the asteroid issue*, find *more information on* [the] *Robot program that Cynthia B. is working on*, [look] *for the segment on mass extinctions, look at obesity information*, or to see the segment about *ancient manuscripts*. Others visited the site because they *had planned to watch the program but didn't get home in time*.
- 10% visited the site looking for information about a specific topic they were researching (e.g., *string theory*, *tsunamis*, [Artificial Intelligence], *bears*, *black holes*, *emotional intelligence*) while others made general statements such as *find a specific segment*, or *research information*.
- An additional 7% visited the site specifically to research a topic from Season One. The majority of these visitors were looking for information about RNAi or mirror neurons. A smaller number reported visiting the site to see the fish surgery and one visitor each came to watch the profile of James McLurkin, find updates on stem cell research, and to see the segment on the ivory-billed woodpecker.
- 7% were teachers who visited the site to gather information to use in a lecture or lesson.

Once they had reported their reasons for visiting the site, respondents were asked whether they were able to find what they were looking for during their visit. The majority of people responded in the affirmative.

- 88% of those who had seen the November 21 broadcast found what they were looking for on the NOVA scienceNOW site during their visit, and
- 91% of those who had not seen the broadcast were able to find what they wanted.

For the minority of people who could not find what they were looking for, the largest group (24%) was looking for information on a certain topic that was either unrelated or tangentially related to the topics covered by the NOVA scienceNOW program. Others (13%) were looking for information about the broadcast schedule, purchasing the show, or for a link that would allow them to watch full episodes. Over one quarter of those who had not seen the November broadcast (31%) visited the site before the Episode Two segments were posted and thus could not access the video.

TIME SPENT ON THE WEB SITE AND VIDEO FEATURES USED

The amount of time that respondents spent on the site varied, with some spending only a few minutes and others spending up to an hour before completing the survey.

- 9% had spent less than five minutes on the site,
- 18% had been on the site for 5-10 minutes,
- 24% had been on the site for 11-20 minutes,
- 20% have been on the site for 21-30 minutes,

- 11% had been on the site for 31-40 minutes, and
- 18% has been on the site for 41-60 minutes.

Just under three-quarters of visitors (72%) had already watched at least one video segment at the time they completed the survey. Table 3 presents the percentage of respondents who reported watching each segment. The type of science segment and air date, as identified by the NOVA scienceNOW site, is also presented.

Segments from the recent broadcast were viewed most often by Web site visitors.

- Two segments (Mass Extinction and 1918 Flu) were viewed by a noticeably larger percentage of visitors than any other segment; both were from the November broadcast.
- Four of the top five segments viewed were from Season Two broadcasts.
- Four of the top ten segments viewed featured topics related to *health and bioscience* and an additional three of the top ten segments featured *physics and space science* topics.
- The scientist profiles and technology segments were among those viewed least often.

Table 3
Segments Web site Visitors Watched

	Subject	Air Date	% respondents
Mass Extinction	Nature	November 2006	36%
1918 Flu	Health and Bioscience	November 2006	34%
Asteroid	Nature Physics and Space Science	October 2006	27%
Stem Cells	Health and Bioscience	April 2005	18%
Cynthia Breazeal	Profile Technology	November 2006	18%
Pandemic Flu	Health and Bioscience	January 2006	17%
Papyrus	Other	November 2006	16%
RNAi	Health and Bioscience	July 2005	15%
Island of Stability	Physics and Space Science	October 2006	14%
Lightening	Nature Physics and Space Science	October 2005	13%
Mirror Neurons	Health and Bioscience	January 2005	13%
Artificial Life	Health and Bioscience	October 2005	13%
10th Planet	Physics and Space Science	January 2006	13%
Fuel Cells	Technology	July 2005	13%
Stem Cell Update	Health and Bioscience	January 2006	12%
Don't Ask the Expert	Other	October 2005	12%
Little People of Flores	Nature	April 2005	11%
Fastest Glacier	Physics and Space Science	July 2005	10%
Obesity	Health and Bioscience	October 2006	10%
Hurricanes	Physics and Space Science	January 2005	10%
Twin Prime Conjecture	Other	January 2006	10%
Frozen Frogs	Nature Health and Bioscience	April 2005	10%
Booming Sands	Physics and Space Science	January 2005	10%
Hurricane Katrina	Nature	October 2005	10%
T-Rex	Nature	April 2005	9%
Brothers Chudnovsky	Profile Technology	July 2005	9%
James McLurkin	Profile Technology	January 2005	8%
Naomi Halas	Profile Health and Bioscience	April 2005	8%
Stronger Hurricanes	Nature	January 2006	8%
Ivory-Billed Woodpecker	Nature	January 2006	8%
Lab meat	Technology	January 2006	7%
Karl Iagnemma	Profile Technology	October 2006	7%
Erich Jarvis	Profile Health and Bioscience	October 2005	7%
Fish Surgery	Health and Bioscience	October 2005	7%
Tyler Curiel	Profile Health and Bioscience	January 2006	6%

N=764

Respondents who did not view any video segments as part of their visit to the site were asked to share why they chose not to watch; 220 visitors responded to this question. Twenty-seven percent reported that they started the survey before watching any video, and another 14% did not watch any video because they had already seen all of the segments featured. However, the most commonly reported obstacles to viewing were time (cited by 17%) and technical problems (15%).

Having video features available was the top-listed feature of the NOVA scienceNOW site

FEEDBACK ABOUT THE NOVA SCIENCENOW WEB SITE

To gather feedback about the Web site, GRG asked respondents to share their favorite and least favorite aspect. They also indicated whether they planned to visit the site again in the future and whether they would recommend the site to others.

Almost every respondent (n=790) shared their favorite thing about the NOVA scienceNOW Web site. The largest group (40%) named the video segments as their favorite component of the Web site. The navigability and/or visual appeal of the site and the site's content were also named as favorites. See Table 4 for examples.

Table 4
Respondents' Favorite Things about the NOVA scienceNOW Web site

Availability of video features 40%	▪ *I can view video segments at my leisure.* ▪ *I love watching the videos on the site either if I missed a NOVA episode or to see one again.* ▪ *Knowing videos are available on past episodes.* ▪ *The fact that we can watch previous episodes of Nova.*
Navigability and visual appeal of the site 16%	▪ *This site is very user friendly. I can see myself visiting it often.* ▪ *The site has tremendous visual appeal, and is very easy to navigate.* ▪ *It was very eye-catching.* ▪ *It is very easy to navigate and well designed visually.*
The content 12%	▪ *The amount of in-depth information shared regarding the subjects covered in the shows.* ▪ *Good quality science.* ▪ *The wealth of science it offers and how NOVA scienceNOW explains things very well.* ▪ *Variety of topics and information sources.*

N=790

When asked to name their least favorite thing about the Web site, 39% reported that there was nothing they didn't like about the site. The next largest group of respondents (21%) reported that they wanted more content including older episodes of NOVA and a further extension of the information provided on NOVA scienceNOW topics. Comments included *Not all of the NOVA segments broadcast on PBS are available for viewing* and *More info!*. Others in this category felt that *updates seem to happen only once a year*.

Technological issues (11%) and navigating the site (11%) were also mentioned as respondents' least favorite part of the Web site. Technological issues included a desire to enlarge the windows media player picture to view the videos. Others

The vast majority of Web site visitors plan to visit the NOVA scienceNOW site again in the future.

wanted to be able to download videos.[12] Comments from those who had trouble navigating the site included *finding what I want isn't easy* and *all the videos aren't in one place*.

Respondents reported their plans for returning to the NOVA scienceNOW Web site using a scale of *yes*, *no*, or *maybe*. Almost all respondents planned to revisit the site in the future (96%). When asked to share why they will return to the site, 764 respondents replied. Responses were coded, based on theme, and each response received up to three codes. The reasons cited most often are presented in Table 5, with examples.

Table 5
Reasons Visitors Will Return to the NOVA scienceNOW Web Site

To watch more NOVA scienceNOW 28%	▪ *Allows me to see NOVA shows I miss on topics of interest to me.* ▪ *I watch little TV, but NOVA is a show I watch as frequently as I can and I particularly enjoyed seeing the scienceNOW version. Now I realize how much I've missed and will try to watch segments on my own schedule.* ▪ *To discover the other programs.* ▪ *To learn, watch videos.*
To learn and/or teach others 26%	▪ *Either to prepare for classroom use of one or more segments or to* [use] *one or more segments in the classroom.* ▪ *Just simply to learn more.* ▪ *There is a plethora of information being offered.* ▪ *To read more.*
Because they like the site, NOVA, science and/or NOVA scienceNOW 26%	▪ *Because I am a science lover and this site really helps me to understand certain things.* ▪ *More entertaining that watching movies, and great topics for conversation and debate if I watch with a friend.* ▪ *To spend time in a pleasant manner and learn additional scientific facts on topics that interest me.* ▪ *Very enjoyable.*
The information presented 15%	▪ *For interesting science information.* ▪ *Now that I know it is there I will add it to the list of places that I go for accurate information.* ▪ *To get more info* [sic] *as needed.* ▪ *Very reliable information and well presented.*
To keep up-to-date on current events and/or to check for new programs 13%	▪ *I like to keep up with science. So much has changed.* ▪ [Stay] *up to date on science information.* ▪ *To see what's new.* ▪ *To watch more programs and see if any new ones have been added.*

N=764

GRG also gathered feedback from respondents who said they might return or would not return to the site. A total of 27 respondents said that they might return to the Web site, depending on their needs and/or interests. For example, responses included *whenever I'm bored*, *if a topic is of interest to me*, and *as a teaching tool for my class*. The two respondents who will not return to the site stated that they were looking for more depth of content; these respondents represented less than 1% of the sample.

[12] WGBH has explored this possibility and, at this time, it is not feasible due to legal and fiscal constraints.

As a final measure of their satisfaction with the Web site, respondents were asked whether they would recommend the NOVA scienceNOW site to others. Almost all respondents (95%) answered in the affirmative.

RESPONDENTS' PREFERENCES FOR PARTICULAR WEB SITE FEATURES

Preferences for NOVA scienceNOW Features

Stories on health and bioscience and physics and space science were those that visitors were most likely to watch on future visits.

Recall that 764 of the 794 respondents (96%) plan to visit the NOVA scienceNOW Web site again in the future. To learn more about the topics that were of most interest to visitors, GRG asked respondents to indicate the video segments they were likely to watch on a return visit.

Respondents reported having plans to watch multiple segments on return visits, with the average number of segments that people planned to watch being 13. Table 6 presents the percentage of respondents who plan to watch each segment in the future by title, topic area, and broadcast date.

- Stories on *health and bioscience* and *physics and space sciences* were those that visitors were most likely to watch on future visits. In contrast, most stories on *nature* and *technology* were at the bottom of the list.
- The date on which the segment was broadcast did not relate to respondents' interest in watching it on a future visit to the site.

Table 6
Segments that Web site Visitors Will Watch in the Future

	Subject	Air Date	% respondents
Stem Cell Update	Health and Bioscience	January 2006	54%
10th Planet	Physics and Space Science	January 2006	53%
Stem Cells	Health and Bioscience	April 2005	52%
Artificial Life	Health and Bioscience	October 2005	51%
Mass Extinction	Nature	November 2006	50%
Fuel Cells	Technology	July 2005	49%
Lightening	Nature Physics and Space Science	October 2005	48%
Mirror Neurons	Health and Bioscience	January 2005	47%
Asteroid	Nature Physics and Space Science	October 2006	46%
1918 flu	Health and Bioscience	November 2006	44%
Fastest Glacier	Physics and Space Science	July 2005	43%
Pandemic Flu	Health and Bioscience	January 2006	43%
RNAi	Health and Bioscience	July 2005	40%
Naomi Halas	Profile Health and Bioscience	April 2005	38%
T-Rex	Nature	April 2005	37%
Island of Stability	Physics and Space Science	October 2006	37%
Papyrus	Other	November 2006	37%
Erich Jarvis	Profile Health and Bioscience	October 2005	36%
Obesity	Health and Bioscience	October 2006	35%
Hurricanes	Physics and Space Science	January 2005	34%
Tyler Curiel	Profile Health and Bioscience	January 2006	34%
Twin Prime Conjecture	Other	January 2006	33%
Cynthia Breazeal	Profile Technology	November 2006	33%
James McLurkin	Profile Technology	January 2005	32%
Don't Ask the Expert	Other	October 2005	32%
Little People of Flores	Nature	April 2005	32%
Stronger Hurricanes	Nature	January 2006	31%
Brothers Chudnovsky	Profile Technology	July 2005	31%
Frozen Frogs	Nature Health and Bioscience	April 2005	31%
Lab meat	Technology	January 2006	30%
Karl Iagnemma	Profile Technology	October 2006	30%
Booming Sands	Physics and Space Science	January 2005	30%
Ivory-Billed Woodpecker	Nature	January 2006	27%
Hurricane Katrina	Nature	October 2005	24%
Fish Surgery	Health and Bioscience	October 2005	24%

N=764

Preferences for Types of Science Segments

Respondents also reported their interest in future topics by indicating, from a list of four options, the types of science stories they would like to see more of in the future. Overall there was broad support for these topics, and there was particular interest in stories about *physics and space science*.

- 82% would like to see more stories about *physics and space science* (such as Asteroid and 10th planet).
- 73% would like more *technology* stories (such as Fuel Cells and Lab Meat).
- 71% would like to see more *health and bioscience* stories (e.g., Mirror Neurons, Stem Cells, and Obesity) in the future.
- 55% would like more *nature stories* (such as Ivory-billed Woodpecker, Little People of Flores and T-rex).

In addition to selecting from these four options, respondents also had the opportunity to make their own suggestions. Approximately one in five respondents (n=180; 23%) shared an additional topic that they would like to see featured in future programs. GRG coded these responses based on topic.

- *10% were interested in* history-based features including "*ancient history"* and "*the history of science."*
- 9% were interested in environmental science including "*global warming*," "*energy efficient fuels*," and "*ecosystem destruction due to human activities*."
- 8% were interested in earth science topics such as "*geology*," "*plate tectonics*," "*mineralogy*," and "*ecology*."
- 8% were interested in seeing *math*-based features on the show.
- 7% were interested in each of the following topics: "*profiles"* of scientists, social science topics such as "*psychology"* and "*sociology*," programs that look at the interaction between disciplines such as "*the intersection of behavioral and hard sciences*," "*technology/nature hybrids*," or "*science & religion & mythology*."

Web site visitors appreciated the level of detail provided in NOVA scienceNOW features and requested that additional video clips be added to the site.

Preference for Amount of Detail Provided in Features

The Phase Two Web Survey gathered information on the level of detail included in different types of NOVA scienceNOW features by asking respondents to indicate whether they would prefer *more* or *less* detail to be presented or whether the amount of detail presented was *just right*. Ratings were only provided by those respondents who had used the feature in question. As shown in Table 7:

- The majority of respondents felt that the interactive features, articles, and interviews included on the site contained a level of detail that was *just right*.
- Respondents were mixed about the level of detail included in podcasts with similar percentages reporting the amount of detail was *just right* or requesting *more* detail.
- The majority of respondents requested *more* detail be presented in the extra video clips included on the site.

Table 7
Respondents' Recommendations for the Amount of Detail Provided in Features

	I would like more detail than presented	I would like less detail than presented	The amount of detail presented was just right.
Interactive features (polls, slide shows, etc.); n=584	35%	3%	62%
Articles and interviews; n=660	36%	3%	61%
Podcasts; n=334	43%	4%	53%
Extra video clips (not segments); n=577	60%	2%	38%

PERCEIVED PURPOSE AND BENEFITS OF THE NOVA SCIENCENOW WEB SITE

Visitors believed that the Web site was designed to make science accessible to the public and to introduce cutting-edge science topics.

To help respondents describe their perceptions of the purpose of the NOVA scienceNOW Web site, GRG presented them with a list of eight statements and asked them to pick the two phrases they would use to describe the site to a friend. Of the choices provided there were two that visitors identified with most (see Table 8).

- Approximately half of the visitors believed that the top two purposes of the NOVA scienceNOW Web site were *to present science in a way that everyone can understand*, and *to introduce cutting edge science topics*.
- 29% believed that a primary purpose of the site was *to allow people to see the show*.
- One in five believed the site was intended *to encourage visitors to engage with science* or *to provide more information about topics featured in the show*.
- Few respondents perceived *combating negative stereotypes about scientists* to be a primary purpose of the Web site.

Table 8
Perceived Purpose of the NOVA scienceNOW Web site

	Cumulative %	% Selected as First Phrase	% Selected as Second Phrase
To present science in a way that everyone can understand	53%	29%	24%
To introduce visitors to cutting edge science topics	45%	31%	14%
To allow people the chance to see the show if they missed it on TV	29%	16%	13%
To encourage visitors to engage with science	21%	5%	16%
To give people more information about topics in the TV series	20%	9%	10%
To demonstrate the various implications of science	17%	4%	14%
To demonstrate the importance of staying up-to-date about science research	14%	6%	8%
To combat negative stereotypes about scientists	<2%	<1%	1%

N=794

After rating the perceived purpose of the Web site, respondents were asked to choose the benefits of the site from a list of seven options and then choose the benefit that was most important to them. The benefits listed were adapted from the open-ended responses provided by Phase One participants to a similar question.

As seen in Table 9, a majority of respondents recognized each of the options given to be a benefit of the site. The benefit people valued the most was the ability to watch the show online, followed by the information provided by the site, and having the ability to learn more about topics of particular interest.

Table 9
Perceived Benefits of the NOVA scienceNOW Web site

	Perceived Benefit of the Site	Most Important Benefit
It provides access to good information (accurate, reliable, well-researched).	82%	19%
It presents science in a way that is easy to understand.	81%	14%
It allows you to learn more about topics that interest you.	79%	19%
It allows people to watch the show.	75%	24%
It gives visitors current science information.	70%	4%
It provides information/knowledge to visitors.	69%	5%
It is a good teaching tool.	66%	11%

In addition to the results reported above, 4% of respondents chose to share their own perspectives about the biggest benefit of the site. The majority of these made statements that combined some of the response options GRG provided; approximately one-third (32%) wrote that the benefit was *"learning about*

interesting topics in a way that is easy to understand." An additional 23% believed that having ready access to the site and its material was the biggest benefit; some added that this feature allowed them to learn at their own pace. Others (12%) stated that they could not choose a most important benefit from the list in Table 9, and a similar portion of respondents shared that using the site as a teaching resource was the biggest benefit to them.

Visitors reported that they were interested in continuing to engage with NOVA scienceNOW content in the future.

EFFECTIVENESS OF THE WEB SITE AT ENCOURAGING CONTINUED INTERACTION WITH RELATED CONTENT

Respondents reported the extent to which the Web site motivated them to continue engaging with NOVA scienceNOW content by indicating whether they would, would not, or might complete each of six activities. Respondents had plans to complete between three and four of the six options, on average. As seen in Table 10,

- Approximately three-quarters of respondents planned to stay more up-to-date on science, watch NOVA scienceNOW, and discuss the program with others.
- Over half reported that they would visit other Web sites to learn about related topics.
- Respondents reported being least likely to read a book about a NOVA scienceNOW topic or attend a Science Café.

Table 10
Respondents' Plans to Continue Engaging with NOVA scienceNOW Content

	% who plan to do this	% who do not plan to do this	% who might do this
Try to stay more up-to-date on cutting edge science topics in general	76%	8%	15%
Watch the NOVA scienceNOW television program	74%	9%	17%
Discuss NOVA scienceNOW topics with family, friends, or colleagues	71%	5%	23%
Visit other Web sites to learn about a NOVA scienceNOW topic	60%	11%	29%
Read a book about a topic from NOVA scienceNOW	31%	22%	47%
Attend a NOVA scienceNOW Science Café event in your local area	13%	44%	43%

N=794

A sub-set of questions about continued engagement focused specifically on parents and/or educators. One question asked whether teachers would use the NOVA scienceNOW Teacher's Guide. The remaining questions focused on the extent to which different parent and educator groups would recommend the Web site to their children and/or students. The data from these groups are presented below in Table 11.

- Over half of the teacher participants plan to use the Teacher's Guide in the future and an additional 27% may use this resource.
- The majority of teachers and professors plan to direct their students to the NOVA scienceNOW Web site in the future.
- Most parent respondents plan to direct their children to the Web site; parents were more likely to direct children aged 18 years and younger to the site compared to their children over the age of 18.

Table 11
Parents' and Educators' Plans to Use NOVA scienceNOW Materials with their Children and/or Students

	% who plan to do this	% who do not plan to do this	% who might do this
Use the NOVA scienceNOW Teacher's Guide activities with my class; n=143 teachers	57%	15%	27%
Direct your students to the NOVA scienceNOW Web site; n=143 teachers	81%	6%	13%
Direct your college level students to the Web site; n=42 professors	69%	10%	21%
Direct your kids aged 18 and younger to the Web site; n=194 parents	75%	13%	12%
Direct your kids aged 18 and older to the Web site; n=146 parents	62%	26%	12%

Parents and teachers reported planning to use NOVA scienceNOW to engage their children and students in science.

As a final measure of the extent to which the NOVA scienceNOW Web site promotes continued engagement, GRG asked respondents who were visiting the site for the first time (n=134) to share whether the site increased their interest in watching NOVA scienceNOW programs. Ratings were made on a scale from 1 (*Not at All)* to (*A Great Deal*) across two media formats, television and the Web. As shown in Table 12, first time visitors reported that the site had increased their interest in continuing to watch NOVA scienceNOW on the Web between *some* and *a great deal*, on average. Interest in watching the program on television increased to a lesser extent, with an average increase between *a little* and *some*.

Table 12
First Time Visitors' Interest in Continuing to Watch NOVA scienceNOW, by Medium

	Not at All 1	A Little 2	Some 3	A Great Deal 4
NOVA scienceNOW television broadcasts mean=2.82	23%	13%	22%	42%
NOVA scienceNOW on the Web mean=3.64	3%	4%	19%	74%

n=134

A COMPARISON OF WEB SITE SURVEY RESULTS

The Season One and Season Two Web surveys were similar in scope. Each survey gathered information to describe the reasons people visited the site, their feedback about the site, the segments viewed, their interest in future stories, and the extent to which the Web site encouraged them to continue engaging with science. The responses received from these two surveys were remarkably similar. In most cases where questions were asked on both surveys, the results differed within a few percentage points and there were not overall differences in results.

The primary difference across the two surveys was the number of respondents. The Season Two Survey generated almost twice the number of respondents as the Season One Survey, which may be an indication of the increase in Web site traffic that results from a television broadcast. As described in the Conclusions section at the end of this chapter, the Season Two data confirm that many respondents were visiting the site as a result of the November episode.

Although there were almost twice as many respondents to the Season Two Survey, the demographic characteristics of the two samples were quite similar across each category measured. Half of the participants in both samples were below the age of 35, most were male, and most were White. Each survey also included both those who were first-time and return visitors to the NOVA scienceNOW Web site, as well as a small portion of respondents who had never seen NOVA or been to a NOVA Web site.

Data from both surveys indicated that visitors were quite interested in stories related to *health and bioscience*. These stories were among those viewed most often by both samples and were reported to be the stories that they were most interested in watching on a later visit to the site. The Season One data also indicated that visitors were interested in more astronomy and space science segments. The collection of these data coincided with the production of Season Two which already included a stronger *physics and space science* focus through both the types of segments included and the perspectives of the show's new host, Neil deGrasse Tyson. Visitors' continued interest in this content was confirmed in the Season Two results; *physics and space science* stories were those that visitors were most interested in seeing in future programs.

Finally, both surveys indicate that the Web site is effective at encouraging visitors to continue to engage with science. The vast majority of respondents in both samples indicated that they will return to the Web site and recommend it to others. Further, both groups indicated that they plan to continue engaging with NOVA scienceNOW content by staying more up-to-date with science news, watching the program, and discussing NOVA scienceNOW topics with others. The next section of the report presents results to describe the extent to which visitors have carried through with these plans.

THE WEB SITE: FOLLOW-UP VISITORS SURVEY

The Follow-Up Visitor Survey was administered in February 2007. The purpose of this final phase was to follow up with participants from GRG's previous evaluations to learn if they had continued to use NOVA scienceNOW resources and the other ways in which they continued to engage with science (see Appendix K).

Of those who participated in the Season One and Season Two evaluations (n=1,122), a total of 752 (67%) agreed to allow GRG to contact them again for future NOVA scienceNOW evaluation efforts. GRG successfully contacted 708 of these participants in February 2007 to invite them to participate in an online survey. Data were collected during a three-week period. During that time, a total of 340 people (48%) completed the survey.

FOLLOW-UP VISITOR SURVEY RESULTS

PROFILE OF RESPONDENTS

Table 13 presents the demographic profile of past Web site visitors who completed the Follow-Up Survey. Overall, the profile presented below is quite similar to that from GRG's previous Web site surveys. In all cases, most participants have been between 18 and 50 years of age, White, and male. The overall numbers of parents and teachers/professors participating has also been consistent across phases.

Table 13
Profile of Web site Follow-Up Survey Participants

		% Respondents
Age	17 and under	6%
	18 – 35 years old	45%
	36 – 50 years old	30%
	51 – 75 years old	20%
Race	African American	4%
	American Indian	4%
	Asian	7%
	Hispanic/Latino	7%
	Native Hawaiian/Pacific Islander	<1%
	White	77%
Gender	Male	73%
	Female	27%
Groups of Particular Interest	Parent	45%
	Teacher/Professor	22%

Number of respondents ranged from 334 to 340 across questions.

WEB SITE FOLLOW-UP RESPONDENTS' CONTINUED NOVA SCIENCENOW VIEWING

The majority of Follow-Up Visitors reported that they had continued to watch NOVA scienceNOW and that they had continued to visit the Web site.

Respondents reported whether they had watched any new NOVA scienceNOW episodes since participating in the evaluation by sharing whether they had seen part of each episode or whether they had seen episodes in their entirety. Phase One participants reported on each of the three episodes that had aired since they participated in the evaluation. Phase Two participants reported whether they had watched the single episode that had aired since their participation.

The majority of participants from both groups (75% of all participants) had continued to watch NOVA scienceNOW. Similar numbers of participants watched part of an episode compared to those who had watched episodes in their entirety.

- 78% of Phase One participants had continued to watch NOVA scienceNOW, including 15% who had watched one episode, 21% who had seen two episodes, and 42% who had watched all three episodes that had aired since their initial participation.
- 74% of Phase Two participants reported that they had watched the episode that aired after their initial participation.

Because these NOVA scienceNOW viewers were originally identified through the Web site, the medium they used to watch new NOVA scienceNOW episodes and/or segments was of interest. Options included watched on TV only, watched on the Web only, and watched on both TV and the Web. Table 14 presents the different ways in which participants watched NOVA scienceNOW, by episode. Participants were fairly evenly divided across the three viewing options.

Table 14
Ways that Web Site Follow-Up Participants Continued to Watch the Program

	Watched on TV Only	Watched on the Web Only	Watched on both TV and the Web
Episode Six (n=51)	35%	27%	37%
Episode Seven (n=49)	29%	33%	39%
Episode Eight (n=238)	29%	36%	33%

WEB SITE FOLLOW-UP RESPONDENTS' CONTINUED ENGAGEMENT WITH NOVA SCIENCENOW CONTENT

GRG ascertained respondents' personal exploration of NOVA scienceNOW topics by asking whether they had noticed and/or interacted with related content on their own since completing the evaluation.

First, respondents reported whether they had visited the NOVA scienceNOW Web site again since completing their initial survey. Almost three-quarters (74%) reported that they had visited the site again.

Next, respondents selected from a list of seven activities, those they had already completed and those they planned to complete in the future (see Table 15). The items listed were of particular interest because participants had reported their interest in completing each as part of their initial Web site survey. At the time of the initial survey, respondents from both phases reported that they were interested in completing between three and four of the seven activities listed, on average.

The NOVA scienceNOW Web site is effective at encouraging visitors to continue engaging with science.

Results from the Follow-Up Survey indicated that participants did, in fact, complete activities to extend NOVA scienceNOW content. Almost every participant (99%) had completed at least one activity to continue engaging with NOVA scienceNOW content since completing their initial survey. Further, participants' predictions for the number of activities they would complete on the initial survey were accurate; they had completed between three and four of the activities listed, on average, at the time of the Follow-Up Survey.

An independent-samples t test showed that while participants from both phases had completed an average of three to four activities, Phase One respondents had completed significantly more engagement activities than Phase Two respondents (3.91 and 3.44 activities respectively; $p<.01$). This statistically significant difference is likely due to the fact that Phase One respondents had more time to engage with the content compared to participants from Phase Two.

Table 15
Continued Engagement with NOVA scienceNOW Content

	% who had done this activity	% who had not done this activity
Discussed NOVA scienceNOW topics with family, friends, or colleagues	87%	13%
Tried to stay more up to date on cutting edge science topics in general	85%	15%
Visited Web sites other than the NOVA scienceNOW site to learn about a NOVA scienceNOW topic	72%	28%
Read a science magazine about a topic from NOVA scienceNOW	47%	54%
Read a newspaper article about a NOVA scienceNOW topic	46%	54%
Read a book about a topic from NOVA scienceNOW	20%	80%
Attended a NOVA scienceNOW Science Café event in your local area	1%	99%

N=340

As an additional measure of continued engagement, respondents were asked whether they had recommended the NOVA scienceNOW Web site to others. In

the initial survey, the overwhelming majority of respondents said that they planned to recommend the Web site to others (94% in Phase One, and 96% in Phase Two). On the Follow-Up Survey, GRG asked visitors if they had recommended the Web site. The majority (76%) reported that they had taken this step.

Parents and Teachers/Professors NOVA scienceNOW Interactions

GRG also examined how two groups of particular interest to the NOVA scienceNOW team had continued to interact with NOVA scienceNOW content.

The majority of parents and teachers surveyed at Follow-Up reported that they have used NOVA scienceNOW to engage their children and/or students in science.

Parents were asked to report whether they had taken part in four NOVA scienceNOW-related interactions with their child(ren). These included recommending the NOVA scienceNOW program, watching the program together, discussing a program topic, and recommending the NOVA scienceNOW Web site. Of the 154 parents in the sample, 88% had participated in at least one of these interactions.

- 55% of parents had recommended the NOVA scienceNOW program to their children,
- 55% had watched NOVA scienceNOW with their child(ren),
- 66% had taken part in a conversation with their child(ren) about a NOVA scienceNOW topic, and
- 48% had recommended the NOVA scienceNOW Web site to their child(ren).

In a similar series of questions, teachers/professors were asked to report on their NOVA scienceNOW-related interactions with students. Teachers/professors reported whether they had recommended the Web site, used the program in class, and/or used a NOVA scienceNOW classroom activity with their students. The vast majority of teachers/professors (92%) had interacted with their students in at least one of these ways. Of those:

- 79% had recommended the NOVA scienceNOW Web site to their students,
- 68% used a NOVA scienceNOW segment in class, and
- 29% used a NOVA scienceNOW classroom activity.

Over half of the Follow-Up Visitors reported that they had seen a NOVA scienceNOW story in the news since completing their initial survey.

WEB SITE FOLLOW-UP RESPONDENTS' AWARENESS OF NOVA SCIENCENOW STORIES IN THE NEWS

Respondents also reported their continued engagement with NOVA scienceNOW content by sharing the science news stories they had heard since completing their initial survey that reminded them of NOVA scienceNOW topics. Respondents were asked to reflect back on instances in which this had happened, and then list the science news story they heard and the NOVA scienceNOW segment that they were reminded of.

A total of 63% of respondents had noticed NOVA scienceNOW topics in the news since completing their initial survey. On average, the number of stories

named was between one and two, with some participants listing up to four stories.

A total of 402 instances were recalled. Of those, GRG was able to identify 297 instances in which a respondent was reminded of a NOVA scienceNOW segment. An additional 47 stories related to recent episodes of NOVA rather than NOVA scienceNOW.[13]

Overall, the most frequently cited NOVA scienceNOW segments were 1918 Flu, Pandemic Flu, and Space Elevator. Both segments on flu-related topics were related to recent news stories on the avian flu. Respondents were reminded of the Space Elevator segment by recent new stories that featured developments in space exploration.

In addition, participants related a number of NOVA scienceNOW segments to recent news stories on global warming and climate change. Respondents related this topic to NOVA scienceNOW segments such as Mass Extinction, Fuel Cells, Hurricanes, Stronger Hurricanes, Hurricane Katrina, and Fastest Glacier. The topics of global warming and climate change also reminded participants of NOVA episodes such as Dimming of the Sun.

[13] The remaining 58 responses were too general to be coded according to either of the categories described.

THE WEB SITE: CONCLUSIONS

The NOVA scienceNOW Web site attracts both traditional and non-traditional visitors.

Approximately half of visitors to the NOVA scienceNOW Web site were aged 35 or younger, a demographic known to be a difficult age group to reach through science programming. Visitors also included both first-time and regular visitors to the site, as well as those who had watched the NOVA scienceNOW program and those who had not. Visitors also included a small portion of people who never watch NOVA and who never visit other NOVA sites.

The NOVA scienceNOW Web site is effective at encouraging visitors to continue engaging with science.

When provided with a list of six options for continuing to engage with NOVA scienceNOW content, Season Two Survey respondents indicated that they planned to do between three and four of the activities listed, on average. First-time visitors indicated that the site had increased their interest in continuing to watch the program *a great deal*. The results from the Follow-Up Survey confirmed that both Season One and Two Survey respondents did continue to engage with science-related content after leaving the Web site.

Parents and teachers use NOVA scienceNOW as a way to engage with children about science.

Parents who participated in the Season Two survey said that they planned to direct their children to the NOVA scienceNOW Web site, and the majority of teachers reported that they will recommend the site to their students. The majority of parents and teachers who responded to the Follow-Up Survey reported that they had engaged in at least one NOVA science-NOW related interaction with their children/students since completing their initial survey.

Television broadcasts bring many visitors to the Web site.

The November 21 broadcast of Season Two, Episode Two motivated people to visit the Web site in many ways. For example, many respondents came to the site to follow up on a topic featured in the episode or to see part of the show they missed. These data were confirmed by the fact that the top two features viewed were from the broadcast. Others were motivated to visit the site because the recent broadcast piqued their interest in seeing which topics and features the site had to offer. Missing the show in its entirety also brought visitors to the site because they wanted to watch the show or a particular segment online.

Visitors like the NOVA scienceNOW site, and are particularly interested in being able to watch the program online.

When asked to list their favorite thing about the site, the largest group of respondents focused on how much they liked being able to watch the show online. Watching the program online was also the number one reason that visitors plan to return to the Web site in the future and was considered the biggest benefit of the site. Over half of the Follow-Up Survey respondents had been back to the site to watch additional segments since completing their initial survey.

The NOVA scienceNOW Web site has a loyal following.

At the time of the Season Two survey, many respondents reported that they visit the site regularly and they stated their plans to return to the site. Further, Season Two respondents reported that they would recommend the Web site to others. The Follow-Up Survey confirmed that most respondents had continued to watch NOVA science NOW, that they had been back to the Web site, and that they had recommended the program.

Web site visitors respect and trust the information provided on the NOVA scienceNOW Web site.

Visitors agreed that one of the greatest benefits of the NOVA scienceNOW Web site is the information that it provides to its visitors. A number of visitors reported that they came to the Web site because they were looking for a particular piece of information and over half reported that they will visit the site again to gather the information they need to learn, teach, or stay up to date on science news.

NOVA scienceNOW visitors want more video segments added to the site.

The most often cited request for changing the Web site focused on adding more video segments. The level of detail provided through extra video clips was also the one area for which the majority of visitors requested more detail.

Visitors were pleased with the level of detail included in NOVA scienceNOW features.

Almost all visitors reported that they were able to find the information they wanted on the NOVA scienceNOW site. Similarly, at least half of the visitors believed that the level of detail provided in interactive features, interview and articles, and Pod casts was *just right*.

Feedback about the organization of the NOVA scienceNOW site was mixed.

The organization of the Web site was named by a sub-set of respondents as both a favorite (16%) and least favorite thing (11%) about the site. Visual appeal of the site was high and some visitors found it very user friendly and easy to navigate. Others had a difficult time navigating the site or wanted to have more video viewing options.

Stories that feature topics related to *health and bioscience* and *physics and space science* are of interest to Web site visitors.

Seven of the top ten stories viewed by survey respondents featured topics related to these two categories. These categories also represented the stories that respondents were most interested in watching on a return visit to the site. When asked to pick the types of stories they would like to see on the NOVA scienceNOW program in the future, the majority of visitors selected each of these two categories.

EVALUATION OF THE NOVA SCIENCENOW SCIENCE CAFÉS

THE SCIENCE CAFÉS

In 2005, WGBH created a Science Café series in order to accomplish several goals:

- to promote NOVA scienceNOW and extend its impact,
- to attract the elusive 18- to 34-year-old demographic,
- to foster scientific debate and discussion between scientists and the public, and
- to enhance the public understanding of science.

WGBH has been at the forefront of building the national Science Café movement. The WGBH team has been instrumental in launching and supporting numerous Science Cafés across the country. Further, they have taken the lead in building a Science Café community by partnering with Sigma Xi to host the first U.S. conference for Science Cafés in 2006, and are planning a second meeting that will take place in 2008.

While WGBH is still focused on achieving the original goals stated above, the team has embraced the larger role of establishing, supporting, and growing the Science Café movement around the country. As part of this effort, WGBH is creating a separate Science Café Web site for launch in mid-2007 that will serve as a virtual headquarters for Science Cafés in the United States. The site will be a central clearinghouse for Cafés, offering tips and resources, contact information, help in finding scientist/presenters, downloadable video clips from NOVA scienceNOW, evaluation surveys, links to local Science Cafés, and more. The Web site will also serve as a central communication center for all stakeholders in the Science Café movement.

As WGBH's role in the Science Café movement has evolved, the evaluation plan for this program component has changed in response. Rather than focusing solely on Café attendees, the evaluation plan was expanded to include two additional groups of informants – Café Organizers and Scientists who have served as presenters at a Science Café. These changes to the evaluation plan were made with the expectation that each group could provide a different perspective on the influence that Cafés have on the public. Further, the data collected from Organizers and Scientists would also provide valuable information about how WGBH can continue supporting the larger Science Café community. This section presents the instruments and procedures that GRG used to collect data from these groups, followed by the evaluation results, which are organized by the informants' role in the Science Café.

INSTRUMENTS AND PROCEDURES

Café Organizer Survey

The Organizer Survey was designed to gather information about Organizers' experiences planning for and implementing Science Cafés. Questions also focused on the challenges Organizers have faced implementing their Café, strategies for finding and working with scientists, methods for recruiting and retaining Café attendees, and their evaluations of their individual Café. A

final question asked Organizers to choose the resources they would find helpful as they continue to operate Cafés (see Appendix L).

In January 2007, the NOVA scienceNOW team provided GRG with a list of Café Organizers who had worked with them in the past. GRG sent an email invitation and up to three reminder emails to each of the 22 Organizers on the list. One of the Café Organizers provided GRG with contact information for an additional five contacts who were also invited to participate. In total, 27 Organizers were contacted. Of those, 20 (74%) completed the survey.

Scientist Survey

The Scientist Survey invited scientists to share their experiences serving as presenters at Science Cafés. The survey questions asked them to describe how and why they became involved in the Cafés, provide a description of their Café presentations, and give advice for Café Organizers or other Scientists interested in presenting at Cafés (see Appendix M).

The list of Scientists was culled from Café Organizers and from internet research conducted by the WGBH team. In March 2007, GRG successfully contacted 88 Scientists to invite them to complete the Scientist Survey. In the three weeks that followed, Scientists received up to two email reminders. A total of 51 Scientists (58%) completed the survey.

Café Attendee Survey

Café Attendees responded to questions designed to learn about their attendance at Science Café events, their impressions of the Café, and their continued engagement with Café topics (see Appendix N). Through preliminary communication with Café Organizers, WGBH learned that Organizers were interested in participating in the evaluation, but that they did not feel comfortable sharing the names and contact information of their attendees. As a result, WGBH and GRG decided to send a Web link to selected Organizers with a request that the Organizers email the link to their attendees.

In April 2007, WGBH contacted eight Café Organizers from around the country to ask that they send the survey invitation. All of the Organizers selected had been leading Cafés for over one year and had hosted multiple NOVA scienceNOW Cafés. GRG also sent an email invitation to participants who had completed a Café evaluation in the past, and who had not already been contacted by their Organizer. As a result of these efforts, 149 Attendees completed the survey. Each received a $10 gift certificate to Amazon.com for their participation. It is not possible to determine a total response rate because the Organizers did not provide statistics on the number of people to whom they sent an email invitation.

THE PERSPECTIVES OF CAFÉ ORGANIZERS

This section presents descriptions of the Cafés led by Organizer respondents, the successes and challenges or operating a Café, the perceived influence of the Café on Attendees, and Organizers' advice for those who are thinking of starting a Café of their own.

A Description of Organizers' Cafés

The 20 survey respondents included both new and seasoned Organizers from around the country.[14] Three Organizers had hosted one Café at the time of the survey, and one Organizer had hosted two Cafés. At the other end of the spectrum, one Organizer had hosted eight Cafes and 13 had hosted more than ten. Of the two remaining respondents, one had hosted four Cafés and the other had hosted five.

Attendance at Science Cafés ranges from 16-25 people up to 91 people or more.

Half of the Organizers (n=10) had hosted a Café that featured NOVA scienceNOW. The number of Cafés they had hosted featuring the program ranged from *one* (n=4) to *six or more* (n=1). Two Organizers had hosted two NOVA scienceNOW Cafés, two had hosted four, and one had hosted five Cafés that featured the program.

Attendance at the Science Cafés ranged from *16-25 people* to *91 or more* attendees. More specifically:

- Two Cafés typically include *16-25 attendees*,
- Six typically include *26-40 people*,
- Three typically include *41-55 people*,
- Two typically include *56-74 people*,
- One typically includes *75-90 people*, and
- Six Cafés typically include *91 attendees or more*.

Science Cafés typically target the general public and those who consider themselves to be science enthusiasts.

To learn more about the types of attendees being targeted through the Science Cafés, the Organizer Survey asked respondents to select -- from a list of seven groups -- those that had been specifically targeted. Nineteen of the 20 Organizers reported targeting at least one group and, on average, Organizers had targeted three of the groups listed. As shown in Table 1, the majority targeted the general public and science enthusiasts. Each of the more specific groups listed were targeted by at least one-quarter of the Organizers.

[14] Organizers led Cafes in California, Colorado, Florida, Missouri, Nebraska, New Mexico, North Carolina, Pennsylvania, Texas, and Virginia, and Washington.

Table 1
Groups Targeted to Attend Science Cafés

	% respondents
The general public	90%
Science enthusiasts	60%
Members of scientist/research organizations	45%
College students	40%
High school students	30%
Populations under-represented in science (women, low SES, African American, Hispanic, and/or Native American populations)	30%
The elderly	25%

N=20

Science Cafés have a loyal following, with most reporting that at least half of their attendees come on a regular basis.

The vast majority of Cafés have a loyal following: 16 of the 17 Organizers who have hosted multiple Cafés reported that they have regular attendees at their Café. The remaining Organizer reported having a new crowd of attendees at every Café event. Of those who have returning attendees:

- Two Organizers reported that *about three-quarters* of their attendees come on a regular basis,
- Most (n=11) reported that *about half* come regularly,
- One reported that *about one-third* come regularly, and
- Two reported that *about one in ten* attendees come to the Café on a regular basis.

After reporting their percentage of regular attendees, Organizers were asked to share their opinions about what keeps attendees coming back to their Café. Having the opportunity to interact with scientists (n=10) and the topics featured at Cafés (n=8) were the characteristics mentioned most often. Others believed the venue (n=5), interest in learning (n=4), and the group discussions (n=3) were the characteristics that brought repeat attendees. Two mentioned that a community has formed as a result of their Café. Responses included:

> *"They like the opportunity to discuss science topics with an expert and learn more about the topics."*
>
> *"I would guess it's that the topics are just incredibly compelling – things people want to know about. Also, it's a fun night out in the city."*
>
> *"Great venue (beer and food), excellent speakers, growing* [camaraderie] *among participants."*
>
> *"The engagement with the material and the opportunity to learn about science* [and] *society at a broader level."*

Most of the Organizers surveyed (n=13) have a formal way of collecting feedback from their attendees, and thus the impressions shared above are probably quite accurate. Surveys are used by 13 Cafés to gather feedback. Others use more informal methods such as talking with attendees to learn their impressions or being receptive to receiving email feedback from attendees.

Organizers' Reasons for Getting Involved

Most Organizers first learned about Science Cafés through the media or a personal connection, and then pursued the idea from there. Five Organizers had connections to or experience with Café Scientifique. Five others learned about the Café, in part, through a professional organization such as AAAS, Sigma Xi, or ASTC. Four Organizers learned about the Café through an article published in Nature, and three learned of the Cafés from WGBH or the NOVA scienceNOW program. In two cases, the Organizer was already leading a Café-type series when they learned about the Café movement.

Café Organizers became involved in the Café movement because they wanted to benefit their community, share their passion for science, and/or wanted to help present science in an informal learning environment.

When asked why they chose to organize a Café, most shared their belief that Cafés benefit the community. Many also believed it was an outlet for sharing their own passion for science and/or were interested in seeing science presented in an informal learning environment.

> *"I was looking for something fun to do outside of my day job and couldn't find a volunteer opportunity that was both compelling *and* a good use of my skills. I love science, and wanted to create an opportunity to do something that I could be really passionate about. I also wanted it to be something social and fun."*

> *"Right thing to do, especially when I found that there is no consistent cafe in the DC area. (Our "local audience" often includes policy-makers and influencers...and their children.) Everyone knows the public needs more "friendly" exposure to science. Seemed like a good thing to try--plus, the concept already has been proven elsewhere. If organized well, not too complicated or time-consuming."*

> *"Commitment to science education, and providing broad public access to leading scientists."*

> *"We wanted to create a space where science meets art and culture through intimate face-to-face dialogues between panelists and the public."*

> *"It sounded like an excellent opportunity to involve my Sigma Xi chapter with a local outreach to enhance the public's appreciation/understanding of science."*

> *"I saw a need within my own region -- of Southern California -- for increased public interest and awareness of science and the benefit to their lives. I am excited about making science and engineering fun for the public to learn about and for kids to get excited."*

> *"I believe that science needs to be more accessible to the general public. Instead of just reading an article, many people want to ask questions, but as adults we have very few opportunities to meet with researchers and ask our questions. This provides a opportunity to learn more about research and therefore about our community as a whole."*

Successes and Challenges of Organizing a Science Café

When asked to share their greatest successes as an Organizer, many focused on growing attendance rates (n=8) or the level of attendee engagement (n=7). Others cited media coverage they have received as a sign of success (n=4).

Café Organizers believe that attendance rates and the level of audience engagement are good indicators of their Café's success.

> *"We have been running since 2003* [and] *keep getting HUGE audiences. And most say they really enjoy the experience."*
>
> *"Attendance is almost always beyond expected (and even beyond the ideal) -- average 100 people at each event, up to 200 at most recent event. Media interest growing on its own; three stories so far, without any deliberate outreach or media plan. Our outreach/distribution plan is extensive but not complex, and seems effective…"*
>
> *"Getting people engaged in a topic they may not have been inclined to talk about or learn."*
>
> *"With minimal publicity, we draw very large crowds."*
>
> *"To watch it celebrate successes for over 2 years, and watch it grow from 40-50 people attending to 150 people attending. We are excited that this work has been reported by several local newspapers/magazines, and we are setting up new spinoffs* [sic] *right now."*
>
> *"Many members of our audience return month after month, regardless of the topic. And I am constantly amazed by the level of engagement between the speakers and the audience. They both have a good time, but they also both get a lot out of the event as well."*
>
> *"Getting very lively discussions and engaging the general public, including through* [write-ups] *by a local newspaper."*

The challenges of operating a Science Café include finding a venue, promotion, and finding good presenters.

Challenges in operating the Café were reported by 18 of the 20 Organizers, with the remaining two indicating that they had not experienced challenges. The challenges they faced and the ways they overcame them are summarized below.

- The challenge faced by the greatest number of Organizers (n=11) was locating a venue. Persistence and communicating directly with venue owners/operators were the strategies that Organizers used to respond to this challenge.
- Promoting the Café was a challenge experienced by six Organizers. To respond to this challenge, one Café has begun doing *"target marketing"* by promoting the Café to *"existing organizations that would be particularly interested in a Café topic."* Others developed listservs, pay to advertise the Café, or use social networking Web sites.
- Five Organizers have faced challenges in finding good presenters. Most had resolved this challenge by partnering with a local University or professional organization.
- Four mentioned that funding is a challenge; none of the Organizers shared a strategy for responding to this challenge.

Perceived Effectiveness of the Science Cafés

Café Organizers were asked to rate the effectiveness of the Science Café at engaging the public with science, using a five-point scale from 1 (*Not at All Effective)* to 5 (*Extremely Effective*). Organizers believed the Cafés were, on average, *very effective* in this regard.

- 30% rated the Science Cafés as *extremely effective* at engaging the public with science,
- 55% gave a rating of *very effective*, and
- 15% gave a rating of *generally effective*.
- None of the Organizers rated them as *a little* or *not at all effective.*

The majority of Café Organizers believe that Cafés are very or extremely effective at engaging the public in science (the top two ratings on the scale), but they also note that they may be preaching to the choir.

When asked to explain the rating they had selected, Organizers noted increasing attendance rates, audience participation during presentations, and feedback they had received directly from attendees. Responses included:

> *"Although we get a relatively small number attending the science cafes (20-40), the discussions go on well after the* [scheduled] *hour, sometimes some people stay an extra hour or two over coffee. We even get some further discussions days or weeks later in the restaurant not even on days of a Science cafe!"*

> *"Highly enthusiastic discussions and steadily increasing attendance."*

> *"This is one of the few opportunities adults have to ask questions of scientists. Also, because of the informality of the cafe setting, many people, especially those who would not ask questions in a larger group or a formal setting, feel free to ask their questions."*

> "[Being extremely effective in this regard is a] *fact, from interviewing many attendees."*

Organizers who provided a lower rating believed that the Café model is effective but also noted that they are not yet reaching the general public. One Organizer summarized this issue by saying "*I think Cafés are very effective at engaging the public that attends* [-] *the challenge is encouraging participation*. Others noted that they are currently "*preaching to the converted*" and that Cafés need to be more effective at engaging "*the more disenfranchised parts of the community as well*."

Café Organizers who have hosted a NOVA scienceNOW Café gave the Cafés that featured the series high marks in each area rated.

The survey solicited feedback on Cafés that have featured the NOVA scienceNOW program. As shown in Table 2, they rated these specific cafes on four characteristics, using a five-point scale from 1 (*Poor*) to 5 (*Excellent*). Organizers gave the NOVA scienceNOW Cafés high marks in each area.

Table 2
Organizers' Ratings of NOVA scienceNOW Cafés

	Poor	Fair	Good	Very Good	Excellent
Engaging audiences	0	0	1	4	5
Providing necessary background information to increase comfort with science topics	0	0	0	7	3
Setting the mood	0	0	2	3	5
Encouraging audience involvement	0	0	3	4	3

N=10

Organizers' Advice about Cafés and Café Resources

Organizers provided advice and other opinions about various components of operating a Café: finding scientists to serve as presenters, what makes a successful Café (including presentation features), and ways to advertise a Science Café. They also rated resources that would be of interest.

To identify presenters for their Café, most Organizers used multiple methods including personal networks, word of mouth, and connections they had established with local groups of interest.

Recommendations for Finding Scientists to Serve as Presenters

Café Organizers were asked to share the methods that have been either more or less effective in helping them identify scientists to serve as Café presenters. All of the methods listed as successful required establishing connections and then building on those connections to recruit presenters. Some relied on their personal networks and/or word of mouth, while others had established connections with universities, scientist organizations, or other professional networks in their area. The majority relied on more than one method to identify and recruit presenters. Responses included:

> *"I read all notices of talks in the area and go to them if they look interesting, so I can be sure the speaker is up to the job at the Cafe. Being a scientist oneself helps* [a lot]. *Also, I have a committee of about 15 people who suggest speakers and topics."*

> *"No problem. Lots of Sigma Xi members, plus university staff."*

> *"Our cafe has a handful of organizers with connections in diverse sciences; these connections give us access to diverse speakers."*

> *"Tapping in to University Speakers Bureaus. Searching online science department faculty web pages. Personal phone calls to those found in directories asking for a talk on a specific topic in their area of expertise."*

> *"Books, articles, and radio interviews provide me with about half of our speakers. If I'm reading about (or listening to) something interesting and the scientist in question happens to be local, I'll look him or her up and extend an invitation. The other half comes to me through word of mouth -*

- friends and acquaintances who tell me about someone they know, or have heard about, who's doing some sort of fascinating research. Sometimes speakers recommend their [colleagues]*."*

"Utilizing a variety of resources has proven successful including WGBH, calling Universities in our state for recommendations and the Charlotte Area Science Network."

Other Organizers were less certain about successful versus unsuccessful methods for locating and recruiting scientists. Some had not had any difficulty finding presenters, and thus had no experience to report. Another wrote, "*The exact same methods that work successfully are also the ones that sometimes don't work! I can't think of any one method that's much better or worse than another*." Email invitations and/or *"blasts"* were cited by four Organizers as an unsuccessful method.

Rather than providing an unsuccessful method, several Organizers provided a cautionary note about using scientists without either personally experiencing or having references about their presentation style. For example, one wrote, "*The one area that I would caution new planners in is trying to make sure that the scientist communicates well and can be engaging with the general public.*"

Café Organizers typically provide their Café presenters with information about the Café format prior to the presentation. Several also provide guidelines for presenters to use as they prepare their presentation.

Organizers' Opinions of What Makes a Successful Café Presentation

The vast majority of Organizers (95%) provide scientists with information to help them prepare for their Café presentation. Most provide an overview of the Café format. Several mentioned that they set parameters around the length of the presentation, and some forbid certain presentation formats such as lectures. A minority of the Organizers reported taking a more hands-off approach in guiding presenters. A range of the responses received is presented below. The full list of responses is provided in Appendix O.

"We share the evenings' format with them and help them to understand that it is designed to encourage informal discussion with [a lot] *of question and answer as opposed to a forum or more formal presentation. In some instances the scientists will provide focus options and we will select the area that we feel the attendees would like to be addressed."*

*"*Background of audience *Importance of lay language *Minimal use of visuals *Emphasis on the importance of dialogue."*

"Guidance is essential! I even give it to "high-ranking policy makers." I send all potential speakers a concept paper in advance, before I even "book" them, to be sure they understand the "ground rules" before they agree to [be a] *speaker. This includes goals, target audience, and format. Format includes: 10-20 min max for remarks, no* [PowerPoint] *but props ok, and open Q&A."*

"*It's VERY minimal. I think part of the fun of this kind of event is that it's not micro-managed by me or anyone else. I like to let the speakers do*

their thing in whatever way will best allow the presentation to shine. This has allowed a lot of interesting variety over the years. I let them decide if they want to bring visuals, handouts, props, or nothing at all. What I do recommend is that they prepare their talk in 2 parts, one for before the break and one for after. And I ask them to use their [judgment] *in taking questions from people; if someone is babbling on too long or not making sense I ask them to say something like, "Let's talk about that during the break," to save the other attendees from having to sit through a lot of nonsense."*

"I tell them the format, explain why the[y] *cannot use visual aids. I have them come early so they can get used to the space and we can mike them properly. I also try to get some beer into them."*

In addition to the guidance provided about Café format, 30% of the Organizers also provide specific resources to help scientists prepare for presenting in an informal environment. Their resources included:

"The concept paper is a resource for them, re. how to visualize their audience and the end goals we want."

"Previous conversations which have been recorded."

Q and A sessions and group discussion were the presentation features endorsed by most Café Organizers.

"We have a 'speaker's page' on our website."

"Handouts, science cafe URL's, and info [sic] *from the WGBH ScienceNOW website."*

"Offer for them to contact previous speaker."

*"We created a "speaker's page" that speakers can u*se. *Includes examples of past talks and recommendations from the public."*

The Organizer Survey also asked respondents to supplement/augment their feedback by selecting the presentation features that they would and would not recommend using in the Café environment. As seen in Table 3:

- The vast majority of the Organizers endorsed Q and A sessions.
- Most Organizers recommended group discussion and the use of videos/DVDs, and half recommended using slides.
- A greater number of Organizers recommended avoiding lecture presentations and the use of audio-based examples compared to those who endorsed these presentations features.
- The same percentage of Organizers endorsed and recommended avoiding the use of trivia.

Table 3
Organizers' Recommendations for Successful Café Presentations

	% who recommend	% who do not recommend
Q and A	90%	0%
Group discussion	75%	10%
Video/DVD	60%	10%
Slides	50%	30%
A demonstration	45%	5%
Lecture	30%	40%
Pictures	25%	10%
One-on-one conversations	25%	20%
Trivia	15%	15%
Audio-based examples	10%	20%

N=20

Café Organizers use multiple methods to advertise their Café. Most use email lists, Web sites, and/or the local press.

Advice about Advertising Science Cafés

Each of the Organizers reported using multiple methods to advertise their Café. Most (n=15) used a Café-specific email or mailing list to notify attendees of a Café event. Ten also had a Café Web site and/or used Web sites of those who partner with them to produce the Café. Others (n=13) have gotten local press and/or used advertisements on the radio, on television, or in the newspaper. Flyers (n=8) and local event listings, community calendars, and sites such as craigslist.org (n=4) were also mentioned.

When asked to share their most successful advertising methods, similar numbers of Organizers named email (n=7), using print or broadcast media, such as newspapers, radio, or TV (n=7), and word of mouth (n=6). There was no consistent answer for advertising methods that were least successful. Eight said that all of the methods used had been successful to some extent, or that they had not collected data on the success of different methods and thus could not comment. Others noted a lack of success with the following very specific methods: "*e-mails to university and college departments*," "*advertising in some papers were less successful*," and "*flyers at our own work environment.*"

Café Organizers were interested in all of the resources that WGBH is considering for the Science Café Web site.

Resources for Café Organizers

NOVA scienceNOW is planning to develop resource materials that can be used by Organizers as they develop, plan for, and host Cafés. To help guide WGBH in the development of these materials, the Organizer Survey asked respondents to select, from a list of eleven items, those that they would like to see included in resource materials. As seen in Table 4, most of the 11 items were of interest to the majority of Organizers surveyed.

Table 4
Interest in Specific Café Organizer Resources

	% respondents
A sample checklist of organization/logistical needs	95%
A short guide to starting a Science Café	90%
A list of Cafés taking place in the U.S.	85%
A short guide to help scientists prepare for their presentation	80%
A catalog of available NOVA scienceNOW episodes	75%
Sample promotional flyers	70%
Customizable evaluation forms for Café attendees	70%
A list of Café ideas and resources for each NOVA scienceNOW episode	65%
List of organizations for finding presenting scientists	65%
A customizable handout with suggestions for ways Café attendees can continue being involved in science	55%
Sample agenda for a trivia event	50%

N=51

Organizers' Final Advice

One of the final questions on the survey gave Organizers the opportunity to share their final advice for people who are interested in starting a Café in their area. Five suggested that new Organizers learn from the work of those who are already involved in the movement. Others noted the importance of choosing scientists and/or topics wisely (n=4). Four believed it was important to identify co-organizers and partners to share the responsibility of running the Café. Responses included:

> *"Study existing public information; attend a cafe in another area if possible."*

> *"Follow the proven format. Keep it simple. Communicate the goals & audience clearly to potential speakers. If possible, use only proven speakers who you know can talk at lay-level, at least until your cafe is off the ground and a reputation is established. (Then you can take a few more risks, but always give clear guidance to speakers BEFORE they commit to participating, and given them an "easy out" in case they decide a free-wheeling Q&A isn't for them--for example.)."*

> *"Get a copy of a Science Cafe "toolkit". Roger Harris at Sigma Xi National has put together one specifically for sigma Xi* [chapters]*, but it could probably be extended to other groups."*

> *"Go with ScienceNow.* [Begin] *with public discussion of local interest* [controversy]."

> *"Select your expert and topic carefully to help ensure a positive experience."*

"Offer a variety of topics, find hosts who are dynamic and able to engage the general public, encourage conversation format."

"Find an existing organization to support you financially and logistically. We work on a grass roots basis and it takes a lot of time."

"Be prepared for a lot of work. Get others to [volunteer] *help."*

"Plan well for the first one: host opinion leaders that are known in town, chose a sexy and timely topic, invite the media and be interviewed. Press articles/radio interviews will help for fundraising."

"Find a roomy neighborhood venue with staff who can support you; advertise by word of mouth; recruit at least a total of 3 co-organizers to help with the volunteer workload; get connected with local universities and industry."

"Be clear on your objective. Work out location, how to attract speakers and audience."

THE PERSPECTIVES OF CAFÉ SCIENTISTS

This section presents descriptions of Scientists' experiences with the Science Café, their feedback on those experiences, and their advice for Café Organizers and WGBH about working with Scientists in the future.

Most scientists became involved in Science Cafés to educate and engage the public in science. Others thought it would be fun or stated that it was important to them to provide outreach to the community.

Scientists' Café Experiences

At the time of the Scientist Survey, the majority of the 51 respondents (84%) had presented at one Science Café. Of the remaining Scientists, five had presented at two Cafés, and three had presented at *four Cafés or more*. Approximately one-quarter (22%) had presented at a Café that featured NOVA scienceNOW; 35% had not presented at a NOVA scienceNOW Café, and the remaining respondents (43%) were not sure whether their Café had featured the program.

The majority of the Scientists (90%) who completed the survey had been recruited to serve as a presenter by the Café Organizer. Scientists agreed to become involved as a presenter for a number of reasons (see Table 5), with the most frequently cited reason being a desire to educate and engage the public. Others cited as motivating factors either benefits to themselves or a belief in the importance of conducting outreach to the community.

Table 5
Reasons Scientists Agreed to Participate in Science Cafés

Educate and/or engage the public with science (n=19)	▪ *It is very important to provide up-to-date-science and scientific research to the public and to demonstrate its importance to society and our being as a nation.* ▪ *I believe that it's important for scientists to communicate effectively with the public.* ▪ *I thought it was a great way to shed light on what has become a rather confusing topic (stem cell biology) for the layperson.*
Personal benefits (n=12)	▪ *Sounded fun* ▪ *I like to share the excitement of science with a general audience.* ▪ *I thought it would be a good experience.*
The importance of outreach (n=10)	▪ *To represent my university.* ▪ *Outreach is very important. I try to do one thing like this each year.* ▪ *I have always thought public outreach is a good idea; I have always thought I would be good at it; I also think it is a good way to raise money for a department.*
Interested in the Café model (n=7)	▪ *I had read about the European version and it sounded like a terrific idea.* ▪ *To publicize one of my recently published popular science books, and to see how this experiment in science for the citizen really worked.* ▪ *Because I think it important to bring science to the public, and this struck me as a novel and interesting way to do so.*

Rather than waiting to be approached about the Science Café, five respondents (10%) sought out the opportunity to present. These Scientists were motivated by positive previous experiences presenting to the public and a desire to bring science to the public. Two Scientists also serve as Café Organizers and had presented at their own Café.

The majority of the Scientists surveyed took steps to prepare for their Café presentation. Few used resources specific to presenting in informal learning environments as part of their preparation.

Preparing for a Science Café

Scientists described, in an open-ended response, how they prepared for their Science Café presentation. Five Scientists did not take any steps to prepare for their Café presentation. Of the 46 scientists who did prepare:

- 37% developed slides and/or PowerPoint presentations,
- 26% reviewed current research and literature on the presentation topic,
- 22% developed an oral presentation, and
- 20% revised a previously developed presentation.
- Other preparation included gathering materials and equipment for demonstrations and visual aids, practicing the presentation, speaking with other panelists, and watching NOVA scienceNOW.

In a separate question, scientists reported whether they used resources specific to presenting in informal learning environments as they prepared for their Café presentation. Approximately 35% of scientists said they did refer to these kinds of resources. Five shared the specific resources used:

> *"I attended a number of other previous cafés. Obviously, I kept in mind the composition of the audience."*

"I took the best parts of my classroom lectures and shared them with friends to put forth the most interesting ideas."

"… checked out some web sites that provide the public with information in the area related to my presentation."

"… talked to the organizer about what he thought would be key areas of interest to the audience. And then spent some time designing some of the things that I though would be relevant, interesting, fun and insightful. I have many years of public debate in Australia, so I am reasonably well versed in presenting in informal learning environments."

"I looked at Science Cafe websites…"

Most Scientists' presentations included a Q and A session and lecture. Over half also reported using slides. Several scientists said they would change future presentations to be more interactive.

Science Café Presentations

Scientists selected, from a list of ten features, methods they used for their presentations. On average, presentations included three or four of the activities listed, with a range from one to ten. As shown in Table 6:

- The majority of the Scientists included Q and A sessions and lecture as part of their presentation.
- Over half of the Scientists used slides as part of their presentation.
- Group discussion was included in just under half of the presentations.
- Visual and audio aides such as videos/DVDs, pictures, demonstrations, and audio examples were used by a minority of the Scientists.

Table 6
Presentation Features from Science Cafés

	% of respondents
Q and A	88%
Lecture	75%
Slides	59%
Group discussion	45%
Video/DVD	29%
One-on-one conversations	28%
Pictures	26%
Trivia	16%
A demonstration	14%
Audio-based examples	4%

N=51

Scientists also shared what they would do differently if they were to present at another Science Café. Of the 27 Scientists who would make a change to their presentation:

- 12 would make the presentation more interactive.

- 6 would change the scope of their presentation by sharing less information overall, spreading the information provided over two Cafés, or presenting on a different topic.
- 6 would change the structure of their presentation. Some said they would add demonstrations to their presentation or use handouts. Others provided feedback about the use of video and lecture; the feedback provided here was divided between those who would use more and less of each of these features in their next presentation.

The majority of Scientists reported that they were very or extremely satisfied with their Science Café experiences, and almost all were interested in presenting at a future Café.

Scientists' Satisfaction with Their Science Café Experiences

Scientists rated how satisfied they have been with their Café experiences, using a five-point scale from 1 (*Not at All Satisfied*) to 5 (*Extremely Satisfied*). Overall, 88% of scientists were *very* or *extremely satisfied* with their Science Café experiences.

- 39% were *extremely satisfied*,
- 49% were *very satisfied*,
- 10% were *generally satisfied*,
- 2% were *a little satisfied*, and
- None of the Scientists reported being *not at all satisfied* with their experience.

Favorable impressions were also evidenced when scientists were asked whether they were interested in presenting at another Café in the future; the vast majority (92%) responded in the affirmative.

Scientists also reflected on their presentation by reporting the biggest surprise they experienced as they shared their research with the general public (see Table 7). Eight scientists (16%) stated that there were no surprises in this regard. Of the 40 scientists who did report a surprise,

- 15 were impressed by the audience's level of interest and engagement with the presentation.
- 11 were surprised by the audience's questions. In some cases, Scientists seemed impressed with the questions received and in others they were surprised by the tone of some negatively biased questions.
- Nine Scientists were surprised by the attendee's knowledge of the topic; some were impressed with the depth of attendees' knowledge and others were surprised by the lack of knowledge.
- Five were pleasantly surprised by the attendance at the Café event, although at least one other felt that the big turn-out stymied discussion.

Table 7
Scientists' Biggest Surprises about Sharing Work with a General Audience

Audience's interest and engagement (n=15)	▪ *The fact that a lot of people were willing to delve into a rather technical subject.* ▪ *How engaged the audience was.* ▪ *The great interest of the audience, from 8-year-old kids to 90-year-old retirees.*
Questions posed by the audience (n=11)	▪ *Some members of the audience were hostile and asked questions like why is DOE involved with nuclear energy when everyone knows that it is insane? Why consider solar energy when birds will poop on the solar panels?...* ▪ *Good questions!* ▪ *Difficult questions!*
Audience's knowledge of topic (n=9)	▪ *I would say that the most surprising thing to me was how many in the audience were technically deep.* ▪ *How little they knew about research in this area.*
Attendance at the Science Café (n=5)	▪ *I had expected fewer people, which would have enabled a freer flowing discussion.* ▪ *The number of people who showed up, and the fact that some drinkers who did not know the Science Cafe was on decided to stay to listen, foregoing a show they were supposed to go to.*

N=35

Approximately one-third of the Scientists (38%) believed that presenting at the Science Café changed how they think about talking to a general audience about their work. These changes included how to structure a presentation for the general public, and the importance of interacting with the audience. Responses included:

> *"My audience loved cow flatulence as a source of green house gases - so maybe it did not change the way I think about talking to a general audience, but it reminded me that you often don't know which examples you use will appeal, and you need to be flexible about how the crowd's interest will morph from one thing to the next, regardless of what you think is interesting."*

> *"It is* [important] *to gauge audience understanding and be able to modify a talk/presentation on short notice."*

> *"You have to realize how specialized you are as a scientist. It is hard but extremely important to avoid jargon. Good analogies and examples are most useful. A clear, exciting and straightforward story is crucial."*

When asked to comment on the benefits of the Science Café, Scientists listed benefits to themselves and benefits to the attendees.

Scientists were also given the opportunity to share how their Café experience could have been even better. A total of 34 Scientists responded to this question. Most focused on improvements to the venue including *better multimedia facilities, better lighting conditions, more space* or conversely *a slightly more intimate venue*, and *more varied appetizers to accompany the drinks!* Other suggested changes included the desire for a *bigger audience* and improvements that they would like to make to their own presentation (a *simpler* or *shorter presentation).*

As a final piece of feedback, Scientists shared the benefits of presenting at a Science Café. In response to the question, some respondents focused on the benefits to themselves, while others focused on the benefits to attendees. Examples of each type of response are presented in Table 8; a full list of responses is in Appendix P.

Table 8
Perceived Benefits of Presenting at a Science Café

Interacting with the public (n=21)	▪ *Nice crowd. Interested kids. Who could ask for more?* ▪ *Chance to connect to the public.* ▪ *Intersecting with inquisitive members of the general public* ▪ *engaging in intellectual conversation* ▪ *The presenter has a good chance to enjoy give and take…*
Professional development (n=17)	▪ *Prepares you to talk with legislators about global warming....* ▪ *Feedback on how to talk with the public.* ▪ *Makes the speaker a better* [communicator] *of science…*
Public education (n=16)	▪ *It is a chance to clear up misperceptions of otherwise confusing science, particularly with controversial subjects which have come to be very important for the general public (e.g. global climate change, stem cell research).* ▪ *I was able to bring my research to the community where it will hopefully help people* ▪ *Getting the facts about hydrogen to the public.*
Outreach and exposure (n=12)	▪ *Good community relations and good publicity for your department.* ▪ *Exposure* ▪ *Good for outreach, which is important.*
Promoting a positive image of science and scientists (n=6)	▪ *Better image of scientists* ▪ *You get to share your interest and enthusiasm with the public, help them understand why what you and others do is of value to them…* ▪ *… let them (and you) see what it means to do science/how it matters.*

N=50

Perceived Effectiveness of the Science Café on Attendees

In addition to the benefits outlined in the previous section, Scientists also answered a series of questions that focused specifically on their impressions of how the Cafés influence attendees. First, Scientists rated the perceived effectiveness of Science Cafes at engaging the public with science, using a five-point scale from 1 (*Not at all effective*) to 5 (*Extremely effective*), and scientists were asked to explain the rating they selected. Over two-thirds (69%) believed that Science Cafés are *very* or *extremely effective* in this regard.

- 22% believed Science Cafés are *extremely effective* at engaging the public with science,
- 47% believed they are *very effective*,
- 20% think they are *generally effective*,
- 10% think they are *a little effective*, and
- 2% believe that Science Cafés are *not at all effective* at engaging the public with science.

Most scientists believed that the Science Cafés are very or extremely effective at engaging the public in science, and some noted that they would be more effective if they reached a broader audience.

When asked to explain the rating they had selected, 47% of the Scientists provided positive feedback about the Café model. They noted the audience's interest in the presentation they made, the effectiveness of the informal setting, and the importance of having a venue that permits direct communication between scientists and the public. Responses included:

> *"I am amazed how many people want to come and learn about science. If Science Cafes can do that, they are extremely effective."*

> *"Participants commented that it was* [non-intimidating] *and very informative. They were also impressed to see a scientist admit uncertainty and/or engage in ethical dilemmas since the general impression is that science is precise and dispassionate."*

> *"A relaxed atmosphere and a chance to interact with people with some expertise, in an informal setting, lets people respond more directly to ideas."*

> *"With blogs, websites, newsletters and email, science cafes have a profound way of reaching a public which no other medium really has. Direct communication with 50-100 people, has unknown ripple effects, but they effects are long-lasting and tangible…"*

As with the Organizers, some Scientists (39%) expressed concerns about the Café model. Most felt that Science Cafés have limited reach and believe that those who do attend are a self-selected group that is already predisposed to science. In the words of one scientist, *"I think they can be extremely effective for those who attend, but people have to choose to attend to get that benefit. Often, those who attend already have a predisposition to learn about the subject and are in effect going out of their way to do so. It may be rather like preaching to the choir. So the effect on society is limited, and may have little impact on those it would most benefit society to influence."*

Scientists' Advice about Cafés and Café Resources

Several questions on the Scientist Survey were designed to gather advice about how Café Organizers should recruit other scientists to serve as presenters. They also had the chance to share recommendations for how to make a good Café presentation, and to identify the resources that would have been helpful to them as they prepared for their first Café.

Scientists' Recommendations for Recruiting Future Presenters

Most scientists provided general suggestions for how Café Organizers can recruit new presenters, including *just asking*, *networking* and *publicizing*, compensating presenters through direct *pay* or *providing* [for] *travel expenses*, *explaining the benefits* of presenting at Cafes, and *having ideas for topics/questions relevant to the scientist and the audience* when asking Scientists to present.

A smaller group (n=14) provided specific suggestions around networking and advertising. Their responses included:

> *"…Have a Science Cafe cafe, an evening where people who aren't familiar with the concept can be introduced to it and to a few techniques for connecting with a general audience; then sign people up to present. Stress scientists' social responsibility (we all want more people to understand evolution). Grad students may be particularly good targets; we're not intimidating, we TA intro courses, and we all want practice presenting our work."*
>
> *"Perhaps asking previous presenters who they think would be interested (and interesting) in giving a presentation."*
>
> *"In order to get the best speakers cafe organizers should build a network of people who have listened to good talks…"*
>
> *"One answer is to spread the net a little wider to include science writers. Though I'm a physicist, I also do popular science writing. That experience has made it easier for me to think of how to connect at a popular level. There are of course many stellar scientists who are also wonderful presenters; but there are also science writers who both understand the science and have that knack of making it clear to just about anybody. I would also recruit among scientists whose first love is teaching. It's true that there's something special in having scientists present their own front-line research, but sometimes other people can do an even better job of getting the research across. I know from my own experience that Einstein's own supposedly simple book about relativity has baffled generations of students; a brilliant scientist isn't necessarily a brilliant expositor."*
>
> *"Create an expanding network of contacts by asking scientists who have participated to recommend colleagues. Also, contact publishers of science books to reach authors who have written for lay audiences -- the Cafes are a great addition to a book tour."*
>
> *"Recruit authors who have recently publish something interesting."*
>
> *"Keep asking people at science based non-governmental organizations."*
>
> *"Partner with member societies or scientific meetings to let more scientists know about this opportunity (e.g. maybe ask for a booth at national meetings such as Experimental Biology)."*
>
> *"…linking with local Mensa chapters, or astronomy clubs, or space society chapters, or Parent/Teacher groups or 'futurist' groups would help the attendance and talent pool of available speakers."*
>
> *"Make personal contacts with scientists, and ask them to recommend others. The ideal scientist for a Science Cafe is one who will jump at the chance when offered."*

"Go to lots of talks and ask the speakers of the talks you like the best."

"Publicize Cafes in the lay press...most scientists don't know they exist."

"Ask those who have made presentations to recommend colleagues and follow up on such recommendations."

"…there are also many CEO's of scientific companies."

Scientists recommended that future presenters include a Q and A session, demonstrations, and/or slides as part of their Café presentations.

Scientists' Opinions of What Makes a Successful Café Presentation

Scientists shared their impressions of what makes a successful and unsuccessful Café by selecting presentation features that they would and would not recommend. As shown in Table 10, over half of the Scientists endorsed Q and A sessions, demonstrations, and the use of slides in Café presentations. Scientists, as a group, did not recommend that Café presentations avoid any of the features on the list, through several recommended that lectures be avoided.

Table 10
Scientists' Recommendations for Successful Café Presentations

	% who recommend	% who do not recommend
Q and A	86%	2%
A demonstration	59%	0%
Slides	57%	12%
Video/DVD	47%	10%
Lecture	39%	22%
Pictures	33%	4%
Group discussion	31%	4%
Trivia	29%	14%
One-on-one conversations	20%	12%
Audio-based examples	16%	10%

A small group of Scientists elaborated on their recommendations. Several emphasized the importance of interacting with the audience:

"I checked "one on one" above because there's a danger that these can exclude most of the audience, so the presenter has to stay alert to make sure a specific question or concern can be turned in a general direction that will include the whole audience."

"Allow plenty of time for Qs and As. That is the most important part. It gets the audience to feel a part of the process of learning."

"Q&A worked great for me after a really nice short NOVA clip."

"Avoid using Powerpoint if you really want to get information across. Viewers of Powerpoint tend to not be really engaged with the material."

Resources for Preparing Future Presenters

Scientists were particularly interested in three resources that WGBH may include on the Science Café Web site: suggestions for engaging audiences, tips for talking about research with the public, and an introduction to the Café format.

As part of the Science Café Web site, WGBH is planning to develop resource materials that can be used by Scientists to help them prepare for Science Café presentations. Thus, the survey presented Scientists with a list of eight items and asked them to indicate which ones they would like included in these resource materials (see Table 9).

- Scientists were most interested in *suggestions for engaging Science Café audiences.*
- Approximately three-quarters of Scientists believed that *tips for talking about research with the general public*, and *an introduction to the unique nature of Science Cafes* would be helpful.
- Approximately half were interested in video clips from past Cafés, methods for communicating science to the public, and a catalog of NOVA scienceNOW segments.
- Links to resources about communicating with the public and audio clips were the resources of least interest to Scientists.

Table 9
Materials to Prepare Future Presenters

	% respondents
Suggestions for engaging Science Café audiences	84%
Tips for talking about research with the general public	78%
An introduction to the unique nature of Science Cafés	73%
Video clips of past Cafes	59%
An overview of methods available for communicating research to the public	49%
A catalog of NOVA scienceNOW video segments that may pertain to your work	45%
Links to resources that detail public communication strategies	37%
Audio clips of past Cafés	24%

N=51

In addition to the items above, a small number of Scientists (10%) made additional suggestions for resources that would be helpful. These included:

"[A] *data-bank of animations."*

"Discussions with previous speakers."

"Rehearsal (with feedback) in front of a non scientific audience."

"Drink a beer with the [audience] *during the talk. It's not a LECTURE, it's a conversation. The beer breaks the barriers between the audience and the speaker, and it's good for a laugh, too."*

"…The experience of teaching is very helpful in knowing how to communicate."

"Media articles on subject to help scientist see how writers present the very complicated data."

"Remember too, that our time is short; we ain't going to spend ours looking over materials!"

"Tips on what to expect from the audience."

In addition to responding to the list of resource materials above, 47 Scientists gave their own suggestions for how Organizers could help them prepare for a Café event. Nearly half (43%) recommended that the organizers provide examples of successful past presentations and/or consult on individual scientists' presentations. Other recommendations included:

- Giving details about the audience to the presenter, including *what the audience is like, their level of knowledge,* and whether *they like to be engaged, to participate, or prefer to just watch.*
- Opportunities to *practice* the presentation,
- *Showing the space and audiovisual equipment in advance,*
- And *providing general information about Science Cafés* such as *the informality of the experience* and *what occurs at a Science Cafe meeting.*

Scientists' Final Advice

The most frequently mentioned piece of advice among the 47 Scientists who had advice for other presenters was to be responsive to the needs of the audience throughout the presentation. This included assessing their level of engagement and fielding and encouraging questions. The next most frequent advice was for the presenter to *relax* and *have fun*. In addition, many scientists gave advice about the level of knowledge to expect among attendees, as well as how to tailor one's presentation to meet these needs. For example, some wrote "*keep it simple*," advised against using scientific "*jargon"*, and suggested "[making] *a bridge between everyday life and what you are talking about*." For a complete list of advice, see Appendix Q.

THE PERSPECTIVE OF CAFÉ ATTENDEES

Overall, the sample of the 149 Café Attendees who completed the Follow-Up Survey is similar to the sample of Attendees from GRG's Season One evaluation. In both years, the largest group of Attendees was between the ages of 18-34. Also in both years, similar numbers of men and women were surveyed, and over half of the respondents were studying or working in a science-related field. See Table 11 for the demographic profile of Follow-Up Survey respondents.

Table 11
Demographic Profile of Follow-Up Attendees

		% Respondents
Age	17 and under	<1%
	18 – 34 years old	42%
	35 – 49 years old	28%
	50 – 64 years old	24%
	65 and older	6%
Gender	Male	46%
	Female	54%
Groups of Particular Interest	Studying in a science-related field	9%
	Working in a science-related field	27%
	Both studying and working in a science-related field	22%

N=149

In addition to the demographic information presented above, Follow-Up Attendees also provided some basic information about the Cafés they had attended. Approximately half of the respondents (52%) had been to one Science Café, 28% had been to two or three Cafés, 9% had attended four or five Cafés, and 12% had attended more than five Café events.

Half of the Follow-Up Attendees (51%) had attended a Science Café that featured a video clip from NOVA scienceNOW. Approximately one-third of the respondents (32%) had not attended a Café that featured the NOVA scienceNOW program and 17% weren't sure one way or the other.

Follow-Up Attendees who had been to more than one Café were asked to share whether they had attended Cafés in different types of venues (e.g., pubs, bookstores, cafés, museums). Of the 72 Attendees who had been to more than one Café, 55% reported that the Cafés they had attended were in the same type of venue and 45% reported attending Cafes in different types of venues.

Feedback about the Science Café

The Follow-Up Survey respondents who had attended one Science Café in the past were asked to share why they had only been to one Café, while the

respondents who had been to multiple Cafés were asked to share why they had continued to attend. For the most part, people had *not* attended another Café for one of two reasons: either logistical constraints or lack of Café availability. For example, 40% of those who had attended only one Cafe reported that they "*haven't had the time"* to attend other Café events. Others (17%) noted that the "*events are too far away"* and that the distance has prevented them from attending. For those who mentioned availability, they seemed interested in attending another Café if/when the opportunity presented itself. Just over one-quarter (29%), for example, reported that they "*just signed up"* or that they "*have not seen any others advertised*" in their area. An additional 10% reported that they are waiting for the Café to feature a topic that interests them. Importantly, only six Follow-Up Attendees (8%) reported that they had not attended a second Café because they did not have a good experience or simply weren't interested.

Café attendees continue to go to Cafés because they appreciate the topics presented, and enjoy the experience overall.

Those who had attended more than one Café shared a number of reasons why they had returned. Almost half (49%) cited Café topics as a reason they returned and over one-third (35%) provided as part of their response positive feedback about the Café. The speakers/scientists (21%) and informal venue (18%) were also reasons that people have chosen to return to the Café. Similar numbers of people also mentioned learning (17%) and/or the social aspects (15%) of the Café as reasons. Representative responses included:

> *"Fascinating speakers; thought-provoking subject matter; great question-answer segments with other wonderful guests."*
>
> *"I enjoy the talks, the setting, the beer."*
>
> *"I find the subjects interesting and I like the atmosphere."*
>
> *"I find the discussions engaging and interesting. It makes me feel in touch with the scientific community. It is a good excuse for me to keep in touch with my friends."*
>
> *"I love to learn and the Science Café provides interesting, relevant topics – most are well presented and most are in pleasant surroundings."*
>
> *"Interesting topics with good speakers and presentations."*
>
> *"Opportunity for dialogue, meeting other like-minded individuals."*

Attendees favorite aspects of the Science Café included having the chance to learn new information, getting to interact with a scientist, and the topics presented.

All Follow-Up Attendees were also asked to share their favorite aspects of the Café by selecting up to three of ten choices. As seen in Table 12, over half of the Attendees' selected *learning new information*, the chance to have an *interaction with a scientist*, and the *topics* as their favorite things about the Café.

Table 12
Favorite Things about the Science Café

	% Respondents
Learning new information	70%
Interaction with scientist	62%
Topic	56%
Chance to meet new people	31%
Inclusive conversation	26%
Video	15%
Where it was held	14%
Availability of drinks	9%
Availability of food	6%
Chance to speak my mind	3%

N=149

Pubs and bookstores were considered favorite venues for a Café.

Follow-Up Attendees who had attended Cafés in multiple locations (n=43) were also asked to share their favorite venue for the Café. Five options were provided.

- 30% of respondents reported that *a pub* was their favorite venue,
- 30% selected *a bookstore* as their favorite,
- 14% indicated that their favorite venue was *a coffeehouse*, and
- 7% each named *a lecture hall* or *a museum* as their favorite venue.

In addition to the list of options presented above, respondents were given the opportunity to share other venues that were their favorite; 12% of respondents wrote in their favorite choice. Two listed a restaurant, while others mentioned the following: an observatory, the "*Historic Opera House*", and "*Third Place books*" (a combination "*bookstore/pub/coffeehouse*").

As a final measure of feedback about the Science Café, all Follow-Up Attendees were asked whether they had recommended the Café to others. Over three-quarters (81%) reported that they had recommended the Café.

The Influence of the Science Cafés on Attendees' Science Interest and Learning

Follow-up Attendees rated the Café's effectiveness in increasing their interest in science, using a five-point scale from 1 (*Not at All effective*) to 5 (*Extremely effective*). They believed that the Cafés were *generally effective* at increasing their interest in science (mean rating = 3.13). More specifically:

- 7% reported that the Café had been *extremely effective* at increasing their interest in science,
- 29% believed the Café had been *very effective* in this way,
- 41% said the Café was *generally effective*,
- 17% reported that it had been *a little effective*, and
- 6% believed the Café was *not at all effective* at increasing their interest in science.

Using the same scale, those who had attended a Café that featured NOVA scienceNOW were asked to rate the extent to which the Café had influenced their

Café attendees believed the Café had been generally or very effective at increasing their interest in science and their interest in watching NOVA programming.

interest in watching the program and/or other NOVA programs. Most Follow-Up attendees reported that the Café was either *generally* or *very effective*.

- 11% believed that the Café was *extremely effective* at increasing their interest in the WGBH programs,
- 33% rated the Café as *very effective*,
- 39% said it was *generally effective*,
- 12% said it was *a little effective*, and
- 5% believed that the Science Café was *not at all effective* at increasing their interest in watch NOVA and/or NOVA scienceNOW programs.

Next, Follow-Up Attendees were asked to think about Cafés that had been particularly interesting to them and then share up to two things they remembered from the Café(s). Most respondents mentioned the topics featured in Cafés that were interesting to them. Some elaborated on the topics named by sharing a fact they had learned (35%), while others simply named the topic of interest (49%). Smaller percentages recalled a particularly good discussion from a Café (15%), a scientist who was a particularly good presenter (9%), or said they couldn't remember anything from the Café (9%).

Many of the salient Café topics recalled by attendees were those that have been featured in NOVA scienceNOW.

As part of these responses, a long list of Café topics was recalled. Some of the specific topics mentioned may have been included in the same Café (for example, evolution, intelligent design, and the Big Bang theory may have been presented in one Café). While it is unclear how many Cafés are represented in this list or how many of those listed used NOVA scienceNOW video clips, it is important to note that many of the topics recalled by Follow-Up Attendees have been featured on the television program. Table 13 displays the specific topics that Follow-Up Attendees mentioned, reflecting the topics that were the most salient to them.

Table 13
Salient Topics Featured in Science Cafés

▪ Alternative energy	▪ Hurricanes
▪ Asteroids	▪ Intelligent design
▪ Astrology	▪ Lightening
▪ The avian flu	▪ Mass extinction
▪ Big Bang theory	▪ Mirror neurons
▪ Biomedical science	▪ Nanotechnology
▪ Black holes	▪ Oil and energy policy
▪ Cosmology	▪ Red wine and health
▪ Dark matter	▪ Science education
▪ Diet	▪ Solar energy
▪ Dinosaurs (and pre-history)	▪ The solar system
▪ DNA and RNA	▪ Space elevators
▪ Emergent behavior	▪ Stem cell research
▪ Evolution	▪ String theory
▪ Fuel cells	▪ Thermal vents
▪ Genes and weight loss	▪ Toxicology/caffeine
▪ Global warming	▪ Women in science

As stated previously, some Attendees mentioned topics only, while others elaborated on the topic named to share a specific fact learned. Examples of these responses include:

> *"At one Café, I learned about emergent behaviors, complex patterns that evolve from simple interactions. The presenter did a memorable demo with swarming robots.*
>
> *"How little things we do can affect* [global] *warming.*
>
> *"Mass extinction[s] in the past may have been caused by* [a] *rapid shift in CO2 levels in the atmosphere.*
>
> *"Ongoing research may soon lead to the discovery of what dark matter is.*
>
> *"Space elevators are a real possibility and will probably be operational in the next 50 years.*
>
> *"They talked about how the Atkins Diet worked. I know lots of people who have used it and don't really know what's going on in their body when they do.*
>
> *"Wine can extend* [your] *life, maybe.*
>
> *"Nanotechnology – now I know* [what] *it is.*
>
> *"Autistics seemed to significant show aberrant brain activity, most interestingly in mirror neurons."*
>
> *"The biggest problem with hydrogen powered transportation is creating a battery to store the energy."*

In addition to reporting what they remembered most from the Cafés, Follow-Up Attendees also rated the extent to which they feel Science Cafés are effective at engaging the public in learning about science (using a five-point scale from *not at all effective* to *extremely effective)*. On average, Follow-Up Attendees reported that the Cafés are *generally* to *very effective* in this regard (mean rating = 3.42).

- 16% believed Science Cafés are *extremely effective* at engaging the public in learning about science,
- 33% rated the Cafés as *very effective*,
- 30% gave a rating of *generally effective*,
- 20% rated the Café as *a little effective*, and
- 1% believed the Science Cafés are *not at all effective* at engaging the public in learning about science.

The Influence of the Science Cafés on Science-Related Behavior

To assess the extent to which the Science Cafés had encouraged attendees to pursue other science activities, Follow-Up Attendees were asked to report which,

Science Cafés are effective at encouraging attendees to continue engaging with the topics presented.

if any, of seven activities they had completed as the result of attending a Café. The two activities carried out by most were discussing café topics with others and trying to stay current with cutting-edge science topics. The vast majority of Follow-Up Attendees (92%) had completed at least one of the activities listed; an average of three to four activities had been completed, with a range of zero to seven. See Table 14 for the percentage of Follow-Up Attendees who had completed each activity.

Table 14
Ways that Follow-Up Attendees Had Continued to Engage with Café Content

	% who had done this activity	% who had not done this activity
Discussed Café topics with family, friends, or colleagues	83%	17%
Tried to stay more up to date on cutting edge science topics in general	71%	29%
Read a newspaper article about a topic you learned about at a Café	66%	34%
Read a science magazine about a topic you learned about at a Café	50%	50%
Visited Web sites other than the NOVA scienceNOW site to learn about a Café topic	48%	52%
Visited the NOVA scienceNOW Web site to learn more about a Café topic	27%	73%
Read a book about a topic you learned about at a Café	26%	74%

N=149

SCIENCE CAFÉ: CONCLUSIONS

The unique learning environment of the Science Café is important to those involved.

Organizers, Scientists, and Attendees all mentioned the informal learning environment of the Café as a benefit. Some focused on a specific type of venue, or the food and drink provided. Others provided positive feedback about the casual and interactive nature of the Café. The level of Scientist-audience interaction and/or group discussion was cited by each group as a benefit of the Café model.

Cafés were viewed as beneficial by Organizers and Scientists alike.

The majority of the Organizers who have hosted a NOVA scienceNOW Café considered the use of NOVA scienceNOW video to be *very good* or *excellent* at engaging audiences, providing background information, setting the mood, and encouraging audience involvement.

The vast majority of Scientists surveyed said they would present at a Science Café again, if asked. Many had ideas for how they would change their presentation or what they would do differently next time, and some reported that the experience had changed how they think about presenting science to the general public.

Science Cafés encourage Attendees to continue pursing science topics.

The vast majority of Follow-Up Attendees reported that they had completed at least one activity related to a Café topic after attending an event. Most had participated in discussions about a Café topic and had tried to stay more up to date on science news. Others had read about Café topics in the newspaper, through science magazines, or on the Web.

People attend Science Cafés because they are interested in the topics covered and because they enjoy having the opportunity to interact with a Scientist.

Organizers reported that the topics covered and Scientists featured are the primary reasons that attendees return to their Science Café. Follow-Up Attendees also reported that these were the primary reasons that they chose to attend.

Organizers and Scientists are interested in the resources that will be available on the WGBH Science Café Web site.

When given the opportunity to indicate resources that would be of interest to them, both Café Organizers and Scientists reacted positively to the items listed. For example, Café Organizers were particularly interested in a logistical checklist

for organizing a Café, a guide to starting a Café, and a list of other Cafés in the United States. Scientists' top choices were a list of tips for engaging Café audiences, tips for working with the general public, and an introduction to the Café environment.

Science Café presentations should be interactive in nature and should provide direct contact between Scientists and Attendees.

Organizers recommend more dynamic presentation formats and some forbid lecture or PowerPoint presentations at the Café. While most Scientists surveyed did use a lecture or PowerPoint format for their presentation, many suggested that they would change future presentations to be more interactive. Both groups recommended that Q and A sessions be included in Cafés. Attendees noted that having the chance to interact with a scientist was one of the highlights of the experience, which reinforces this recommendation.

An important next step for the Science Café movement is reaching out to new audiences.

Organizers and Scientists agree that the Café format is effective for engaging members of the public who attend events, but that most attendees are *"the converted"* or those with an existing interest in science. Both groups believe that the Café format will be more effective at engaging the public in science once the Cafés have broader reach.

RECOMMENDATIONS

The results from this report indicate that each component of the NOVA scienceNOW initiative has been successful at meeting its stated goals. As in Season One, each Season Two component has proven to (a) increase the audience's awareness of a topic, and/or (b) increase their audience's knowledge of science topics. Further, evaluation results showed that each component has been effective at increasing public engagement with science; people continue to pursue NOVA scienceNOW topics on their own after experiencing one of the program's offerings.

Moreover, the various NOVA scienceNOW offerings allow the initiative, as a whole, to reach different audiences. **The series** reaches both the traditional NOVA viewership and, according to Neilsen data, a slightly younger audience than typical NOVA viewers. **The Web site** also reaches a younger audience than that typically engaged with science; in addition, it reaches a sub-group of people who do not watch television and who prefer to watch the program online. Parents and teachers also indicated that they use the program and Web site as a way to interact with youth about science. The NOVA scienceNOW **bioscience classroom activities** reach high school students who reported that they do not typically watch NOVA programming. Finally, the **Science Cafés** have reached a younger audience and more females compared to those who typically engage with science. This multi-pronged approach maximizes the reach of the NOVA scienceNOW program. ***GRG's primary recommendation is that WGBH continue producing each offering in future seasons. Further, we recommend that the general formula for each remain unchanged.***

Based on the results from both the evaluation of the series and the Web site, ***GRG recommends that WGBH continues to include stories on physics/space science and health/bioscience in future seasons.*** These types of stories received the highest ratings from participants in the Viewer Study, and were the stories watched the most often by those who completed the Web site survey. Further, they were considered to have the most personal relevance to the highest number of viewers, and thus were cited most often as the stories that held their interest the most.. Based on audience interest in space science and the positive feedback received about his skills as host, ***GRG recommends that Neil deGrasse Tyson continue to host the program in Season Three.***

Results from the Web site survey revealed that visitors do not necessarily distinguish NOVA scienceNOW from NOVA. In each phase of the Web site evaluation, people mistakenly named NOVA episodes as segments from NOVA scienceNOW. While the association with NOVA is certainly beneficial for traditional science viewers, it may not be the best way to continue building the non-traditional, younger science viewing audience. ***If WGBH wants to distinguish NOVA scienceNOW from NOVA as a way to continue attracting new audiences, GRG recommends that WGBH consider developing and branding NOVA scienceNOW as its own series.***

Throughout the evaluation of the Web site, respondents applauded NOVA scienceNOW for providing the capacity to watch the program online. The only

requests made by visitors for changing to the site centered on the viewing options. For example a small group of Season Two respondents reported that they were looking for new segments that were not yet available on the site even though the program had aired. A larger group of visitors requested additional video segments and/or more variety in the ways that they can watch NOVA scienceNOW programming. ***GRG recommends that the WGBH team: (1) continue to develop new clips related to NSN topics, and (2) add full-segment viewing to the site***. These actions should increase the amount of video available to visitors and the number of viewing options, without sizeable extra production costs. If WGBH's budget allows only one of these steps to be taken, GRG suggests that WGBH pursue the first rather than the second recommendation.

The results from this evaluation also speak to the success of the bioscience classroom activities developed by the NOVA scienceNOW team in increasing students' content knowledge, interest in biomedical careers, and continued engagement with science content. ***GRG recommends that the NOVA scienceNOW team continue to follow the model they use for developing bioscience activities.***

As stated earlier in this report, a puzzling evaluation finding has been students' consistent ratings of NOVA scienceNOW activities as less hands-on than typical science activities. While it is unclear how students define hands-on, results from this year indicated that students had very positive attitudes about science lab work and that Follow-Up teachers often used this kind of science activity in their personal definitions of hands-on. ***GRG recommends that additional formative research be done to learn students' and teachers' definitions of hands-on activities and their interest in these kinds of lessons, if WGBH is interested in creating hands-on classroom activities in later seasons. Further, if future evaluations ask students to rate the hands-on nature of activities, we recommend that the survey also document students' definitions for that term.***

Finally, we believe that the results from this evaluation have yielded valuable information to support WGBH's role in the Science Café movement. ***GRG recommends that WGBH use the formative feedback provided by Organizers and Scientists to help develop the Science Café Web site.*** Specific resources of interest were highlighted by each group. Further, both groups agree that Café presentations need to be interactive in nature, should include Q and A sessions, and should avoid lecture. Attendees reported that the interactive nature of Café presentations was important to them as well.

WGBH can also provide guidance in helping Cafés target new audiences to increase the reach and influence of the Café. Organizers and Scientists agreed that the Café model is effective at engaging the public with science, but that the Cafés are currently reaching "*the converted*." ***GRG recommends that WGBH take the lead in developing strategies that can be used by Café Organizers across the country to increase the reach of the Science Café movement.*** As a leader in the Science Café movement, one of the ways that WGBH may be able to have the greatest impact is by helping existing Cafés reach out to new audiences.

Finally, this evaluation has demonstrated how different offerings from the same initiative can bolster one another. Visitors to the Web site, for example, visited primarily to watch program segments or to learn more about a topic they had heard about through the program. The bioscience classroom activities and a subset of Science Cafés also reinforced the program by building on NOVA scienceNOW segment content. This intersection of initiative offerings provides the general public with multiple ways to continue engaging with science, in general, and with NOVA scienceNOW topics, in particular. ***GRG recommends that the WGBH team continue to explore new ways to create synergy between initiative offerings as a way to leverage and perpetuate the influence of NOVA scienceNOW as an initiative on the public.***

In summary, this report presents many findings that speak to the success of the NOVA scienceNOW initiative. The recommendations made here will assist the WGBH team in responding to audience interests, while continuing to strengthen their existing offerings.

APPENDIX