

**Seeing in the Dark:
Film and Web site Evaluation**

Submitted by

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INTRODUCTION

ROCKMAN *ET AL* (REA), an independent evaluation, research, and consulting firm headquartered in San Francisco, conducted an evaluation of media pieces related to the film *Seeing in the Dark* in order to explore the quality and impact of the film and its associated Web site on audiences. Aspects of each media component evaluated included audience interest, learning, behavior and appeal, as well as usability and content of the Web site.

The REA evaluation included three parts:

- 1) Formative evaluation of the film, in order to inform film development,
- 2) Summative evaluation of the film, to measure impact on interest, learning, and behaviors (i.e., doing things related to astronomy such as reading magazines, stargazing, etc.),
- 3) Summative evaluation of the Web site, to measure the impact on interest, learning, and behaviors, as well as appeal, usability, and quality of the content on the Web site to inform future iterations of the site.

This report focuses on summative findings, while other reports to the client have focused on formative findings in order to inform project development. The summative evaluation sought to answer the following questions, in regard to the film and the Web site:

Appeal & Web site Usability

- 1) Does the film appeal to audiences?
- 2) Does the Web site appeal to visitors?
- 3) How easily are visitors able to navigate the Web site?

Impact

- 4) What do audiences learn from the film?
- 5) What do visitors learn from the Web site?
- 6) What is the film's impact on short-term behavior and attitudes? (e.g., Does it help and/or inspire audiences to do their own amateur astronomy? Do they talk with others about the content? Do they go to the program website to explore further? Do they go to other websites such as NASA, etc.? Do they seek out astronomers who might provide an opportunity to search? Do they go to a planetarium to see a show or hear a lecture? etc.)
- 7) What is the Web site's impact on short-term behavior and attitudes?

METHOD

In the summative and formative evaluation, researchers used a mixed-methods approach including surveys, focus groups, and think-alouds, in order to gather broad as well as in-depth, nuanced information about appeal, impact, and usability of the *Seeing in the Dark* Web site and film. The formative evaluation was completed on a short timeline in Spring 2007. Summative evaluation activities were initially planned for a four-month timeframe, from October 2007 to February 2008. Due to holiday considerations, this timeline was extended one month in order to complete follow-up impact data collection to March 2008.

Formative evaluation activities

On April 12, 2007, REA researchers conducted two focus groups in downtown San Francisco. Participants viewed and discussed segments of the rough-cut of *Seeing in the Dark*. The video segments presented were selected to illustrate some of the main points of the program and were still undergoing revision at the time.

Two distinct groups of participants were selected for the focus groups. A total of 17 participated in the two focus groups. The first group was comprised of 4 men and 5 women 30 to 45 years of age. The second group included 4 women and 4 men, ages 21-30. Participants in both groups had a professed interest in astronomy but not a professional interest. The participants were relatively well educated; 4 reported “some college” but did not graduate, 1 is currently in college, 1 had his/her Associate’s degree, 6 reported Bachelor’s degrees, 3 have “some graduate school,” and 2 have Master’s degrees.

In the formative evaluation, researchers found a generally positive response to the film, which the following suggestions for improvements, including:

- More opportunities to “learn” about astronomy,
- Inclusion of more “beginner”-type astronomers. Some participants questioned the idea of “amateur” and found those featured in the film to be “semi-pro” or possessing more resources than they could imagine having themselves,
- More information about the actual costs and availability of the equipment would make the topic more accessible,
- Clearer focus on the contributions made by women and/or people of color in the field of astronomy and/or practicing amateur astronomy, in order to appeal to a broader range of viewers.

Suggestions for website content included:

- Information on how to choose a telescope
- How to build your own telescope
- Specific locations of viewing opportunities, observatories and telescopes accessible to the public, perhaps accessible by Zip code

- Ways to connect with others interested in astronomy, local groups (such as San Francisco Sidewalk Astronomers)
- A place to pose a question to an expert that you want answered
- Stream the video itself
- A kid-friendly forum, ways for kids to get involved

See *Appendix A: Formative Report* for more detailed findings from formative evaluation activities, as this report focuses on summative findings.

Summative evaluation activities

Film evaluation activities & demographics

REA researchers recruited and conducted two screenings of *Seeing in the Dark* in high definition on January 8, 2008. Both screenings were held at a local San Francisco viewing room. At the screening, audience members completed pre- and post-viewing surveys and participated in 30-minute post-viewing discussions groups. Approximately 41 participants attended the screenings and almost all participated in the post-viewing discussions. Participants were recruited through Craigslist.org and similar websites and listservs and were entered into a drawing for a prize (\$50 gift certificate) and each given a stargazing flashlight as incentive for participation. Additionally, discussion group participants (most of those who attended the film screening) were given a \$20 additional incentive.

Audience members from the film screenings were contacted a month after viewing the film to complete a follow-up online survey that asked respondents to report on impacts of the film. These impacts included interest, learning and/or behaviors related to astronomy such as visiting a planetarium, reading about astronomy, watching other films or television shows about astronomy, etc. In order to ensure high response rates, participants were offered \$20 gift certificates for completion of the follow-up survey.

See *Appendix B: Pre-screening Survey*, *Appendix C: Post-screening Survey*, and *Appendix D: Follow-up Survey* for instruments used to collect information related to the film.

A total of 115 participants were recruited to participate in the film screening, but unfortunately due to severe weather conditions, many were unable to attend the night of the screening. A total of 41 individuals participated in the screening. Table 1, on the following page, shows the gender, ethnicity, age, and highest grade completed by all participants.

Table 1: Characteristics of film evaluation participants

Characteristic		n	% of Total (N=41)
Gender	Male	19	46.3
	Female	22	53.7
Ethnicity	African American	4	9.8
	Asian and/or Pacific Islander	12	29.3
	Caucasian	23	56.1
	Hispanic/Latino	0	0.0
	Native American	1	2.4
	Multi-ethnic	1	2.4
Age	13-17	1	2.4
	18-22	16	39.0
	23-30	6	14.6
	31-40	17	41.5
	41-50	1	2.4
Last grade completed	Some high school or less	0	0.0
	Completed high school	0	0.0
	Some college	13	31.7
	Completed college	14	34.1
	Some graduate school	6	14.6
	Completed graduate school	8	19.5

As shown in the table above, the film-screening group represented diverse demographics in terms of gender, ethnicity, and age, but were fairly homogenous in terms of education; all had at least some college.

Web site evaluation activities & demographics

The same week of the screening, surveys for the Web site study were posted online and linked from the *Seeing in the Dark* Web site. Two surveys were developed for the study: 1) a viewer survey for those who have watched *Seeing in the Dark* prior to visiting the Web site and 2) a non-viewer survey. A link to these surveys was placed on each page of the PBS Web site, <http://www.pbs.org/seeinginthedark>, as well as on the film Web site, <http://www.seeinginthedark.org>. As incentive for completing the survey, the first 200 respondents were offered a stargazing flashlight. See *Appendix E: Web site Survey*.

Unfortunately, users of “freebie” Web sites such as “Fatwallet.com” spammed the online web survey. Researchers sorted through the surveys submitted, discarding questionable surveys. Over 300 survey responses were discarded, including all of the “viewer” surveys that were deemed unreliable data. A total 786 web surveys were submitted, but

only a total of 486 were deemed usable. Table 2 summarizes the gender, ethnicity, and age of survey respondents.

Table 2: Characteristics of web survey respondents

Characteristic		N	% of total (N=486)
Gender	Male	141	29.0
	Female	341	70.2
	Transgender/Other	1	0.2
	Declined to state	3	0.6
Ethnicity	African American	7	1.4
	Asian and/or Pacific Islander	57	11.7
	Caucasian	381	78.4
	Hispanic/Latino	24	4.9
	Native American	5	1.0
	Multi-ethnic	9	1.9
	Declined to state	3	0.6
Age	12 or younger	3	0.6
	13-17	7	1.4
	18-22	45	9.3
	23-30	84	17.3
	31-40	155	31.9
	41-50	124	25.5
	Above 51	68	14.0

Web survey respondents were mostly female (70.2%), Caucasian (78.4%) and between the ages of 31 and 50 years old (57.4%). Table 3, below, shows the educational background of survey respondents. They represented a diversity of educational backgrounds, with the majority of respondents not having completed college (61.3%).

Table 3: Educational Background of web survey respondents

Characteristic		n	% of total (N=486)
Last grade completed	Some high school or less	16	3.3
	Completed high school	99	20.4
	Some college	184	37.9
	Completed college	121	24.9
	Some graduate school	21	4.3
	Completed graduate school	45	9.3

Based on reliability issues with the online survey, researchers decided to conduct in-person think-aloud sessions although it was not in the original research plan. The think-alouds allowed researchers to gather more nuanced information about users' experiences with the site including usability, appeal, and quality of content on the *Seeing in the Dark* Web site. Think-aloud participants were offered a \$75 incentive for an hour and a half sessions. The think-aloud protocol included unguided exploration of the site, as well as specific tasks participants were asked to accomplish. See *Appendix F: Think-aloud Protocol*

For the think-aloud sessions, researchers recruited a total of 9 participants, including three middle school and high school teachers, three parents, and three general audience members ages 18-29. All teachers included in the think-aloud sessions were credentialed science teachers, but they had a range of educational background in astronomy from not having taken any astronomy courses to having majored in Physics and minored in Astronomy, but all had an interest in Astronomy. Teachers also had a range of experiences with teaching astronomy, from teaching it in informal outdoor education courses to teaching astronomy as part of state-mandated classroom content. General audience members had a range of educational background, from high school to Master's degree, all with minimal education in science, but all had an interest in astronomy. All parents had at least some college education, no training in physical sciences (including astronomy), and some interest in astronomy. Parents invited to participate in the think-alouds had at least one adolescent child and were asked questions about their children's interest as well as their own.

FINDINGS

Researchers were interested in finding out how much the film and its Web site appealed to viewers and had an impact on interest, behavior, and knowledge of astronomy. Findings are presented below, organized by research questions.

As described above, researchers used several methods to gather feedback about the *Seeing in the Dark* Web site, including online surveys and think-alouds. The online surveys collected information about appeal and potential impact on future behaviors, while the think-alouds provided more in-depth feedback about these issues, as well as any usability issues.

Appeal & Web site Usability

Does the film appeal to audiences?

Film viewers appeared to feel fairly neutral about the film. After seeing the film, viewers were asked to rate the film on a scale of 1-5 from “poor” to “excellent.” Viewers on average rated the film in the middle of this scale, although their opinions varied (Mean = 3.10 out of 5, SD = 1.04). When asked to rate the quality of specific content on the same 5 point scale, viewers were similarly mixed in response to the quality of information about amateur astronomers (Mean = 3.61/5, SD = 1.00) and the information about astronomy (Mean = 3.22 out of 5, SD = 0.91).

When asked to indicate how they would describe the film, a little over half of the viewers described the film as being of an appropriate length (61.0%), having good narration (56.1%), and having appealing music (53.7%). Table 4, below, shows the ways that viewers said they would describe the film.

Table 4: Film viewers’ description of the film

Which of the following words or phrases best describes the movie you just saw?	n	% of Total (N=41)
Appropriate length	25	60.8
Good narration	23	56.0
Appealing music	22	53.5
Appealing look/feel	21	51.1
Different/original	20	48.7
Good pacing	15	36.5
My type of movie	9	21.9
Boring/dull	9	21.9

During the focus groups, film viewers said they liked the information about amateur astronomers, building your own telescope, and visuals of the film the most. Participants explained about amateur astronomers,

I like the idea that people are out there deciding that "I can do this" and getting into something like that.

When the film shows how accessible it is...normal people like you and I are making these historical findings. That was really cool. I really enjoyed that.

I liked how it really focused on individual astronomers rather than the actual science. It took me back to my first astronomy club - kind of creating a whole wonder about it - the discovery of this entire world beyond.

Several viewers mentioned building homemade telescopes as a particularly impressive part of the information about amateur astronomers. Two viewers explained,

It was nice to see how it's accessible to everyone and how they can build a telescope by themselves.

I did like the section where these amateur astronomers were talking about how they were building with PVC pipes, their own telescopes...I liked that.

Many audience members also mentioned that they enjoyed the visuals presented in the film, including pictures and simulations. One viewer said the "pictures of the actual galaxy" was the best part. Another viewer summed it up with, "The visuals were really beautiful."

In spite of enjoying the information about amateur astronomy (particularly Robert Smith and information about amateur astronomers creating their own telescopes) as well as the visuals presented in the film, many film viewers said they were confused as to the main point of the film; Was it about amateur astronomers? A personal story? An informational piece? This perceived lack of focus may account for the fact that on the survey 21.9% of viewers said this was "their type of film." One focus group participant explained,

I didn't really understand what [the film] was about. For a while I thought it was about amateur astronomers, which I thought was pretty cool. But, then we went back in time to a contrived historical recollection or something. I didn't find those pieces very useful at all... They didn't help me understand anything.

When asked about which demographic would enjoy the film, viewers tended to believe that the film would appeal to older audiences, including adults 51 and above (78.0%) and adults 41-50 (75.6%), and adults age 31-40 (63.3%). Table 5 shows the age range that film viewers thought would enjoy the film.

Table 5: Film viewers' perception of which ages would enjoy the film

Category	n	% of Total (N=41)
Adults 51 or above	32	77.9
Adults age 41-50	31	75.4
Adults age 31-40	26	63.3
Adults age 20-30	22	53.5
Teenagers (13-19)	21	51.1
Pre-teens (younger than 12)	12	29.2

Film viewers explained the film had a “PBS” quality to it and they believed that older audiences would enjoy this particular aesthetic and pacing even if they were not particularly knowledgeable about the subject area. One focus group participant explained,

I would recommend it to my 60-year-old parents when they are just sitting there watching TV in the evening. My first response for the first 30 or 20 seconds of the film was, 'Oh, this is one of those shows that my parents watch on PBS.' And, that's purely what I thought based on the theme music, based on the strolling through the woods, and the cinematography. That was my first impression and I think it kind of followed through the film consistently.

When asked about which types of audiences would like the film most, the large majority of film viewers said that the film would appeal to a range of audiences. Viewers reported that they believed that people who are interested in astronomy (87.8%), interested in science in general (75.6%), as well as those with and without training in science would enjoy the film. Table 6 below shows viewers' perception of the characters of people who would enjoy *Seeing in the Dark*.

Table 6: Film viewers' perception of the film's target audience

Category	n	% of Total (N=41)
People interested in astronomy	36	87.6
People interested in science in general, or in another topic in science	31	75.4
People with training/education in science	28	68.1
People who do not have training in science	28	68.1

In the focus group one viewer said in addition to these audiences, the film has the potential to reach wider audiences if changed slightly,

I think if you have a love for astronomy, this film would be much more interesting. If it's just somebody who doesn't really have the love for it, I'd say it's still a good film if it's maybe shorter.

I would recommend it to my friend who I already know is interested in astrophysics, or my sister who studied engineering.

In general film viewers seemed to believe that older adults who have a previous interest in the subject matter (but not necessarily specific training in science) would like the film.

***Does the design of the Web site appeal to audiences?
How easily are users able to navigate the Web site?***

The *Seeing in the Dark* Web site appeared to have broader appeal than the film. Respondents rated the website's appeal, quality of information, and navigability positively, with average scores ranging from 2.25 to 2.40 on a scale from zero to three (SD = 0.50 – 0.59). Table 7, below, shows that survey respondents felt that the Web site was useful, easy to navigate, visually appealing, and had sufficiently in-depth information.

Table 7: Appeal, quality of information and navigability of the site

Item	N	Mean	SD
The information on the Web site was useful.	480	2.44	0.53
The Web site was easy to navigate.	483	2.41	0.53
The look of the Web site was appealing.	482	2.40	0.50
The depth of information on the Web site was sufficient.	483	2.36	0.52

Scale: 0 = Strongly disagree, 1 = Disagree, 2 = Agree, 3 = Strongly agree

This generally positive response was reflected in the think-aloud sessions. General audience members, teachers, and parents all said they liked the design and the organization of the site. General comments included,

I like the "astronomy-ish" colors [Teacher]

The site is aesthetically pleasing [Parent]

Nice pictures. [General audience]

In terms of navigability, participants said that due to the simple navigation, with tabs that highlight as you scroll over them, "it is very clear where you can go." Participants also said that they did not feel overwhelmed by the amount of information presented, although there seemed to be quite a bit of information on the site. Parents said that they could see using the site as a resource for helping their kids with projects on astronomy.

However, participants suggested that the Web site make a few improvements in order to increase its appeal. The two top suggestions across all participants groups were: 1) to cut down on the amount of text in the site and 2) to be clear about the target audience. In terms of the text, participants said they wanted smaller “chunked” and bullet-pointed text throughout the site. Participants commented,

The writing is difficult. Verbose...would be hard for the average teen. [Teacher]

The text is very technical and not very engaging for a non-expert. [Parent]

I think there's a lot of words as far as a website goes. [General audience]

The other big concern across all groups was the clarity of purpose of the site. Participants said that they wanted designers to be more purposeful in providing resources to target audiences. Participants suggested that “target audiences” could be organized by age and/or by anticipated or suggested behaviors (i.e., those searching for information, those who might be recruited to participate in amateur astronomy, those who might be interested in seeing the film). For more on this particular issue, see discussion about impact on behaviors below.

Suggestions for improvements included changes in design, including:

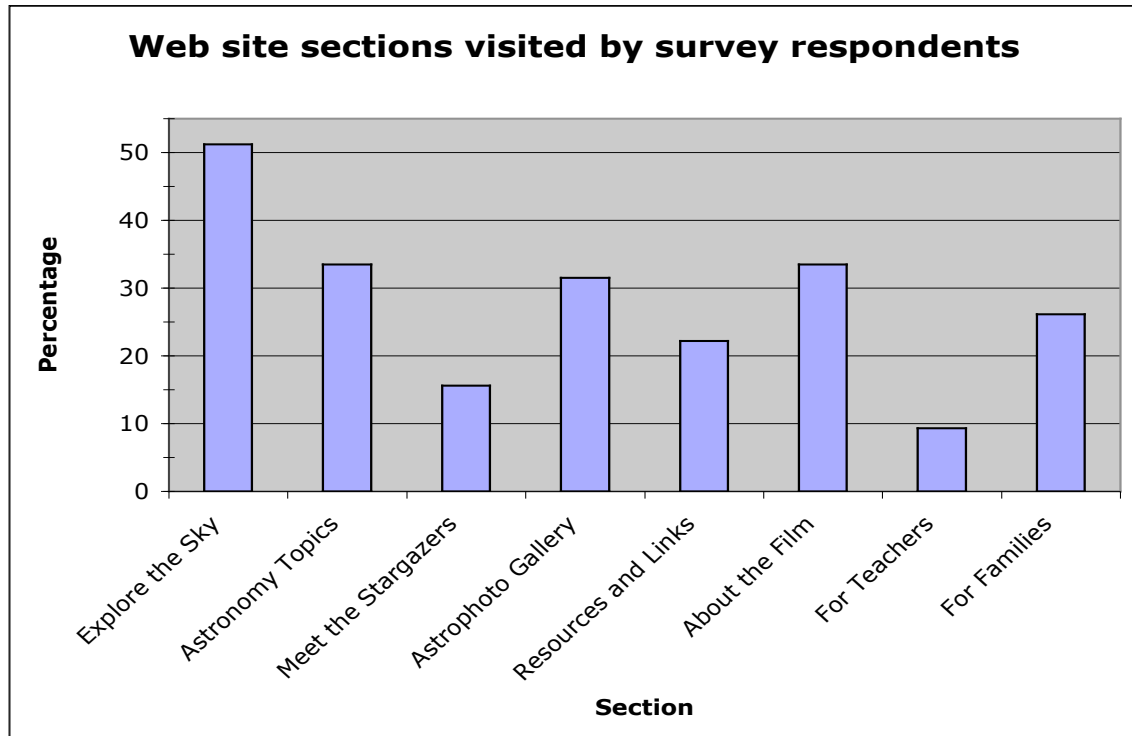
- Provide printable versions of all pages (i.e., pictures, text, etc.),
- Make all links blue, all other text is not blue,
- Create roll over for glossary definitions rather than linking to a different page and provide images in the glossary (“I expected to see a picture of a star cluster and then more information about it, not just the definition in a list.”)
- Place navigation bar consistently on the left-hand side,
- Specify why links are marked in different ways (i.e., underline versus blue not underlined),
- Make all pictures links.

Other improvements suggested by particular user groups included:

- Teachers and parents were concerned about the low number of pictures of minorities and women on the site. One said, “that would be a powerful thing to have” in order to help children and teenagers identify,
- Teachers said that they wanted “information about things you can see without a telescope” for their students,
- Young adult think-aloud participants said they expected more “interactivity” from the site, including movement and interactive features (e.g., a game putting the planets in their correct order, etc.),
- Adults were concerned that the Web site conveyed the message that “you have to have fancy equipment to do this” and it “didn’t look like a thing that the average person can do.” This message should be changed by adding information about a variety of resources to use to view the night sky,
- Adult participants suggested adding an “update” about particular upcoming celestial events in order to “make it more relevant and useful.”

In the survey, visitors were asked to report which sections of the Web site they had viewed. Respondents reported viewing the Explore the Sky pages (51.2%), Astronomy Topics (33.5%), About the Film (33.5%), and Astrophoto Gallery (31.5%). This was reflected in the think-aloud sessions in which users most frequently visited these same areas of the site without prompting from researchers.

Figure 1.



During the think-alouds researchers asked users to share their reactions to each section of the site and describe any usability issues they encountered. Below we report on the appeal and usability of each section.

Homepage

Think-aloud participants generally liked the Web site homepage. They said they liked the layout, that the links are very clear, and that there is nice resolution in the preview video.

Participants gave the following suggestions for improving the homepage:

- Make all images links,
- Make preview play larger,
- Provide a longer, more compelling preview video,
- Cut down on the amount of text,
- Fill all available white space instead of placing the “Continue” link so high,
- Cut out technical notes; provide them as a link or roll over so that visitors will see them only if interested.

Explore the Sky

Most think-aloud participants clicked on “Explore the Sky” first. One participant explained that he/she did so because he/she “assumed that the order of Web site sections has been selected by the experts as being the most important.”

Your Sky Tonight

Think-aloud participants were asked to visit all pages under the “Explore the Sky” section and to provide feedback on each page. In “Your Sky Tonight” participants said they liked that:

- The tool automatically knew where visitors are located,
- The star chart could be printed out,
- It can be used to view stars on the same day with no advanced planning,
- It could be used in conjunction with using a telescope or with the naked eye,
- It is a “familiar” interface.

However, participants suggested a number of ways the “Your Sky Tonight” main page and tool could be improved. They suggested the following improvements:

- Switch the plus and minus buttons to a “gradient” toggle to make zooming easier,
- Enable grabbing and moving the sky “like Google Sky,”
- Include the names of constellations as an option,
- More clarity in terms of what is being labeled,
- Close the second window with the link from the star chart application back to the *Seeing in the Dark* Web site rather than keeping two windows open,
- Create roll-overs for word definitions (e.g., Azimuth, Altitude, Right Ascension, etc.) instead of opening and closing overlays,
- Indicate what will happen when clicking “Zenith,”
- Add boxes to plug in exact coordinates for navigation,
- Add a box to plug in “objects” for more experienced users,
- Include check boxes that indicate the horizon and field of view displayed,
- Allow users to highlight a few constellations or objects of interest without “having all the labels cluttering the chart.”

A few think-aloud participants pointed out that they looked for things they recognized rather than new stars and planets. This suggests that users may need some support in learning about new stars/planets in order to expand their knowledge of astronomy while using this tool. Other participants commented that if the purpose is to get a beginner outside looking at the stars, “overhead” and the “naked eye” view should be default settings because that would be how they would begin to look at the stars.

How-To Videos

Think-aloud participants generally enjoyed the “How-To” videos, particularly the “Dress for Success” video (“The underwear thing was fun.”). Participants said they were great

for beginners (“It’s exactly for someone like me!”). Only a few suggestions were made about the design of the page, including:

- Get rid of the introductory video (“11 seconds is not even worth doing.”),
- Describe videos as “high resolution” and “low resolution” to clarify that there are 7 downloadable videos, not 14,
- Enable videos to start playing automatically,
- Make the videos slightly longer to add more detail,
- Include different types of telescopes (i.e., less expensive, intricate)

One participant also suggested that the design could be improved by making the background consistent with other pages by changing the color to white instead of black.

Internet Telescope

On the “Internet Telescope” page, participants said they liked the idea that they could request images and use it as a resource if they did not have a telescope and/or needed a specific image. One participant said that he/she liked that the telescope was part of the project and related to the film. Parents and teachers said that they thought their students and children would like picking objects to request. One parent explained,

I think that’s really cool. It allows you to become the astronomer and decide what to photograph. I would say my 14 year old would really like this. This would be exciting for him.

A couple of participants were disappointed that they could not manipulate a telescope online, assuming “it was a live thing.” These participants said they expected they would have the ability to manipulate a telescope online (“Like Google street view, but with constellations”). Participants suggested the following improvements:

- More locations of telescopes so that images can be received the same day,
- Clarify whether or not you have to be a student to request an image,
- Clarify the resolution of the images that will be sent,
- Create a way for users to click on an object description and have the information appear in the request form,
- Move image request form higher,
- Clarify what to do and how to do it (i.e., “Pick an object from the list below and put the ‘M’ number into the order form following the list to order an image of that object. A photo of the image will be taken tonight, or as soon as is possible, and sent to your email address.”)

Observation Guides

All participants liked the observation guides, particularly that they could be downloaded and the fact that “hot topics” (e.g., shooting stars, lunar eclipse) were highlighted. The only suggestions that participants offered to make the observation guides better were to 1) label the guides as “beginner guides” to clarify the audience, and 2) create a way for Web site visitors to order a glossy version to be sent to them through the mail.

Birthday Stars

Teachers and parents said the “Birthday Stars” section appeared to be something that students and children would like. Supporting this assumption, the youngest participant (18 years old) liked this section of the Web site best. However, other participants were not as interested in this page. Parents said that it “sounds like astrology.”

Astronomy Topics

Think-aloud participants generally liked the astronomy topics pages, saying they felt that they quickly and easily learned about topics based on the information provided. One participant explained, “I like that by the end of the second paragraph I know enough to pass a basic test.” For this reason, teachers said they would use these pages for quick facts for teaching. They also liked:

- The images that encourage users to click on topics and help users understand the information presented on pages,
- The topics that have video clips (and would like them for all topics),
- Diagrams that reinforce ideas,
- The numbered steps under “Lives of Stars” because “it is easy to get the gist of the information quickly,”
- The particular topics presented, particularly Pluto and why it is no longer a planet.

Participants suggested the following ways to improve this section of the site:

- Link the topics to the film,
- Use a word other than “topics” (“Topics sounds boring”),
- Take out the last two boxes on the main “Astronomy Topics” page because it “looks like it didn’t download completely,”
- Enable users to enlarge pictures,
- Add interactives (e.g., dragging planets into their correct order),
- Line up “Light Pollution” images so that comparisons are easier.

Meet the Stargazers

Due to the fact that all think-aloud participants had not seen the movie, participants were less interested in the “Meet the Stargazers” section. When viewing the page, participants said they read the page looking for personal connections. One participant recognized a reference to a person he/she was familiar with (“Wow, she worked with Geoff Marcy. He’s a big exoplanets guy.”) Another participant said he/she connected with Robert Smith, “the football player.” One parent explained that she liked the page because,

As a parent, I am interested in inspiration for my son. I want to know why these people got involved in astronomy, how it has affected them, info to help me find ways to help my son find something to get excited about.

However, several participants said that this was the least favorite part of the site, including younger participants (“Reading bios of middle aged people doesn’t make me want to go see the movie”) and teachers (“Looks mostly white, I wouldn’t show this to my students of color.”) and some parents (“This reinforces my preconception that these people are nerds. Nothing speaks to *me* and draws me in”). Participants suggested the following changes:

- Include places/ways different stargazers see the stars,
- Clarify why stargazers appear in the order that they are listed; some participants assumed they were listed in order from most “professional” to most amateur,
- Add links for further information about the amateur astronomers,
- Include clear links to the film.

Astrophoto Gallery

The “Astrophoto Gallery” section was one of the most well liked among think-aloud participants; younger participants spent most of their time on this part of the site, teachers said they would use the photos as resources in their classes, and parents clicked through all of the pictures and said the photos were “amazing, really beautiful.” Participants were particularly pleased with the captions at the bottom of each image and the fact that links in the text go deeper into the topic. Participants also liked the links at the bottom of the main “Astrophoto Gallery” page (“You can go there if you can’t find what you’re looking for”).

Improvements suggested by participants were primarily ways of seeing more or learning more in-depth information about the topics depicted in the photos, including larger images and more information about where the photo originated (e.g., stills from the movie, different types of telescopes, etc.). Participants also suggested:

- Explicitly link with the movie,
- Distinguish this gallery from other photo galleries of the stars,
- Display images without scroll bars,
- Change the white background to be consistent with other pages,
- Connect references to historical figures in captions to glossary.

Resources and Links

Participants said they appreciated the quality of resources and links presented in this section. One teacher said that this was “the best part of the site” because it was most “science-y” with links to NASA, SETI, etc. Participants described this section as a good “jumping off point” for further exploration and only made a couple of small suggestions, including adding a description of how local societies could help teachers and improving the design by cutting down on blank white space.

About the Film

The “About the Film” section of the Web site was the least favorite section among think-aloud participants. This may be due to the fact that none had seen the film, although most

criticism shared was about the especially text-heavy nature of this part of the site (“Based on the writing... I would expect the film to be boring, too”). Participants said they expected more visuals such as “head shots” of filmmakers, a compelling “preview” of the film, and video of “the making of.” They also expected more in-depth information such as links about the production team, how the film was made, etc. (“The standard movie site stuff.”). A few participants said that they were put off by the fact that in “About the Filmmakers” there were two paragraphs presented on Tim Ferris and much less about the rest of the production team and that the 10-minute interview with Tim Ferris “seems long.” Another participant suggested that in the “About the Filmmakers” section, filmmaker titles should be moved next to names (i.e., Nigel Ashcroft, Director). One participant said that he/she was “not impressed with the special effects” and disappointed that the information presented in the special effects videos was not complete (i.e., it was edited inappropriately), although another participant said he/she liked the narrator in the special effects videos (“Reminds me of *Planet Earth*”). As with other videos, participants expected videos to automatically start.

For Teachers

Teacher think-aloud participants were asked to explore the “For Teachers” part of the site. Teachers said they liked that what they had expected to be in this part of the site was there (i.e., downloadable lesson plans). They also liked the organization by topic and amount and variety of resources available. All teachers found something they would be interested in using.

All teachers said there was too much text at the top of the page and that it should all be “bullet pointed” and easy for a teacher with “no time” to utilize quickly. For this reason, teachers also suggested adding sub-headings to the overall navigation bar to move quickly among topic areas. Teachers also said they did not like the use of the word “youngster” because they perceived it as being used only by those who did have experience working with students. Teachers made other suggestions to improve the section of the Web site, including:

- Add clips of the film related for activities related to the film (with how long the clips are) or whole film with highlights of where to go (minutes, seconds),
- Include more information on the phases of the Moon and Mars, as they are big in standards (particularly middle school standards),
- Distinguish the list of resources from other resources (“Topics on size and scale appear in any teacher astronomy book”),
- Add higher quality/more in-depth lesson plans (“More ‘science-y’ stuff rather than ‘pretty,’ more about actual Astronomy”),
- Clarify what the yellow dots signify,
- Take out link to standards as none of the teachers were interested in looking at them (i.e., they would use their local standards and know how to find them),
- Add information about where to find resources such as telescopes, observatories, etc. and other required technological resources,

- Add information about the source of the lesson plans so that teachers know where the lessons are from and whether or not they overlap with resources they have already used,
- Add videos of teacher testimonies/ways they've used the movie and/or Web site,
- Enable lesson plans to be opened in a browser window rather than having to download .pdfs.

Teachers also said they did not like the grade level parameters given and that if something was characterized as “Grade 2 and up” they might skip over it for older grades, but the lesson might be appropriate for their students.

Teachers also overwhelmingly said that they would like “areas” or “links and resources” specifically for student use. One participant suggested “a Wiki with videos.”

For Families

Parent think-aloud participants were asked to explore the “For Families” part of the site. Parents said that they liked some of activities presented, including:

- “Astronomical Names” (“Activity sounds fun & interesting.”),
- “Uncle Al’s Star Wheel,” and
- “Make Your Own Sundial.”

Parents had several suggestions for improving the parent section. First, they suggested adding guidelines for what age they would work best for different ages (“like teacher page”), although they warned that “teens don’t really like to do things with their parents,” so “family” activities should be things to do with younger kids. However, if the site wanted to attract teens, they suggested adding resources about “how to make your own telescope.”

Particularly important to parents was whether or not their children would be able to relate to things on the site. For this reason, parents said that the picture on the “For Families” page was troubling because it depicts only males using a telescope. One parent explained:

Astronomy seems to be for guys, that’s the stereotype, and here you have a picture of two boys and their father. It would be nice to have pictures of girls and women. My daughters (age 8) are very aware of what activities are supposed to be for which gender, and this would let them know this wasn’t for them.

For the same reason, parents wanted the writing to be more “kid-friendly” and should include more “interactive” features such as video games involving astronomy. In fact, parents looked for these types of resources and were disappointed when they did not find what they were looking for (i.e., “Crash Landing” says it is a “game” but it was not a video game, as expected; “It is more work and less interesting than I’d hoped”). Parents wanted the pages more kid-friendly with more graphics, less text, whimsical icons and/or pictures to illustrate the activities. They also suggested adding a category “Just for Kids”

that includes activities kids can do on their own, as opposed to those that will have to be led by an adult.

Many resources took parents off the *Seeing in the Dark* Web site. Parents said they did not like this because external sites looked very different; they found some of the off-site resources bland, text-dense, and full of advertisements, which they did not like. Parents felt that there should be more information about each link before you click on them “so you know what you will be getting.” Also, they suggested that each activity should provide consistent information, similar to the “Constellation Detective” activity (i.e., recommended age level, time to do activity, materials needed, etc.).

In terms of topics they would like to see on the site, parents indicated that safety was a big issue and the site should highlight safety information (e.g. warnings about looking directly at the sun, how to look at the sun safely). Parents also suggested the following design changes:

- Highlight the activities by using a different color or font for this section of the “For Families” page,
- Cut down on the amount of text above the activities and/or bullet point this information,
- Categorize activities by age level or type of activity; for parents, topic areas are not useful.

Impact

What do audiences learn from the film?

In order to measure changes in short-term learning, researchers compared data from the pre-viewing survey and the follow-up survey (one month after viewing the film). These included participants’ overall self-rating of knowledge of astronomy and amateur astronomers using paired samples t-test. There were no changes in knowledge (all p values > 0.05). When comparing groups using repeated-measures ANOVA, there were no significant differences based on age or gender.

When asked to describe what they had learned from the film during focus groups immediately following the film, participants reported what they had learned about most was amateur astronomers. A few film viewers also mentioned a few astronomy facts that were new to them. This low number may be due to the fact that viewers selected to participate in the film screening were those with prior interest in science, and thus may have already been aware of the topics presented in the film. Viewers explained,

I felt like I didn't learn so much about astronomy from the film. I learned about astronomers - who to be an amateur astronomer. It was more a film about the sociology of astronomers not about astronomy itself. Or, maybe that was the intent. I was hoping to learn more about astronomy itself. That's why I liked the segments that were about the science itself.

[There was] nothing that I didn't already know [in terms of astronomy facts]. I did learn about the [home-made] scopes, though. Thought it was neat that they could create that quality [scopes].

What viewers said they learned about amateur astronomers was 1) the contribution of amateur astronomers, and 2) the idea that other amateurs (like them) could make similar contributions. Film viewers explained,

I never really knew before the contributions that all these different amateurs astronomers make. You can just go in your backyard, and have a telescope, and actually make a contribution to the science.

It's a very encouraging film in the sense - I walked away from it feeling that anyone could be an amateur astronomer. You could be a little kid - 12 years old - or you can be an adult. Anyone can do it.

What this film really alludes to is that clearly the amateurs that are collecting all this information - they are the ones that are really feeding this to the experts and tracking a lot of the stuff. I thought that was really fascinating.

I always thought you had to be involved with the university or something academic to have access to telescopes. And, I thought, "Oh my god, people actually built those things?" They were talking about PVC pipes or whatever. I thought it was a good exposure to something new.

However, this focus disappointed some viewers who were hoping for more "scientific" information ("I didn't feel like it was designed to teach that much. It was about amateur astronomers, not astronomy"). Some felt that they wanted more information and/or were not clear what the film was trying to get across. One viewer explained, "There were a few facts in there that were pretty cool but I was confused what I was supposed to bring away." Viewers who wanted a more clear focus in the film explained,

I felt it was stuffed full of clichés ...sands of time... why don't you tell me what the diff is between reflective and refraction telescope? I guess what I'm saying is either do it more philosophical... or more science. Felt like awkward mix of the two just scratching the surface, not enough facts and not enough personal stories.

I had no idea what [the filmmaker] was trying to tell us. Especially at the end when it started going how astronomers are musicians...I had no idea how that was relevant. Also the part about setting up the telescope. I still have no idea how to do that. It was really vague.

Film viewers said that while the film presented some information that was new to them, it was more difficult to remember "facts" presented in the film rather than retain an overall understanding of amateur astronomy. One participant explained, "I had a hard time retaining a lot of facts in a one-hour movie. It's just kind of in one ear and out the other."

However, a few viewers were able to recall some larger-picture astronomy concepts and/or more detailed facts or resources they had learned about during the movie, including:

- The idea that the star was giving off light before the earth ever existed,
- How to find planets by monitoring light levels,
- Issues of light pollution and how 1 in 5 in the U.S. have never seen the Milky Way,
- About GPS telescopes; tracking things through the night by entering coordinates,
- About a website that you can go to actually look at the stars (“You know how the four brothers constructed it and then they called this guy wherever he was and said, ‘Now you can check online.’ That’s the website that I would be interested in seeing”).

What do audiences learn from the Web site?

When asked in the web survey to rate the extent to which they agreed with statements about their learning about amateur astronomers, astronomy, and how to explore the sky from visiting the Web site, respondents said they “agree” with statements that indicated that they learned about all three of these topics. Table 8, below, summarizes respondents’ ratings on survey items related to learning.

Table 8: What visitors learned while on the Web site

Item	N	Mean	SD
I learned about astronomy by visiting the Web site.	477	2.32	0.56
I learned how to explore the sky by visiting the Web site.	479	2.30	0.59
I learned about amateur astronomers by visiting the Web site.	480	2.25	0.59

Scale: 0=Strongly disagree, 1=Disagree, 2=Agree, 3=Strongly agree

When asked in the think-alouds to specifically identify what they learned about on the site, participants named a range of topics depending on what most interested them, including:

- What a Gamma Ray burst is,
- That SETI has a podcast (very excited about this fact),
- It takes Mars 1.9 earth years to go around the sun,
- 80% of people haven’t seen the Milky Way,
- The LA issue—when lights went out, people were scared of the Milky Way.

What is the film’s impact on short-term behavior and attitudes?

Viewers reported that after they viewed the film, they would be most likely to go out at night and look at the stars (Mean = 3.49 out of 4, SD = 0.60) and go to a planetarium (Mean = 3.09/4, SD = 0.68). They would be least likely to buy a DVD of the film (Mean = 1.61/4, SD = 0.59) and or buy the book *Seeing in the Dark* (Mean = 1.90/4, SD = 0.87). There were no significant differences in likelihood by age or gender.

In order to measure changes in short-term behavior, researchers compared data from the pre-viewing survey and the follow-up survey (one month after viewing the film). These included participants' ratings on interest and behavior scales using paired samples t-test. There were no changes in interest (all p values > 0.05). When comparing populations (i.e., age groups, genders) using repeated-measures ANOVA there were no significant differences between groups.

Although there were no significant differences in terms of interest in astronomy before and after viewing the film, there were changes in some specific behaviors. When asked whether or not they read magazines about astronomy before and after viewing the film, the frequency of magazine reading increased significantly ($\chi^2 (2, N=34) = 6.77, p > 0.05$). Of the 22 people who reported not reading an astronomy magazine, 12 (54.4%) reported reading a magazine or newsletter about astronomy in the follow-up survey. There were no differences between groups (i.e., gender and age). Reading astronomy-related materials appeared to be an immediate interest following the film screening, as viewers reported in the focus groups that they would be interested in reading about the topics presented in the film, including the book *Seeing in the Dark*. For example, one film viewer said,

I'm kind of interested in reading the book to see what the book says because I know sometimes when you watch the movie you only get a particular insight. Usually the book is more thorough.

Respondents' intentions immediately after the film had limited ability to predict short-term behavior. Correlation coefficients were computed between the likelihood of doing an activity (from the post-viewing survey) and the frequency of doing that activity on the follow-up survey. The strongest relationships between intention and action were for recommending the film to others ($r = 0.66, p < 0.01$), viewing the stars at night ($r = 0.56, p < 0.01$), and talking about the film ($r = 0.53, p < 0.01$).

What is the Web site's impact on behavior?

After viewing the site, survey respondents were asked which activities related to astronomy they were most and least likely to do. Respondents said they were most likely to go out and look at the stars (Mean = 2.48 out of 3, SD = 0.69) and watch television shows about astronomy (Mean = 2.27/3, SD = 0.72). Respondents were least likely to seek out a local amateur astronomy club (Mean = 1.32/3, SD = 1.00), take a class about astronomy (Mean = 1.33/3, SD = 1.02), and subscribe to a magazine or newsletter about astronomy (Mean = 1.42/3, SD = 1.00). Table 9, on the following page, shows the likelihood that respondents would follow up their visit on the Web site with activities related to astronomy.

Table 9: Likelihood Web site visitors will do activities related to astronomy

Now that you have visited the Web site, how likely are you to ...	N	Mean	SD
...go out at night to look at the stars?	479	2.48	0.69
...watch television shows about astronomy?	480	2.27	0.72
...watch the film <i>Seeing in the Dark</i> ?	476	2.22	0.76
...talk to other people about astronomy?	475	2.02	0.83
...go to a planetarium to see a show, hear a presentation, etc.?	478	2.02	0.87
...recommend that others watch the film <i>Seeing in the Dark</i> ?	478	2.01	0.83
...look at other astronomy Web sites?	483	2.00	0.79
...read a book about astronomy?	479	1.87	0.92
...read a magazine or newsletter about astronomy?	476	1.87	0.88
...read the book <i>Seeing in the Dark</i> by Timothy Ferris?	476	1.68	0.95
...buy a DVD of the film <i>Seeing in the Dark</i> ?	479	1.56	0.95
...buy the book <i>Seeing in the Dark</i> by Timothy Ferris?	476	1.47	0.97
...subscribe to a magazine or newsletter about astronomy?	478	1.42	0.99
...take a class about astronomy?	476	1.33	1.02
...seek out a local amateur astronomy club?	480	1.32	1.01

Scale: 0 = Not at all likely, 1 = Somewhat likely, 2 = Likely, 3 = Very likely

As an overall design issue, think-aloud participants felt the intended outcomes of the site were unclear; did the designers wish to encourage them to see the film? To do amateur astronomy? To find particular information?

Overall, think-aloud participants said the site would have greater impact on their future behaviors if the site were organized to target behaviors, such as gaining scientific expertise, info and resources; recruiting/engaging younger and older amateur astronomers through activities; and seeing and learning about the film.

Since all think-aloud participants had not seen the film, their primary purpose was to find information on what the film was about and specific instruction on how to see the film. They all found they were left with no sense of how to do this, other than by buying the DVD. Across all groups, participants said that they were all “unclear about the links to the film” and (at the end of an hour and a half of using the site) did not know what the film was about or how to see it. Participants made a large number of comments about the lack of connection to the film including,

I still don't know what the movie is about which is strange. [Teacher]

[The site] didn't have a lot of focus on the movie. You kind of forget about the film. If its purpose is to get me into astronomy, it's fine, but wouldn't get me to see the film. [General audience]

I didn't get the feeling they were trying to promote the film. [Parent]

One participant suggested adding a “zip code box” where you could plug in your zip code to find out when the show was airing on your local station—not knowing that this is already a feature on the site. It was a feature that was not easy for participants to find, even after an hour and a half using the site. Others suggested providing the entire film either by streaming it or through iTunes or the Web site so that visitors who are interested in viewing the film can do so after visiting the site.

In spite of confusion in terms of links with the film, most think-aloud participants found at least a few things that they liked and said they would return to the site and/or refer the site to others. All three teacher-participants said they would come back to the site for themselves and/or to give resources to others. While most participants said they probably would not go out and buy a telescope, they would use the website again and watch the movie if it aired on their local television station. Participants said they would recommend the site to those already interested in astronomy, particularly those who own telescopes.

Teachers and parents said they would not recommend the site to kids due to the difficulty of the language. When asked for whom the Web site is most appropriate, think-aloud participants said “educated adults,” thus they would not recommend it to others.

CONCLUSIONS & RECOMMENDATIONS

Overall, film viewers and Web site visitors responded positively to the project. Audiences of the film said they were “encouraged” by and learned the most about the personal stories of amateur astronomers contributing to scientific discovery and were impressed with the visuals presented in the film. Web site visitors consistently liked the design of the site and particularly enjoyed images and tools for viewing the night sky.

Study participants said they would encourage further development of the project. They said that while the current design may exclude those who do not already have an interest in science and younger audiences, these populations could be and should be reached. Participants suggested a number of strategies for appealing to a broader audience, including:

To reach younger audiences, shorten the film, tighten pacing, and/or chunk the film into segments for in-class use. Film viewers said that while they believe the overall film was an appropriate length, pacing was slow and this would not appeal to younger audiences. In order to support shorter viewing sessions, the film could be provided as chunks or “chapters” so that viewers can focus in on particular segments.

Add elements of interactivity on the Web site and/or add sections specifically for children. Parents, younger general audiences, and teachers all expressed a desire for interactive elements on the Web site. Understanding that most youth are exposed to interactive elements and thus have expectations about the nature of interactivity on Web sites, adding this type of feature has the potential to help the project appeal to a broader audience.

Cut down on the amount of text on the Web site (Note: This was suggested for all audiences, but particularly children). All think-aloud participants noted the amount of text on the Web site. One said that he would rather read *Seeing in the Dark* as a book than read the text on the Web site. A teacher commented, “I just don’t like reading so much on a screen.” Cutting down on text in the site would not only appeal to younger audiences, it would also encourage general audiences to dig deeper into the site’s content and perhaps go to the film and/or read the *Seeing in the Dark* book for further information.

Create more explicit links between the film and the Web site to strengthen connection between project elements. Think-aloud participants were particularly confused about how they could see the film and the connection between the information presented on the Web site and the film. In order to cross-promote project media elements as well as create a more synergistic project, links between project elements should be strengthened.

Clarify purpose and desired behavioral outcomes in all project components. Both think-aloud participants and film viewers said they were unclear what the goals were behind each project element. Developers should think about how each piece of media can create particular outcomes appropriate to the form. For example, the film could be presented in “chapters” with a particular focus along with a viewer guide or action steps in order for audiences to dig deeper. The Web site could be organized for audiences with different goals in mind (i.e., see the film, find information about specific topics presented in the film, read information and/or watch videos about how to create your own telescope, etc.).

Appendix A

Seeing in the Dark **Formative Evaluation Report** April 13, 2007

ROCKMAN *ET AL*, a San Francisco-based research and evaluation group, conducted two focus groups on the evening of April 12, 2007 in downtown San Francisco. The participants viewed and discussed segments of the rough-cut of *Seeing in the Dark*, an hour-long program for distribution through PBS. The program is a presentation of the perspectives and activities of amateur astronomers and builds on the personal story of the writer-producer and is based, in part, on his book by the same name.

The video segments presented were selected to illustrate some of the main points of the program and were ones still undergoing revision. Several of the segments shown to the focus group members had already been altered by the time this research was conducted. Because the research on the program was designed to inform the production team about elements still being revised, some components that would have added coherence and continuity to the overall perception of the program were not shown, given the time available for the focus group activities.

The focus group process began with an introduction by the moderator and a brief exploration of the participants' interest in astronomy. A screening of five program segments from three-to-five minutes in length followed. After each was presented, participants rated the segment on several scales and free-wrote comments about the piece. When the focus group members finished their writing, the moderator led a discussion of the segment, seeking reactions, perceptions, and comments—seeking the positive and less-than-positive responses of the participants.

PARTICIPANT DEMOGRAPHICS

We selected two distinct groups of participants for the research. We recruited from Craigslist in San Francisco and used a screening questionnaire to qualify individuals. One group was comprised of men and women 30 – 45 years of age, all with a professed interest in astronomy, but not a professional interest. A second group was in the 21 – 30 age cohort, and had similar interests. A summary of characteristics of each group is listed below.

Group 1 (5:00 – 6:30pm)

9 participants; Age range: 32 – 44; Gender: 5 women and 4 men
Education: 2 have “some college;” 1 has an Associate's degree; 3 have Bachelor's degrees; 1 has “some graduate school;” and 2 have Master's degrees.

Group 2 (7:00 – 8:30pm)

8 participants; Age range: 21 – 30; Gender: 4 women and 4 men
Education: 2 have “some college;” 1 is currently in college; 3 have Bachelor's degrees; and 2 have “some graduate school.”

In order to provide useful information in a timely fashion, we have distilled our notes, section-by-section, to aid in the further editing of the program. These notes have been quickly put together, but do integrate the discussions after each segment's viewing and the ratings and notes written by the participants immediately following the segment screening. In one case, we have provided ratings data to illustrate the differences in reactions by the two groups. Top-line themes, issues, and suggested tweaks are included, often using the language of the participants. We have also included suggestions offered for promotion and elements for the website.

NOTES ON EACH SEGMENT

Intro chapters 1, 2, and 3 (Segment 1)

Participants, especially the first group, were not clear that the film would be about amateur astronomers rather than being about astronomy itself. They did not understand how the introduction related to the topic. Most found the intro too slow and wanted a “snappier” pace. However a few liked the slow pace and found it similar to other documentaries they had seen on PBS. These urban viewers found the narrator's voice to be “country,” which for some meant “warm” and “homey” but others found “downbeat” and unenthusiastic. They also wanted to know more about the narrator as a character.

Elements most participants found engaging: San Francisco Sidewalk Astronomers, building plans the narrator made as a kid (several wanted close-ups of it), the music (although some found it “hokey”).

Specific notes: Most wanted information on where it takes place, although the San Francisco location was clear, other locations were not identified; “Should have the voice over the image of Orion;” the groups also desired more enthusiasm from narrator, believing him to be a dispenser of knowledge about astronomy, a teacher of those interested in learning more.

This introductory material appeared to conflict with the viewers' preconceived notions of what a program about science on PBS should be. They were expecting to be informed through a collection of facts and visuals, seeking guidance from a strong, authoritative voice. They were hampered by the darkness of the DVD copy we presented, as well as by the lack of identifiers for the individuals shown on the screen.

Chapter 8, Steve O'Meara (Segment 2)

Most found the main point very satisfying: that an amateur using simple or old-fashioned methods can contribute to scientific knowledge. The idea that someone, special though he may be, could observe and draw like 19th Century scientists yet conduct important science, somewhat romantic. They also appreciated his passion and enthusiasm. Viewers in Group 1 focused on the idea of amateur astronomers, and were even inspired (to go to Harvard, for example), while viewers in Group 2 were disappointed that they didn't learn more about the science behind his observations.

One person, a amateur astronomer, wanted to know "nerdy" things like how much the telescope weighs, and also details about Steve's astronomy experience and current activities. Viewers in group 2 wanted more graphics, clearer explanations of the science; they were looking for instruction. Both groups wanted more information about the individual, what he did for a living, whether he was still doing astronomy, etc.

Chapter 9, Lives of the Stars (Group 1 only; Segment 3)

Group 1 really appreciated getting so much scientific information, with the exception of one viewer who already had this knowledge. They also liked the "stunning" images. (Not viewing this segment seems to have significantly detracted from the experience of viewers in Group 2 who continued to complain about not "learning" enough.) Several of the first focus group members quoted lines from the segment to express their delight with it. With the one exception, all the viewers gave this section high, positive ratings on interest, clarity and learning. The moderator observed high attention to the segment during its presentation, too.

To strike a balance between providing information for those who desire it, while not boring those who already know the information, perhaps the segment could be shorter and appear earlier in the film. Alternatively, deeper explanations of the science could be woven into the segments on the amateur astronomers with more visuals as well. This would satisfy the desire of many viewers to learn more about astronomy without distracting from the main point about the astronomers themselves.

Chapter 12: Remote telescopes (Group 1 – Segment 4 / Group 2 – Segment 3)

Most viewers found this segment comical, but did not realize that the comedy was intentional. While this was not seen as a particularly informative or interesting, the last minute of the segment captured the attention of both groups. First, people were very interested in the idea that anyone can look through a telescope from their computer, but more than that, they liked the conversation at the end. Viewers in Group 1 were especially appreciative of the enthusiasm and passion of the conversation at the end of the piece.

However, most found the segment too long, and not necessary (especially the phone call). Almost everyone suggested cutting out “the middle part,” in which the narrator runs through the rain to answer a phone call. Some felt the setting up of the telescope was not clear and only the obvious was presented; one never sees the entire scope in its setting.

One suggestion was to put the voices of the conversation at the end over the images of them putting the telescope together, but in doing so, one loses the animation of the team’s faces. Another idea was to show a kid using the telescope through a computer, rather than showing an expert like the narrator (this idea actually came up in both groups).

Viewers in Group 2, a highly technology-literate group, were unconvinced that this really was accessible to anyone. They wanted specific information about how they could do it; they wanted a URL to use themselves and get pictures on their computers—on the screen and in real time. They acknowledge that they, or some of their friends, may be watching television while going to different websites at the same time.

Chapter 13: Gamma Rays (Group 1 – Segment 5 / Group 2 – Segment 4)

Group 1 found this segment very engaging and liked the personality of the subject. Some in Group 2 liked it as well, but the difference between the responses of the 2 groups is striking, as can be seen in their responses to the questionnaires:

*Questionnaires (scales = 1 – 9) “Gamma Rays”**Group 1 (Segment 5)*

Interest: 7, 9, 8, 9, 8, 8, 9, 9, 8; mean = 8.33

Clarity: 8, 8, 9, 9, 7, 9, 9, 9, 8; mean = 8.44

Learning: 7, 8, 8, 9, 8, 8, 9, 8, 7; mean = 8.0

Comments – A: liked the idea of individual contributing to knowledge; B: Gamma bursts cool, immediacy and accessibility is fascinating; C: compelling; D: love his passion; E: good graphics; F: --; G: very cool segment, his enthusiasm is contagious; H: he has good energy and is engaging, enjoyed his musings; I: nice story, nice to see someone at home with such elaborate equipment.

Group 2 (Segment 4)

Interest: 7, 5, 7, 1, 8, 7, 5, 7; mean = 5.88

Clarity: 4, 6, 7, 1, 7, 8, 7, 7; mean = 5.88

Learning: 6, 5, 5, 1, 8, 6, 7, 6; mean = 5.5

Comments – A: light leaving so long ago was interesting; B: he rambles, stop before synthesizer; C: segment too long; D: too rambling; E: I liked hearing about why he likes to do what he does, maybe a brief explanation of figuring out distance of GRB; F: I liked it, I thought he was engaging, wanted to see email better; G: started cool but ended lame; H: music made it more interesting.

Both groups noted the dip in interest once the individual sat down and started to play music. Some acknowledged that he might be good, given the gold record hanging on the wall behind him, but his comments were seen as redundant and the music less than appealing. This scene was one that might be edited down towards the last 30 seconds.

Chapter 14: Extra-solar planets (Group 2 only, Segment 5)

Viewers in Group 2 still wanted to learn more about astronomy and felt that the explanations in this segment went too fast for them. Several group members noted that the woman was clearly a professional astronomer, and while they liked the idea that the amateurs were working with professionals they also wanted to know more about her. (It is worth noting that she is the only woman any of these viewers saw in the film, and it was two of the women participating who specifically asked about her. We recognize that a woman is featured prominently in another, unviewed, segment.)

Viewers also perceived that the amateur astronomers they were seeing in the last few segments were wealthy, had expensive equipment, had modified their houses to accommodate their hobby, and were devoting large portions of their lives to this effort. A valuable addition might be to provide viewers with a benchmark or model against which they could judge costs and level-of-effort.

OVERALL NOTES

These viewers did not see most of the chapters, so they did not realize that the film does contain many of the elements they desire. In particular, they desired more information about the narrator and his interest and experience with astronomy, information that is in other chapters. Participants also wanted and/or expected to “learn” more about astronomy, rather than learn about the astronomers themselves.

Many of the interviews were too dark, with shadows on most or all of the faces. When the interviewee is in too much shadow, viewers would rather see pictures, graphics, or simulations of the stars with the voice-over of the interview.

Viewers in Group 2 questioned the idea of “amateur” and found those featured in the film to be “semi-pro” or possessing more resources than they could imagine having. More information about amateurs with very little (contained in other segments of the film) or about the actual costs and availability of the equipment would make the topic more accessible.

Of the segments shown, only one (Extra-solar planets) featured a woman, and this segment was only shown to Group 2. In this group, two of the women asked, “Who is Deborah Fisher?” in response to this segment. In our viewing, we were intrigued by the woman mentioned in the “Barnard” segment, who started as a housecleaner and ended up discovering the Horsehead Nebula. We were also interested in Barbara Wilson, and found her section underdeveloped and lacking in information about her. The three women who do appear in the film could be better developed as characters and would increase the appeal of the subject to female viewers.

WEBSITE INFORMATION

Suggestions for website content included:

- Information on how to choose a telescope
- How to build your own telescope
- Specific locations of viewing opportunities, observatories and telescopes accessible to the public, perhaps accessible by Zip code
- Ways to connect with others interested in astronomy, local groups (such as San Francisco Sidewalk Astronomers)
- A place to pose a question to an expert that you want answered
- Stream the video itself
- A kid-friendly forum, ways for kids to get involved

APPENDIX B: PRE-SCREENING SURVEY

We would greatly appreciate it if you would take a few minutes to give us some information about your interest and habits related to science and films. Please put your name at the top of the page so we can match your feedback with a post-film questionnaire. We will keep all data that we collect confidential. We will not use any identifying information in our analyses or reports.

1. Which of the following best describes your **age**? (Please check one.)

- Above 51 41-50 31-40 23-30 18-22 13-17 12 or younger

2. What is the last **grade** in school you completed?

- Some high school or less Some college Some graduate school
 Completed high school Completed college Completed graduate school

3. Do you hold a **degree** in Astronomy? Yes No

4. How would you describe your **race/ethnicity**?

- African-American Caucasian Native American
 Asian and/or Pacific Islander Hispanic/Latino Multi-ethnic—please describe:

5. How would you describe your **gender**? Male Female Transgender/Other

6. Where do you **live**? (City, State): _____

7. How **interested** are you in...

	<i>Very interested</i>	<i>Interested</i>	<i>Somewhat interested</i>	<i>Not at all interested</i>
... science in general?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... astronomy, specifically?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. On a scale of 1-5, with 1=novice and 5=expert, how would you rate your **knowledge**...

	1, Novice	2	3	4	5, Expert
... of science in general?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... of astronomy, specifically?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. At any point in the past, have you **done** any of the following? (Check all that apply)

- Watched *Seeing in the Dark* Read an astronomy magazine
 Watched *NOVA* episodes about astronomy Subscribed to a newsletter or magazine about astronomy
 Watched other television shows about astronomy Participated in a local amateur astronomy club
 Looked at the Web site for *Seeing in the Dark* at <http://www.pbs.org/seeinginthedark> Went to a planetarium to see a show, hear a presentation, etc.
 Looked at other web sites about astronomy Took classes about astronomy
 Read *Seeing in the Dark*, the book by Timothy Ferris Talked to other people about astronomy
 Read other books about astronomy

10. How often do you watch your local PBS TV station (i.e., KQED), if at all?

- Daily 1-3 times a week A few times a month A few times a year Never

11. In the past 3 months, how many times have you watched a **film an hour or longer** on your local PBS TV station?

- None Once or twice 3-5 times 5-10 times 10 or more

APPENDIX C: FILM POST-VIEWING SURVEY

We would greatly appreciate it if you would take a few minutes to give us some of your thoughts and reactions to the film. Please put your name at the top of the page so we can match your feedback with the information you provided in the pre-screening questionnaire. *As previously stated, all data will be kept confidential.*

1. How would you rate...	Excellent	Very good	Good	Fair	Poor
...the film in general?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...the information about amateur astronomers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...the information about astronomy (e.g., info about stars, galaxies, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Which of the following words or phrases best describes the movie you just saw? (*Please check all that apply.*)

- | | | | |
|---|--|---|---|
| <input type="checkbox"/> Different/original | <input type="checkbox"/> Good narration | <input type="checkbox"/> Appealing music | <input type="checkbox"/> Appropriate length |
| <input type="checkbox"/> Boring/dull | <input type="checkbox"/> Appealing look/feel | <input type="checkbox"/> My type of movie | <input type="checkbox"/> Good pacing |

3. How much did you...	A lot	Some	Very little	Not at all/None	N/A (I already knew a lot about the topic)
...enjoy the film?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...learn about astronomy from the film?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...learn about amateur astronomers from the film?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Who do you think would enjoy the film? (*Please check all that apply.*)

- | | | |
|---|---|---|
| <input type="checkbox"/> Adults 51 or above | <input type="checkbox"/> Pre-teens (younger than 12) | <input type="checkbox"/> People with training/education in science |
| <input type="checkbox"/> Adults age 41-50 | <input type="checkbox"/> People interested in astronomy | <input type="checkbox"/> People who do not have training in science |
| <input type="checkbox"/> Adults age 31-40 | <input type="checkbox"/> People interested in science in general, or another topic in science | |
| <input type="checkbox"/> Adults age 20-30 | | |
| <input type="checkbox"/> Teenagers (13-19) | | |

5. Now that you have viewed the film, how likely are you to...	Definitely	Probably	Probably not	Definitely not
...look at the website for the film? http://www.pbs.org/seeinginthedark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...look at other astronomy websites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...watch television shows about astronomy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...read a book about astronomy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...read a magazine or newsletter about astronomy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...subscribe to a magazine or newsletter about astronomy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...talk to other people about astronomy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...recommend the film to others?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...seek out a local amateur astronomy club?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...go to a planetarium to see a show, hear a presentation, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...take a class about astronomy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...go out at night and look at the stars?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...watch the film again on PBS (i.e., KQED)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...buy a DVD of the film?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...buy the book <i>Seeing in the Dark</i> by Timothy Ferris?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...read the book <i>Seeing in the Dark</i> by Timothy Ferris?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX D: FILM FOLLOW-UP SURVEY

**Seeing in the Dark
Follow Up Survey**

We would greatly appreciate it if you would take a few minutes to give us some information about your interest and habits related to astronomy and science since watching the film, *Seeing in the Dark* in January. Please enter your name and email so we can match your feedback with survey responses gathered at the film screening.

All responses will be held confidentially and used only for research purposes. If you have any questions, please contact Cassidy Puckett at cassidy@rockman.com.

1. Name (first & last)

2. Email

3. Since watching the film, how interested are you in...

	Interest Level			
	Not interested at all	Somewhat interested	Interested	Very interested
...science, in general?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...astronomy, specifically?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Since watching the film, how would you rate your knowledge in...

	Knowledge Level				
	Novice 1	2	3	4	Expert 5
...science, in general?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...astronomy, specifically?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Since watching the film, have you...

	Frequency			
	No, and I don't plan to	No, but I plan to	Yes, once or twice	Yes, more than twice
...looked at the web site for the film? www.pbs.org/seeinginthedark	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...looked at other astronomy web sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...watched NOVA episodes about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...watched other television shows about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...read a book about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...read a magazine or newsletter about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

...subscribed to a magazine or newsletter about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...talked to other people about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...recommended the film to others?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...sought out and/or participated in a local amateur astronomy club?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...gone to a planetarium to see a show, hear a presentation, etc?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...taken a class about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...gone out at night and looked at the stars?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...watched the film again on PBS (i.e., KQED)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...bought a DVD of the film?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...bought the book <i>Seeing in the Dark</i> by Timothy Ferris?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...read the book <i>Seeing in the Dark</i> by Timothy Ferris?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Since watching the film, have you talked to anyone about it? If yes, who did you talk to and what did you say?

Yes No

7. What are some things you remember from the film?

Thank you for completing the survey. Please press the submit button below only once.

Submit Form

APPENDIX E: WEB SITE SURVEY

**Seeing in the Dark
Site Visitor Web Survey**

Background information

1. Which of the following best describes your **age**? (Please check one.)

- Above 51
- 41-50
- 31-40
- 23-30
- 18-22
- 13-17
- 12 or younger

2. What is the last **grade** in school you completed? (Please check one.)

- Some high school or less
- Completed high school
- Some college
- Completed college
- Some graduate school
- Completed graduate school

3. Do you hold a **degree** in Astronomy?

Yes No

4. How would you describe your **race/ethnicity**?

- African-American
- Asian and/or Pacific Islander
- Caucasian
- Hispanic/Latino
- Native American
- Multi-ethnic -- Please describe:

5. How would you describe your **gender**?

Male Female Transgender/Other

6. Where do you **live**? (City, State)

7. How **interested** are you in...

	Very interested	Interested	Somewhat interested	Not at all interested
...science in general?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...astronomy, specifically?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. On a scale of 1-5, with 1=novice and 5=expert, how would you rate your **knowledge** of...

	Novice 1	2	3	4	Expert 5
...science in general?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...astronomy, specifically?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. In the past, have you **done** any of the following? (Check all that apply.)

- Watched *NOVA* episodes about astronomy.
- Watched other television shows about astronomy.
- Looked at other Web sites about astronomy.
- Read *Seeing in the Dark* by Timothy Ferris.
- Read an astronomy magazine.
- Read a book about astronomy.
- Subscribed to a newsletter or magazine about astronomy.
- Participated in a local amateur astronomy club.
- Went to a planetarium to see a show, hear a presentation, etc.
- Talked to other people about astronomy.
- Took classes about astronomy.

10. How often do you watch your **local PBS TV station** (i.e., KQED), if at all?

- Daily
- 1-3 times a week
- A few times a month
- A few times a year
- Never

11. In the past 3 months, how many times have you watched a **film an hour or longer** on your local PBS TV station?

- None
- Once or twice
- 3-5 times
- 5-10 times
- 10 or more

About your visit to the Web site

1. How did you hear about the *Seeing in the Dark* Web site?

- Discovered it through an Internet search. What terms did you search for?
- Heard about it from a friend/colleague.
- Heard about it on television.
- Read about it in the newspaper.
- Discovered it through a link on another Web site. Which Web site?
- Other. Please specify:

2. Why did you visit the Web site? (Check all that apply.)

- To find information about astronomy (e.g., name of stars, constellations, about galaxies, etc.).
- To find information about amateur astronomers (e.g., who they are, what they do, what they've contributed, etc.).
- To find information about the film *Seeing in the Dark*.
- To practice astronomy (e.g., viewing stars, constructing telescopes, etc.).
- To pursue a general interest in astronomy.
- To look for a specific piece of information. Please specify:
- Other. Please specify:

3. Which pages did you view while on the Web site? (Check all that apply.)

- Explore the Sky
- Astronomy Topics
- Meet the Stargazers
- Astrophoto Gallery
- Resources and Links
- About the Film
- For Teachers
- For Families

4. Did you look at and/or download any of the following resources? (Check all that apply.)

- Your Sky Tonight
- "How To" videos
- Internet Telescope
- Observation Guides
- Birthday Stars
- Videos about the film (including interviews and/or special effects)
- Film script
- Film press documents
- Seeing in the Dark* activities for teachers
- Seeing in the Dark* activities for families

Web site feedback

1. Were you able to find what you were looking for on the Web site?

- Yes No Not applicable - I wasn't looking for anything in particular.

Please explain:

2. How much do you agree with each of the following statements?

	Strongly agree	Agree	Disagree	Strongly disagree
The look of the Web site was appealing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information on the Web site was useful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The depth of information on the Web site was sufficient.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Web site was easy to navigate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learned about amateur astronomers by visiting the Web site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learned about astronomy by visiting the Web site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learned how to explore the sky by visiting the Web site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Did you learn anything new from the Web site?

- Yes No

If yes, what new information did you learn?

4. Now that you have visited the Web site, how likely are you to...

	Very likely	Likely	Somewhat likely	Not at all likely
...go out at night to look at the stars?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...look at other astronomy Web sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...watch television shows about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...read a book about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...read a magazine or newsletter about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...subscribe to a magazine or newsletter about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...talk to other people about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...watch the film <i>Seeing in the Dark</i> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...recommend that others watch the film <i>Seeing in the Dark</i> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...seek out a local amateur astronomy club?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

...go to a planetarium to see a show, hear a presentation, etc.?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...take a class about astronomy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...buy a DVD of the film <i>Seeing in the Dark</i> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...buy the book <i>Seeing in the Dark</i> by Timothy Ferris?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...read the book <i>Seeing in the Dark</i> by Timothy Ferris?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. If you are a teacher, how likely are you to use this Web site and/or content from this Web site in your classroom?

- Very likely
- Likely
- Somewhat likely
- Not at all likely
- I am not a teacher

6. If you are a parent, how likely are you to share this Web site and/or content from this Web site with your child(ren)?

- Very likely
- Likely
- Somewhat likely
- Not at all likely
- I am not a parent

7. What is the most useful thing you found on the site?

8. What could be improved about the site, if anything?

Thank you for your feedback! Please provide your name (first, last) and email below so that we may follow up with you.

First name:

Last name:

Email:

Please click the button to submit your responses.

APPENDIX F: THINK-ALLOUD PROTOCOL

Participant Name:**Name of tester:****Date:**

**[Set browser to "Seeing in the Dark" PBS page:
<http://www.pbs.org/seeinginthedark/>]**

[Read this to the participant before you begin]

Thanks for coming in today. The goal of this study is to evaluate how participants interact with the website associated with a PBS film about amateur astronomy called "Seeing in the Dark." I will first ask you a few questions about your background and then ask you to do a series activities on the site. I would like you to think out loud as you go about completing the tasks and you should take your time and work on them as you would at home. After you finish the activities, I will ask you a few more questions about your experience. Remember, we are testing the effectiveness and the organization of the site – we're not testing your knowledge, so there is no right or wrong answer. Do you have any questions?

Before we begin, you'll need to sign the consent form. *[Give consent form]*

Ok, let's get started with the background information...

BACKGROUND QUESTIONS

1. What is your educational background? (highest grade level completed)

2. Do you have any education in the physical sciences (physics, chemistry, earth sciences, astronomy)? (college major, minor, other coursework, professional development)

3. What is your interest level in astronomy?

Pick two of the tasks below—for the first task, ask participant to choose a part of the site they haven't been to (their choice); for the second task, assign a part of the site that no user has gone to yet (prompted).

Task 2a: Explore the Sky

Did the participant go to this page on their own or did you prompt them?

on own prompted

Before clicking: Before you click on the page, tell me what you expect to see on this page?

After clicking: Is this what you expected? Is it clear to you what you can do from this page just from first glance?

Pick one of the links on this page to explore.

RESPONSE TO THIS TASK:

- What did you think of what you saw? What did you like? What could make it better?

- Was this something that you think you would look at/use again? Under what circumstances?

Task 2b: Astronomy Topics

Did the participant go to this page on their own or did you prompt them?

on own prompted

Before clicking: Before you click on the page, tell me what you expect to see on this page?

After clicking: Is this what you expected? Is it clear to you what you can do from this page just from first glance?

Pick one of the links on this page to explore.

RESPONSE TO THIS TASK:

- What did you think of what you saw? What did you like? What could make it better?

- Was this something that you think you would look at/use again? Under what circumstances?

Task 2c: Meet the Stargazers

Did the participant go to this page on their own or did you prompt them?

on own prompted

Before clicking: Before you click on the page, tell me what you expect to see on this page?

After clicking: Is this what you expected? Is it clear to you what you can do from this page just from first glance?

Pick one of the links on this page to explore.

RESPONSE TO THIS TASK:

- What did you think of what you saw? What did you like? What could make it better?

- Was this something that you think you would look at/use again? Under what circumstances?

- What is the impact of this page (e.g., would you see the film, find more about these people, contact these people, etc.)?

Task 2d: Astrophoto Gallery

Did the participant go to this page on their own or did you prompt them?

on own prompted

Before clicking: Before you click on the page, tell me what you expect to see on this page?

After clicking: Is this what you expected? Is it clear to you what you can do from this page just from first glance?

Pick one of the links on this page to explore.

RESPONSE TO THIS TASK:

- What did you think of what you saw? What did you like? What could make it better?

- Was this something that you think you would look at/use again? Under what circumstances?

Task 2f: About the film

on own prompted

Before clicking: Before you click on the page, tell me what you expect to see on this page?

After clicking: Is this what you expected? Is it clear to you what you can do from this page just from first glance?

Pick one of the links on this page to explore.

RESPONSE TO THIS TASK:

- What did you think of what you saw? What did you like? What could make it better?

- Was this something that you think you would look at/use again? Under what circumstances?

- What is the impact of this page (e.g., would you see the film, find more about these people, contact these people, etc.)?

Ok, we're done with the task part of the session. You did a great job. Good feedback. I just have a few more wrap up questions and we'll be all set.

POST-SESSION QUESTIONS

1. Overall, what did you think about the website?

[prompt: Did you like the way it looked? Was it easy to navigate? Did you like the amount and kinds of information presented?]

2. What did you like best about it? What did you like least?

3. Was there anything that you wanted to know, but couldn't find?

4. What was the main thing you learned/took away from the site? (Or what were several things that you learned?)

