# A STUDY OF BILL NYE THE SCIENCE GUY
## OUTREACH AND IMAGE

## EXECUTIVE SUMMARY

During school year 1997-98, the BILL NYE THE SCIENCE GUY series engaged school and home audiences through two major outreach efforts: 30,000 lunch box science kits sent to students at school and home, and 150,000 Teacher's Guides sent to 4th grade teachers. ROCKMAN *ET AL*'s Spring 1998 evaluation of the BILL NYE THE SCIENCE GUY series focused on the use, value and impact of these outreach materials, and also explored viewers' perceptions of Bill Nye as a science expert.

### METHODOLOGY

**Science Kit Outreach Study:** Half of the 30,000 lunch boxes went as class sets to 600 of the poorest schools in the nation and the remainder were distributed to individuals who requested them and to community organizations such as Girls, Inc.

In each of four metropolitan areas—Houston, Baltimore, San Diego and Minneapolis— we contacted all schools that had received classroom sets of the kits. Teachers and students from these schools completed questionnaires and participated in interviews. We also conducted telephone interviews with an additional 116 teachers outside of the four cities. In total, our interviews from both sources included more than 175 teachers who had received the lunch boxes.

To study home use, we relied on response cards enclosed in the science kits as well as Family Surveys that we mailed to individuals who had requested the outreach materials. From the 15,000 lunch boxes that were sent out to individuals, 1,195 cards were returned. We also received responses from close to 500 of the 3,000 families we surveyed.

**Teacher's Guide Outreach Study:** To assess the utility and value of the BILL NYE Teacher's Guide, we aggregated data from 1,171 response cards returned from the guides distributed to 4th grade teachers. Forty teachers within our four metropolitan regions reviewed the guide and provided written feedback. We also conducted three focus groups with 17 BILL NYE-viewing teachers about the Teacher's Guide.

**BILL NYE's Image Study:** We explored perceptions of Bill Nye's image whenever we gathered information from students, their families, and teachers. Additionally, we used electronic surveys designed for children, teens, and adults to capture their impressions. Questions about Bill Nye's image were posed to more than 600 participants: more than 450 children and their parents in our Family Survey, 85 students of various ages and 35 adult viewers in our electronic surveys, 52 children in group interviews, and 35 teachers in focus groups and interviews.

# BILL NYE SERIES OUTREACH

## Student Science Kits

### Distribution

We worked with schools, individual students, and teachers to assess the use, value, and impact of the science kits, and, in that process, came to understand that appropriate distribution was a critical first step for schools.

Although each school was sent 25 kits, intended as a class set, they were not often distributed as such. Teachers received between 1 and 25 science kits per class. Breaking up the class sets was the school's choice, and may reflect an inherent emphasis on equity in public schools. Almost as many received one kit for the class as received an entire class set.

Overall, home distribution appeared far more successful than school distribution. Nevertheless, about 10% of families who returned the survey sent to those who requested a kit indicated that they had never received the lunch box.

### Science Experience and Attitudes

**School Sample:** Teachers interviewed by telephone were confident about their science experience and background and spent three-to-four hours per week on science instruction. In general, teachers rate their students' as having a relatively high level of interest in science, higher than they rate their students' level of science knowledge.

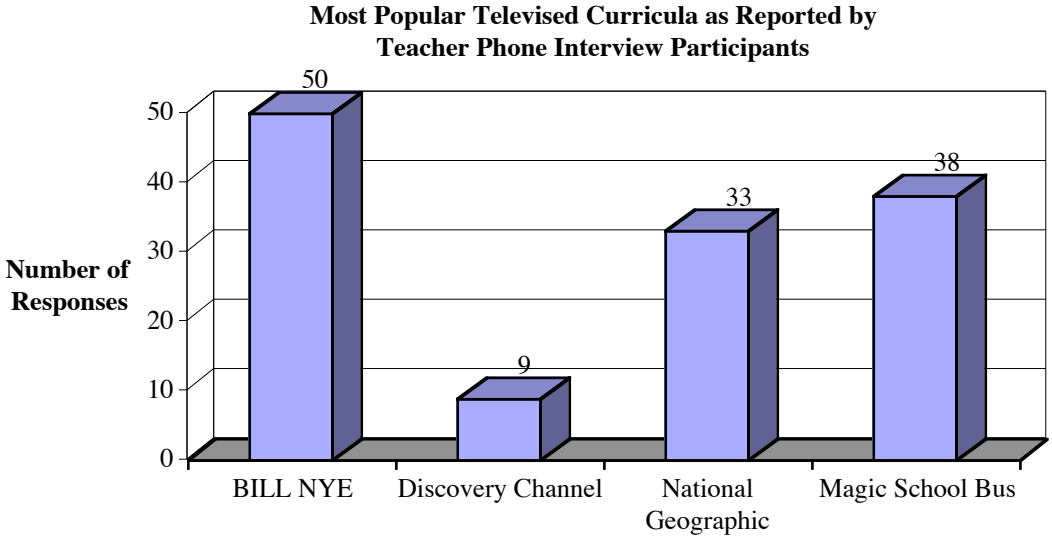
Students we interviewed in the four metropolitan areas almost unanimously claimed that science is their favorite subject, a result likely influenced by the introduction of researchers as being "from BILL NYE." Few students, however, were familiar with the types of jobs that involve science. The low socioeconomic status of the school participants provides one explanation for students' lack of knowledge about science careers.

**Home Sample:** The Family Survey was divided into sections for adults and for children. The adults indicated that they felt fairly comfortable explaining science to children. Families appear to be involved with science activities outside of school and rely on a variety of resources for science learning. Family members enjoy science-related activities because they like learning about new things, find science to be fun and interesting, are motivated by the hands-on aspects of their science experiences, and appreciate opportunities to spend time socializing with family and friends.

## BILL NYE Viewing Patterns

Using the science kit and viewing the BILL NYE series are not necessarily associated. Students who watch BILL NYE at home and requested the kits individually were more likely to be avid viewers than those who received the science kits at school.

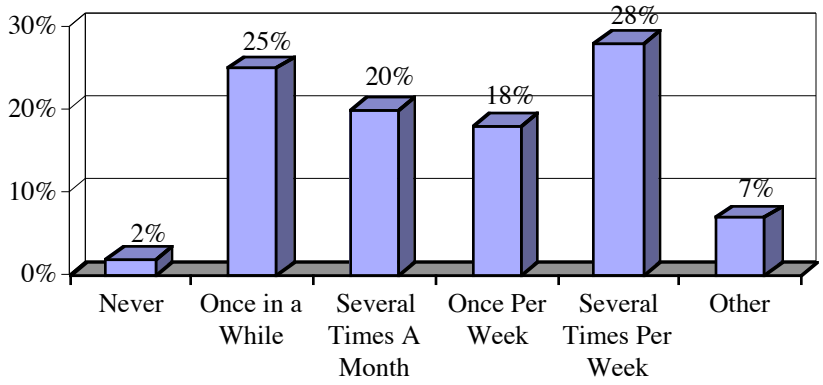
**School Sample:** Of 176 teachers interviewed, 139 regularly use televised programs in class. BILL NYE was one of four popular science series mentioned.




Students from these schools viewed BILL NYE with different frequencies, from every day at home, to once in a while, to those who saw the show a few times.

**Home Sample:** Our home viewers are frequent, but not regular, viewers of BILL NYE, with fewer than half viewing at least once a week.

**Figure 2: Frequency of Bill Nye Viewing by Family Survey Participants**



Most home viewers (84%) watch BILL NYE on PBS, however, they also view the program on other television stations, at school, or on videos. BILL NYE is most often viewed alone or with nuclear family members.

## Use of the Science Kits

**School Use:** Of the 176 teachers we interviewed from the 600 poorest school, 66% (or 116) used the kits *in class*. Many of these teachers indicated that the content of the experiments in the science kit fit well with their established science curriculum. Other teachers distributed the kits to students by giving them away, loaning them, passing them out as rewards, or using them as demonstrations. About half of the teachers we interviewed planned to keep the kits for future school use; the remaining teachers gave the kits to students for home use.

The ways in which the science kits were distributed within schools had a profound effect upon pedagogy. With one kit per student, all students participated in the hands-on activities at the same time, while with just a few kits or one per class, the science materials were used for demonstration or small group work.

Teachers noted that many students who took the science kits home completed the science experiments in the kit for fun or as an assignment. Several students carried out additional experiments of their own design. Other students used the lunch boxes to store items. Some used the lunch box science kits as a lunch box. According to students, using materials in the kits to conduct experiments that they designed themselves was the most popular kit-related activity.

**Home Use:** Almost every child (94%) said that he or she had conducted at least one of the experiments in the science kit. About half of the children claimed that they conducted only one of the experiments; the other half reported that they undertook all three. A few designed additional experiments that were often similar to the ones described on the cards enclosed in the kits. Almost half of the children used the science kits to store items, but only 14% used the kit as a lunch box.

## Responses to the Science Kits

**Teachers' Responses:** Teachers' ratings of various aspects of the science kits were uniformly high. On a series of five-point scales, teachers indicated that the kits were appropriate for their students (4.6), instructions were clear (4.6), experiments were easy to conduct (4.4) and they believed their students would also rate the kits very favorably (4.7).

Teachers believed that students would find both the bright, colorful case and the hands-on activities to be the most exciting and motivating aspects of the science kits. They also believed their students would enjoy owning the boxes and working on the experiments with their parents.

**Children's Responses:** "Testing for Acid" was the most popular of the three experiments according to both home and school groups. Students interviewed at school indicated that their experience with the science materials in the lunch box spurred their curiosity. They most frequently described the science kits as "cool", "good" or "neat."

**Families' Responses:** Overall, the kits were extremely well received by families who responded to our home survey. On a series of five-point scales, families gave high ratings to the appropriateness of the kits (4.2), the ease of experimentation (4.3) and student enjoyment of the experiments (4.5).

Families also indicated that they were most impressed with the activities and the box design, they appreciated the simplicity of the instructions and the opportunity to learn, and they noted that students enjoy getting things sent directly to them in the mail.

## Conclusions and Recommendations

The science kits created and disseminated in 1997-98 were an excellent form of outreach. Children, parents and teachers appreciated the gift, universally perceiving it as appealing and appropriate for fourth grade students.

The only notable problem with the kits had more to do with their distribution in the poorest schools than their content; these schools weren't always able to deal with an unannounced set of science materials.

The following are observations about the science kits and recommendations on future outreach efforts:

- **Continue providing effective and usable science materials for children.** As in previous outreach efforts, the content of the science materials led to exciting science experimenting and enjoyment.

- **Continue to develop outreach with standards-based, hands-on experiments.** Teachers referred to standards, student engagement, and classroom management as reasons for wanting more opportunities like the kits to do hands-on experiments in class.

- **Purposeful distribution is essential for the materials to have the intended impact.** To reach target teachers in urban, inner city schools—and most of the 600 poorest schools qualified on this count—KCTS outreach needs to provide more information to the right people.

- **In outreach efforts, build stronger connections to the BILL NYE series and resources.** Teachers were generally uninformed about BILL NYE offerings. The opportunity to build connections and allegiance to the series in schools is great, but untapped by this outreach effort.

- **To reach a diverse population, use varied outreach methods.** Overall, the multiple approaches were very successful in reaching different types of students. If the goal of outreach is to seek out and provide BILL NYE resources for all students, then finding a cost-effective way to reach inner city and minority populations in schools is necessary.

## BILL NYE Teacher's Guide

### Science Experience and Attitudes

Teachers who responded to our written surveys reported feeling somewhat confident about their background in science and preparation for teaching it; they averaged 3.8 on a five-point scale (where one is weak and five is strong). Typically, they worked at schools where an annual science fair and science field trips took place. Their classes' overall interest in science was high— 4.5 on a five-point scale— and teachers provided science instruction for nearly four hours every week.

### BILL NYE Viewing

From the response cards sent in by many of the Teacher's Guide recipients, the majority of respondents were selective, rather than regular, viewers of the BILL NYE series. About one-third of the teachers use NYE programs on a weekly basis or more frequently.

We found that more than three quarters of the teachers who participated in our focus groups watch BILL NYE outside of school. And most had watched it in the classroom with their students. Some teachers used the compelling nature of series as a "hook" for teaching their students concepts while others used the series to further drill home concepts already introduced by lecture.

### Adoption of Curricular Materials

In focus groups, teachers noted that several factors influenced—both positively and negatively—the selection of new curriculum materials such as BILL NYE, including:

- students' needs/abilities
- national/state curriculum standards
- school- and district-wide decisions
- teacher's individual interests and experience

Most of these teachers acknowledged a tension between their desire to introduce new materials and the increasing pressure for testing students on their acquisition of specific skills and knowledge. For the most part, teachers were willing to seek out and acquire additional materials, but felt their highest priority was to cover the required texts.

### Classroom Use of the Teacher's Guide

Of the 1,171 teachers who sent in their response cards, 94% used the guide in their classrooms, 25% used the activity sheets, and 83% hung the posters. More noteworthy is the report that 82% of these teachers shared the guide with, on average, more than three of their colleagues.

All of our participants (in the focus groups and those who provided written reactions) were overwhelmingly positive about the guide. The written response group found it easy-to-use, rating it 4.5 on a five-point scale. All of the teachers were enthusiastic about working the guide into their curriculum.

Forty teachers rated the Teacher's Guide (using a scale of 1 to 5) on usefulness, clarity and appropriateness. On usefulness, the mean score was 4.0; for clarity of activity instructions, the teachers averaged 4.4; with regard to appropriateness to their students' level, teachers averaged 3.9.

Some of the topics presented in the guides were more valued by teachers than others. The following table indicates the percentage of participants who felt specific themes (and BILL NYE programs about them) would be useful in their classes' curricula.

**Useful Topics in BILL NYE Programming**

| Theme | Percentage |
|---|---|
| Erosion | 88% |
| Measurement | 75% |
| Life Cycles | 68% |
| Ocean Exploration | 65% |
| Fluids | 65% |
| Lakes and Ponds | 58% |
| Atoms and Molecules | 55% |
| Motion | 55% |
| Comets and Meteors | 55% |
| Patterns | 53% |
| Storms | 50% |
| Smell | 48% |
| Do it yourself Science | 43% |
| Music | 33% |
| Caves | 25% |

## Teachers' Suggestions for Future Guides

Teachers thought that complex set-ups were a deterrent to using some of the suggested activities and discussed using some experiments as demonstrations rather than all-class activities. Additional suggestions included using a lesson plan format to describe the experiments, listing process skills taught or reinforced by the lessons, designating appropriate age levels, identifying shorter experiments and adding bibliographies and more facts to facilitate teachers' review of the science concepts.

## Conclusions and Recommendations

Teachers thought the Teacher's Guide was wonderful and were excited about the contents and potential for good science lessons based on its ideas. Moreover, those who had Guides tended to use them—and often shared them with others in their school. For some, the Guide was seen as useful with or without the videos.

The following is a list of observations and recommendations about future versions of the Teacher's Guide:

- **Promote the Guide Actively.** Work with local PBS stations to promote the Guide and provide access to BILL NYE materials through their workshops and local mailings.

- **Provide opportunities for teachers to collaborate.** Specifically encourage teachers to share the materials and even combine their classes for viewing or for performing science activities presented in the Guide.

- **Align the Guide with prescribed fourth grade curricula.** Teachers often mentioned the constraints of a prescribed curriculum as a barrier to using BILL NYE materials.

- **Align with national standards.** By more closely aligning the content and concepts with state and national curriculum standards and frameworks, and by using more of the "language" used in those documents, teachers can more easily justify adopting BILL NYE rather than relying only on their textbooks.

- **Recognize that the guide is only as strong as the teachers who implement activities.** Style, preference, and classroom management issues will influence if and how teachers use the Guide. In the Guide, explicitly address alternative uses of the materials.

- **Provide local affiliate stations with workshop ideas and materials to help teachers integrate guide activities.** Many stations already conduct workshops on BILL NYE and other television series. Closer ties between the series and the Guide could be established through a model for presenting a sample Guide activity as part of a workshop.

- **Continue to provide teachers with ways to contact BILL NYE.** Researchers were often asked how teachers could get lists of videos and local airing times of the program. More coordination between the outreach staff of the series and the ITV and outreach staff of the stations might increase the opportunities for teachers to plan and use the series for science instruction.

# BILL NYE'S IMAGE

## Elementary School Children

Elementary school children clearly see Bill Nye as an effective teacher and a scientist in his own right, and the silliness of his on-screen personality does not stand in the way of these more potent perspectives.

Students thought Bill Nye was smart, did well in school, and would make a good teacher. More importantly, children responded that Bill Nye makes "kids like science more."

When asked whether Bill Nye is a scientist or actor and comedian, most children agreed that he is a scientist, but many said both. They could not extract either aspect, actor or scientist, from his whole TV persona. The students with whom we talked described Bill Nye almost equally as both "funny" and "smart," and believed he was a source of good information. The fact that they see him as a teacher indicates their overall respect for his knowledge.

## High School Youth

Most of the secondary school students claimed to watch the BILL NYE series for one of the following three reasons:

- "It is funny/entertaining" (31%);
- "It teaches science in an enjoyable way" (36%);
- "It helps me understand science better" (26%).

While most of the 13-17 year-olds (87%) like BILL NYE THE SCIENCE GUY, in part, because the show is funny, slightly more (93%) say that watching BILL NYE has increased their interest in science. Two-thirds agree that they "... enjoy TV shows that contain humor as well as scientific content," and even more (87%) agree that Bill Nye himself is very funny.

Most students (53%) thought Bill Nye was more like a scientist than a comedian; only seven percent thought he was more like a comedian. Nevertheless, four out of every ten students viewed him equally as scientist and comedian.

**Additional Products, Programs, and Services:** High school students were asked to indicate their interest in several BILL NYE products, programs, and services. Mild interest was spread across all of the options. The top choices among teenagers were a BILL NYE show for older kids, a BILL NYE CD-ROM, and a periodical written by NYE. These students also expressed mild interest in the following themes for television specials: Science of the Future, The Mind, The Seven Wonders of the World, and Einstein.

**Adults**

Like the younger viewers, the adults responding to the electronic survey like the BILL NYE series because it is "funny and entertaining" and it "teaches science in an enjoyable way." Moreover, since almost half of the adults also view BILL NYE with their children, the series provides an opportunity for adults to be substantive companions to their children. Whatever their motivation, 94% of the adult respondents believe watching the program has increased their own interest in science.

Of our sample of adults, 88% prefer the humorous delivery in their science programs over a more serious approach, and 66% believe that BILL NYE is very funny.

When asked to compare two statements stating "Bill Nye is an actor," with "Bill Nye is a scientist," one-third (34%) sat on the fence, stating that the two options were "about the same." About 56% felt that Bill Nye is more of a scientist than a comedian. Only 10% felt Bill Nye is more of a comedic actor than a scientist.

**Additional Products, Programs, and Services:** We presented the adult respondents with an array of resources the BILL NYE project might produce, including encyclopedias, CD-ROMs, periodicals, or a BILL NYE television program for adults. Mild interest was expressed for each option. A similar, moderate level of interest emerged when adult respondents commented on the types of television programs and science specials that could be created.

**Conclusions and Recommendations**

Perhaps the most important aspect of the descriptions offered in this image study is that children, teenagers, and adults describe Bill Nye and the BILL NYE show with two pairs of inextricable ideas:

- BILL NYE teaches science and BILL NYE is fun or humorous, and
- Bill Nye is a scientist and Bill Nye is a humorous actor.

For younger children, we can add a third characteristic: Bill Nye is a good teacher. In fact, most of our adult respondents also commented in some way that the show made learning science fun or taught science in an entertaining fashion. The combination of science and fun makes BILL NYE programs and Bill Nye, the actor, very special.

Overall, the consensus was that BILL NYE is good television. The show and its host engage viewers of all ages. The audience does not separate Bill Nye's identities as science authority and entertainer. He is both. He teaches science and amuses; and more importantly, he provides a non-threatening environment for children and adults to learn science.

The question of whether Bill Nye can draw an audience into a science special is not fully answered by this study. We found only mild interest among viewers of high school age and beyond for any particular, thematic BILL NYE special. The general notion of a BILL NYE science program geared at an older audience was also only moderately appealing to both adults and high school age youth. A series of focus groups might better draw out viewer preferences for the host and the topics of television science specials.