



# MULTIMEDIA RESEARCH

33 BROWNS LANE • BELLPORT, NY 11713 • (631) 286-8925

## Impact of Television Presentation Formats on Understanding *DragonflyTV Nano* Content



Report for Twin Cities Public Television  
by Barbara N. Flagg, Ed.D., Director, Multimedia Research



*Small is Different* – Presentation format of “onscreen kids doing hands-on activity” to explore reaction of soda to different surface areas of rocks, pebbles and sand



*Structure of Matter* – Presentation format of “model” using chicken wire to show how structure affects strength

with assistance by Alice Bernard, Debra Klich,  
Valerie Knight-Williams, Laura Minnigerode, Helen Swartwood

Research Report No. 09-010

July 24, 2009

**EXECUTIVE SUMMARY**  
**IMPACT OF TELEVISION PRESENTATION FORMATS**  
**ON UNDERSTANDING *DRAGONFLYTV NANO* CONTENT**  
**MULTIMEDIA RESEARCH • JULY 24 2009**

Produced by Twin Cities Public Television, St. Paul, MN, *DragonflyTV (DFTV)* is a weekly television series of half-hour live action shows for 8-12 year olds, distributed by PBS Plus. *DFTV* features real children engaged in real inquiry-based investigations in and around science centers across America. Six 2009 episodes of *DFTV* focus on the world of nanoscale science and technology. *DFTV Nano* highlights science centers and university research labs while applying the *DFTV* “Real Kids ... Real Science” model to communicate basic concepts and the scientific process in nanoscience. The themes of the six programs include Size & Scale, Structure of Matter, Small is Different, Forces at the Nanoscale, Applications, and Nanotechnology & Society.

Thirty female and thirty male fifth graders equally distributed across five national sites participated in the study. Participants had not previously seen *DFTV* and reported that they were somewhat or very interested in science. Half of the sample viewed the program *Structure of Matter*, and half viewed *Small is Different*. Participants were interviewed individually both before and after seeing their respective program. The pre-post same-sample study implemented by Multimedia Research involved an assessment of what children can learn about nanoscience from television and an exploration into how viewers’ understanding of nanoscience content relates to television presentation formats.

**The programs were very successful in communicating their main messages of nanoscience**

The content in *DFTV Nano* is shaped for the 8-12 year old level of understanding. Both programs used in this study illustrate the meaning of the words nano and nanotechnology and show also how scientists work at the nanoscale. The program *Small is Different* covers the meaning of surface area and demonstrates that when some things are nanosized, they change a lot, influencing their reactivity and their color. The program *Structure of Matter* communicates the message that how something is structured or made on the inside can change the strength of the object or can change the color on the outside of the object. This program also addressed how products use nanoscale material. Pre and post interview questions assessed changes in nanoscience understanding.

- Viewing *Small is Different* significantly increased viewers’ understanding that nano means a very small size and significantly increased the proportion of viewers who noted something about change in reactivity or color in their understanding of the words “nano” or “nanotechnology.” The fifth graders significantly improved in their ability to explain the statement that “when some things are nanosized, they change a lot.” Also, significantly more viewers could provide an acceptable definition of surface area after seeing this program.

- Viewing *Structure of Matter* significantly increased viewers’ understanding that the nanoscale cannot be seen with the naked eye and significantly increased the proportion of viewers who noted some property of matter in their description of the words “nano” or “nanotechnology.” The fifth graders significantly improved in their ability to verbalize an understanding that the structure inside something can influence the strength or color of an object.

**Viewers identified the television presentation formats of  
“onscreen kids doing hands-on activities” and “the use of models to support content”  
as most effective in helping them learn nanoscience content**

With each post-viewing interview question about nanoscience content, viewers were asked also what particular parts of the program helped them learn that content. Four presentation formats widely used in the programs were of interest in this study: (1) onscreen kids doing hands-on activities; (2) onscreen kids meeting with adults who show them something; (3) use of models to support content explanations; and (4) the host, Eric, explaining directly to the viewing audience.

- 20% or more viewers pointed to the presentation format of onscreen kids doing hands-on activities as helping their understanding of the words “nano,” “nanotechnology” and “surface area;” that some things change a lot when nanosized; what happens when surface area increases a lot; that structure inside can impact strength or color of an object; how scientists work at the nanoscale; and what products use nanoscale structures.
- The second most-effective format supporting the learning of nanoscience content was the use of models, which 20% or more viewers identified as helping them understand the phrase “surface area;” that some things change a lot when nanosized; and that structure inside can impact strength of an object.
- The presentation format of onscreen kids meeting with adults who show them something was referred to much less frequently. This format mostly helped viewers understand how scientists work at the nanoscale and that nanoscale means smaller than can be seen by the naked eye.
- The format of the host Eric explaining directly to the audience was least noted in helping viewers except in the recall of products using nanoscale structures.

**Viewers described four production characteristics as helping them learn the best:  
“clear demonstration of relationships, comparisons, procedures and results,”  
“showing critical information visually,” “connection to the content,”  
and “clear age-appropriate explanations”**

Viewers explained how different segments within the four presentation formats helped them learn something. This part of the post-interview permitted the identification of production characteristics that support learning, including:

- Clear demonstration of relationships, comparisons, procedures, and results was noted as important to effective learning from all four presentation formats.

- Showing critical information visually was also described as a critical attribute for all four formats.
- Viewers felt connected to the content of three of the four formats (hands-on activities, models, host)
- Viewers emphasized that explanations were age-appropriate and clear in three of the four formats (models, host, adults showing something to onscreen kids).
- The hands-on activity and host segments were described as fun or funny.
- Viewers felt that they could do the activity presented in the hands-on activity format.
- With respect to the segments where the onscreen kids meet with adults who show them something, viewers felt they could learn along with the onscreen kids, that the scientists know more, and that they could really see how small the nanoscale is.

**All viewers concluded that nanotechnology will be very or somewhat important in the future**

Viewers of the two programs came away thinking that nanotechnology will be important in the future because it can be applied in many different ways; it may make life easier; it uses fewer resources, saves money or has the potential to produce better sources of energy; and that nanotechnology stimulates building or inventing new things.

In conclusion, this study demonstrates that the *DragonflyTV Nano* television programs can significantly expand pre-teens' understanding of nanoscience in terms of scale, properties, methodology and applications. The television presentation formats of showing "onscreen kids doing hands-on activity" and "models" were perceived by viewers as most effective in communicating the nanoscience messages, and the characteristics of *DFTV Nano*'s presentation formats that were identified as most helpful for learning include "clear demonstration of relationships, comparisons procedures and results," "showing critical information visually," "connection to the content," and "clear age-appropriate explanations."