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AUTHOR Calvert, Sandra; Kotler, Jennifer; Kuhl, Alison; Riboli, Michael

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ABSTRACT

The impact of the Children's Television Act, which requires broadcasters to provide educational and informational programs for children, was examined by having 141 second through sixth graders watch 16 popular and unpopular television programs and then assess the motivational appeal of, and children's learning from, these programs. Popular and unpopular prosocial and academic programs broadcast by the four major commercial networks (ABC, CBS, NBC, and Fox) were compared to comparable programs broadcast by PBS and Nickelodeon. Younger children and girls liked educational and informational programs more than older children and boys did. Popular programs were liked better than unpopular ones. Older children understood program content better than did younger children, particularly those programs that focused on academic content. Popular programs, prosocial programs, and network programs also tended to be better understood. Findings suggest beneficial effects of commercial educational and informational television programs for children, thereby affirming the beneficial effects of governmental policies that are designed to improve the quality of children's television programs for the nation's youth. (Contains 2 tables and 26 references.) (NKA)

Impact of the Children's Television Act on Children's Learning

Sandra Calvert, Jennifer Kotler, Alison Kuhl, and Michael Riboli

Children and Media Project

Department of Psychology

Georgetown University

37th & O Streets, N.W.

Washington, D.C. 20057

202.687.3968 (phone)

202.687.6050 (fax)

calverts@georgetown.edu

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Impact of the Children's Television Act on Children's Learning

The impact of the Children's Television Act, which requires broadcasters to provide educational and informational programs for children, was examined by having 2nd through 6th graders watch popular and unpopular programs and then assessing the motivational appeal of, and children's learning from, these programs. Popular and unpopular prosocial and academic programs broadcast by the four major commercial networks (ABC, CBS, NBC, and FOX) were compared to comparable programs broadcast by PBS and Nickelodeon. Younger children and girls liked educational and informational programs more so than older children and boys. Popular programs were better liked than unpopular ones. Older children understood program content better than did younger children, particularly those that focused on academic content. Popular programs, prosocial programs, and network programs also tended to be better understood. Results suggest beneficial effects of commercial educational and informational television programs for children, thereby affirming the beneficial effects of governmental policies that are designed to improve the quality of children's television programs for our nation's youth.

Impact of the Children's Television Act on Children's Learning

Broadcast television is a medium filled with educational promise that has never fulfilled its potential (Calvert, 1999a). Market forces encourage entertainment programming at the expense of educational fare (Jordan, 1996), and the First Amendment puts limits on efforts by government to improve the quality of children's television programming. Despite these obstacles, advantaged and disadvantaged preschool children who view educational television programs perform better in school, both at initial school entry and later as they complete high school (Huston et al., in press; Wright & Huston, 1995). Realizing the unique potential of the medium to educate our youth, Congress passed the Children's Television Act of 1990 (CTA, 1990).

One facet of the Children's Television Act requires broadcasters to provide educational and informational programs for young viewers. Consequently, researchers have been examining the educational content that broadcasters are providing for children by conducting content analyses of actual programs and of broadcaster reports submitted to the Federal Communications Commission, the government agency charged with regulating broadcast television (Center for Media Education & Institute for Public Representation, Georgetown University, 1992; Jordan & Woodard, 1997; Kunkel & Canepa, 1994). Although the intent of the law is to improve the cognitive and social development of children, we know relatively little about what children actually *learn* from these programs. The **central research question** that we are addressing is whether broadcasters are meeting their obligation to the child audience- to provide programming

that improves the social and/or cognitive development of children- as mandated by the Children's Television Act of 1990.

History and Past Investigations in the Educational Television Area

American children spend more time watching television programming than in any other activity but sleeping. With television sets in 99% of homes (Roberts et al., 1999), television content is readily accessible to almost all American children. Poor children, who are often concentrated in ethnic minority groups, have fewer books than wealthier children, but they do have television sets (Calvert, 1999a). Caucasian children view an average of 2-3 hours of television each day (Huston & Wright, 1998), and African American and Latino children view about 1-2 hours more each day than their Caucasian peers (Greenberg & Brand, 1994). Because of the ubiquitous presence of television in children's daily lives, the medium has become a major socializer and educator of children, surpassing schools in the amount of time spent in a single activity. Although television programs have a vast potential for educating youth, more profitable entertainment programming has driven the commercial agenda (Huston & Wright, 1998).

After 25 years of pressure by public advocacy groups, The Children's Television Act of 1990, which requires broadcasters to provide educational and informational programs for our nation's youth, became a law. Based on the obstacles encountered in passing and implementing this law, it is clear that research is essential for guiding policy decisions in this area.

The Children's Television Act

Children's programming is the key policy area in which battles have been waged to alter television content (Huston et al., 1992; Huston, Watkins & Kunkel, 1989). Although much of the controversy has centered around the negative impact of violence and of advertisements directed at young viewers, it also involves the lack of quality programming developed and distributed for young audiences (Calvert, 1999a).

The Federal Communications Commission (FCC) regulates all television programming on the air waves. Because these air waves are public domain and belong to the people, broadcasters are required to "serve the public interest, convenience, and necessity" (Communications Act of 1934, p. 51). Hence, every five years, broadcasters must apply to the FCC for license renewal.

The First Amendment, which protects freedom of speech, keeps the FCC from truly regulating television content (Huston & Wright, 1998). The American people did not want government to control the public airwaves, which could allow government to control information and to censor content (Calvert, 1999a). These two conflicting charges for the FCC- to regulate content and to protect freedom of speech- made it difficult to enforce policy (Liebert & Sprafkin, 1988). The outcome of this tension has consistently favored the broadcasters' First Amendment rights. For example, no television station has ever lost its license for the kind of programs it broadcasts (Condry, 1989).

Years of debate and attempts to implement voluntary compliance policies, by which broadcasters were expected to regulate themselves, led to little change in children's television programming (Kunkel & Canepa, 1994). This failure by

broadcasters eventually led Congress to take action and pass the Children's Television Act of 1990.

When the Children's Television Act became law, the FCC was charged with implementing rules for broadcasters to follow. The commissioners defined educational and informational programming as those that contain content that would "further the positive development of the child in any respect, including the child's cognitive/ intellectual or social/emotional needs" (FCC, 1991).

Broadcaster Compliance with the Children's Television Act

The flexibility of the FCC guidelines, in keeping with their dual obligation to enforce the law while protecting freedom of speech, led to issues about the quality of the programs being broadcast to meet the requirements of the Children's Television Act. For example, although monitored by the FCC, initial compliance with the Children's Television Act was predominantly at the discretion of television stations. During license renewal procedures, some stations claimed that highly questionable programs met the requirements of the law. Social scientists and public interest groups documented and challenged some of these claims. *Content analyses of broadcaster reports* submitted to the FCC during license renewal applications and *content analyses of actual television programs* became the key methodologies used by researchers to evaluate broadcaster compliance with the Children's Television Act.

Content analyses of license renewal claims. Researchers who examined broadcaster reports to the FCC often discovered distorted and inaccurate classifications of educational and informational television programs (Calvert, 1999a). For example, the license renewal form for WDIV-TV in Detroit, Michigan, listed *GI Joe* as an educational

and informational television program. This station described one episode as follows: "The Joes fight against an evil that has the capabilities of mass destruction of society. Issues of social consciousness and responsibility are show themes" (Center for Media Education and Institute of Public Representation, Georgetown University, 1992, p. 6). Such interpretations of plot lines allowed broadcasters to claim that almost any program was educational.

Widespread distortions in the meaning of the term "educational and informational" television content were also reported by Kunkel & Canepa (1994). When examining the license renewal applications of 48 stations, broadcasters aired an average of only three and a half hours of educational and informational programming each week, even when broadcaster reports were taken at face value. Many of these programs had questionable educational value. For instance, some broadcasters submitted programs such as *Beetlejuice*, *Goof Troop*, and *The Jetsons* as those that met the educational and informational license renewal requirement. Rather than improving the quality of children's programs, the Children's Television Act became a hurdle that broadcasters often met with little intent to go beyond the literal requirements of the law.

Content analyses of educational and informational television programs. Content analyses of educational and informational television programs, in which a large sample of programs are taped and then analyzed, were a second major research tool to document compliance, or the lack thereof, with the Children's Television Act. In 1996, The Annenberg Public Policy Center at the University of Pennsylvania began to conduct annual content analyses of educational and informational television programs (Jordan, 1996). Because the majority of stations broadcast programs that are distributed by the

major networks, their sample provides a representative look at the kinds of programs children view throughout the United States.

Since 1996, Jordan has examined the educational value of programming that broadcasters have classified as educational and informational (E & I). The educational value of programs is measured by: 1) lesson clarity; 2) lesson salience; 3) lesson involvement; and 4) lesson applicability (Jordan & Woodard, 1997). Content analyses revealed a lack of consensus between broadcaster claims of educational and informational value and independent evaluations of those programs. Roughly 1/4 of programs were rated as minimally educational, creating questions about which programs should qualify as meeting the requirements of the Children's Television Act. Almost all of the network programs had prosocial messages as their primary theme.

Why is it difficult to get broadcasters to show high quality children's television programs to young audiences? The answer is profit. Children's television programming has a narrow profit margin when compared to adult programming. Educational and informational programs have an even smaller financial base, particularly programs that focus on traditional academic lessons that have to be narrowly defined in order to teach children. Broadcasters also believe that these programs attract younger, not older children, thereby limiting the size of the audience (Jordan, 1996). Smaller audiences translate into less commercial revenue (Calvert, 1999a). Although high quality educational programs which hold a "large" audience are difficult to create, viewing well-designed, academically-oriented programs, historically broadcast on PBS, predicts the long-term academic success of children (Huston et al., in press). Moreover, quality programs are not necessarily a financial liability. Well-designed programming which

teaches social and emotional lessons can be profitable and draw large audiences, as demonstrated by Nickelodeon (Friend, 1997). Because of the potential for drawing a larger audience, thereby maximizing profits, most educational and informational programs focus on prosocial rather than academic lessons (Calvert, 1999a).

Changes in FCC Broadcaster Guidelines

Because researchers repeatedly documented problems with broadcaster compliance in meeting the requirements of the Children's Television Act, the FCC moved to strengthen the law. In 1997, the FCC introduced several new guidelines. Those who complied with these guidelines were rewarded with an expedited license renewal. Those who did not had to follow a more lengthy full license renewal procedure (Calvert, 1999a).

These new guidelines were influenced by the independent content analyses conducted on the educational and informational broadcaster offerings. Since September of 1997, the *3 hour rule*, which requires broadcasters to provide a minimum of three hours of educational and informational television programs each week, has been in effect. This rule addresses the concern that financial liabilities occur as stations broadcast more educational television programs (Jordan, 1997). Because all stations have to provide the same amount of programming, no one station is at a disadvantage (Hundt, 1995). *Core educational programming* is required for an expedited license renewal. Core programs must be: a) designed to meet the educational and informational needs of children aged 16 and under; b) aired between 7:00am and 10:00pm; c) scheduled on a weekly basis; and d) at least 30 minutes in length (FCC, 1996). Effective January 2, 1997, stations also had to

label educational and informational television programs with E & I (Educational and Informational) logos so that parents and children could find them (FCC, 1996).

While quality programs are a prerequisite for educational lessons to be transmitted, they do not ensure that those lessons will be learned. At present, *we know very little about children learning from educational and informational programs.*

Children's Learning from Television Programs

The literature about children's learning from television programs has almost always been derived from laboratory investigations. In such studies, children view specific television programs and are later asked questions which assess their memory of the content (Calvert, 1999b; Calvert, Huston, Watkins & Wright, 1982; Collins, 1970; Wright et al., 1984). Some of these television programs are **narrative stories** whereas others, like *Sesame Street*, are comprised of discrete vignettes that are put together in an **expository, magazine** format. Narrative stories tend to teach social and emotional lessons whereas expository magazines tend to teach traditional academic lessons. Taken together, these studies have documented a developmental increase in children's memory for the important over the irrelevant program material, particularly for narrative stories (Collins, 1970; Wright et al., 1984).

For children to understand narrative plot lines, they must perform specific cognitive activities. In particular, children must 1) separate the central, plot-relevant from the incidental, irrelevant program details; 2) order that content into a story scheme; and 3) draw inferences about the motivations and feelings of characters as well as connect cause-event sequences that are presented across the narrative structure (Collins, Wellman, Keniston & Westby, 1978). Until about ages nine or ten, children are notably

deficient in comprehending televised stories (Huston et al., 1992), yet televised stories are the main type of program being created by broadcasters to meet the requirements of the Children's Television Act (Calvert, 1999a). Do young children understand the prosocial messages in these programs?

Summary

The Children's Television Act of 1990 requires broadcasters to provide educational and informational television programs that benefit the development of children. Well-designed educational television programs have immediate and enduring academic and social benefits for both advantaged and disadvantaged viewers. Academic benefits are clearest when programs focus on the cognitive skills that children can use in schools. Young children's social behavior benefits from prosocial programs, but they have difficulty remembering essential plot-relevant events in prosocial stories, even when retention is assessed immediately after viewing. This comprehension problem is particularly salient because the program of choice to meet the requirements of the Children's Television Act is a prosocial story.

The overall body of literature is limited in that: 1) most studies have involved adult content analyses of television programs with limited knowledge about what child viewers learn from these programs; and 2) few studies have examined the impact of educational television programs on children during the grade school years. This study examines both issues.

Research Question and Hypotheses

Our main research question asks if broadcasters are meeting the requirements of the Children's Television Act: i.e., to provide programming that improves the cognitive and/or social development of children. To answer this question, we compared broadcaster ratings of their educational and informational programs to three sources of data: 1) naturalistic data of children's viewing patterns and their learning from their favorite programs; 2) experimental data of children's learning for programs that are frequently versus infrequently viewed by children; and 3) analyses which link the children's data to content analyses being conducted by the Annenberg Public Policy Center. Specifically, we used naturalistic and laboratory designs to examine what 2nd through 6th grade children view and learn from programs labeled as educational and informational by broadcasters compared to PBS and Nickelodeon programs. Then we relate those findings to adult ratings of the television program content. The results of the experimental study are reported here.

Our major hypotheses were that: 1) younger children would like the educational and informational programs more than would older children; 2) older children would understand the content more than would younger children; 3) children would like popular programs more than unpopular ones, and the popular programs would also be better understood; and 4) prosocial programs would be better liked, and hence, better understood, when compared to academic programs.

Method

To discover what makes educational programs interesting and comprehensible for children, we conducted a laboratory study of children's learning from the most and least viewed programs as determined by our Internet reports in the naturalistic study where children reported the number of educational and informational television programs they viewed. The program sample originally included 30 educational and informational programs broadcast by the commercial networks and by PBS/Nickelodeon.

Experimental Stimuli

Based on children's viewing patterns from the naturalistic data during the first wave of data collection, we selected the most and least viewed educational television fare for two types of programs: prosocial (social emotional content) or academic (cognitive skills and informational content) from the four networks and from PBS/Nickelodeon. Because only one program from PBS/Nickelodeon fell in the bottom half of the distribution, two episodes of it were used as stimuli. The four networks only provided 3 academically oriented programs. Therefore, two episodes of the unpopular academic program were used as stimuli. With the exception of the additional programs that had to be added to the sample, the specific programs shown were drawn from the 1998 and 1999 Annenberg Public Policy Center samples.

As seen in Table 1, the 16 programs formed four cells of a design that crossed program popularity (most versus least viewed programs) with broadcaster type (network versus PBS/Nickelodeon). Within each cell, two programs focused on academic content (Programs A & B) and two focused on prosocial content (Programs C & D). Within age groups and schools, small groups of children were randomly assigned to view two

programs (one academic and one prosocial) from one of the four cells of program popularity by broadcaster type design. Within each viewing frequency by broadcaster type cell, half of the subjects viewed Programs A and C; the other half viewed programs B and D. The complete experimental design includes grade (2) by sex (2) by program popularity (2) by network type (2) as between-subjects variables and program content (academic vs. prosocial) as a within-subject variable. Program set (A-C vs. B-D) was nested within viewing frequency and broadcaster type.

Table 1.

Television Programs in the Experimental Study

	Commercial Broadcasters	**Nickelodeon/PBS**
Social/Emotional		
Viewed Often:	1. Recess 2. Sabrina, the Animated Series	1. Hey Arnold 2. Doug
Rarely Viewed:	1. Anatole 2. Blaster's Universe	1. Shelby Woo- UFO 2. Shelby Woo- Baseball
Academic		
Viewed Often:	1. The Magic School Bus 2. Bill Nye, the Science Guy	1. Wishbone 2. Zoom
Rarely Viewed:	1. Squigglevision- Siphon 2. Squigglevision-Rocks	1. Kratt's Creatures 2. Nick News

Participants

We examined 141 2nd through 6th grade boys and girls learning from 16 television programs. Our sample was drawn from one elementary and one middle school from the Washington metropolitan area who were participating in the broader naturalistic Internet study.

Procedure

Children were randomly assigned to small groups who viewed two television programs on two separate days. Children sat at school desks or on bean bag chairs as they viewed a program in their classrooms. Comic books were available for reading as a distractor task.

Motivational Appeal and Learning Measures

After viewing, each child answered the motivational appeal measure and then answered three types of learning measures: 1) free recall of the program content; 2) multiple-choice questions of the central, inferential, and incidental program content; and 3) picture sequencing of key program scenes. Two forty-five minute to one-hour sessions were required for each group of children to view the programs and to answer learning measures. Older children read the directions and answered questions by themselves whereas an adult read the directions and questions to younger children. The motivational, multiple-choice, and picture sequencing data are presented here.

Motivational appeal measure. Children's motivation to view programs is important in creating effective educational programs that they will view. Motivation can be indexed by asking children how much they like certain programs and by asking them for feedback about those choices (Calvert, 1999b). We assessed motivation with several Likert items to find out how much children like the particular programs that they see. For example, "How much did you like Doug? Potential responses are "I didn't like it. It was OK." or "I liked it a lot!"

Multiple-choice measure. The multiple-choice measure allowed us to assess learning while controlling for possible age or gender differences in children's verbal skills. Questions consisted of content that adults judged as essential or nonessential to the program message. Following procedures used by Calvert et al. (1982), this measure was constructed by having a research team of 11 people view the programs and generate questions to assess learning for each program. Next, questions were consolidated into one questionnaire by two project members and placed in an open-ended format. The entire research team then rated each question as essential or nonessential to the plot, and they answer each question. Material that was rated as essential or nonessential content by a minimum of 70% of the adult judges was retained. The surviving essential program material was then broken into two categories: 1) central content *explicitly* presented in the program; and 2) central, inferential content *implicitly* presented in the program. The implicit, inferential program content required the viewer to go beyond the information given and figure out how characters felt, what their motivations were, and what the cause-effect sequences in the program were. Explicit and implicit classifications were made by having two project members review each question in relation to the program and determine whether or not the answer to a question was concretely shown or had to inferred from the program content.

The final questions were organized into a multiple-choice measure, assessing children's knowledge of explicit, implicit, and incidental (i.e., nonessential) program content. Three responses options were possible for each question. Incorrect responses were created by using the incorrect answers that the adult judges of the program gave on their questionnaires. These questions were placed in a test booklet.

Picture sequencing measure. Another way to control for potential differences in verbal skills is to ask children to sequence visual pictures of the key scenes in each program. This kind of measure assesses children's skills at temporally organizing and integrating important visual events from the program (Wright et al., 1984). Three project members initially selected six central pictures from key scenes in each program. Two additional project members then reviewed those pictures and occasionally made modifications. The final set of six pictures were then selected, downloaded from the computer using a "snappy" picture copying device, arranged in a random way, and then xeroxed onto a sheet of paper for the test booklet.

Children were asked to put the pictures in order from the first thing that happened in the program to the last. They indicated their order by placing the numbers 1-6 in small boxes located at the top of each picture.

Results

Separate analyses were conducted for the appeal of the programs and for each comprehension measure, i.e., recognition of explicit, implicit, and incidental multiple-choice items and picture sequencing. Each dependent variable was analyzed, in turn, by a Gender (2) by Grade (2) by Popularity (2) by Station (2) by Type (2: Academic versus Prosocial program) mixed ANOVA. Type was the only within-subject variable. When follow-up tests were necessary because of significant interactions by Type, differences between variables were first tested separately by Type. Means and standard deviations for each of the variables are presented in Table 2.

Table 2 about here

Motivational Appeal

To assess motivational appeal, children were asked how much they liked the program they viewed on a scale from one to three. Higher scores indicated stronger appeal. Scores ranged from 1 to 3.

The 5 factor mixed ANOVA computed on motivational appeal scores yielded main effects for type $F(1,125) = 9.131$, $p < .01$; gender $F(1,125)=14.459$, $p < .01$; and grade $F(1,125) = 39.900$, $p <.001$. As predicted, children liked the prosocial more than the academic programs; younger children liked the programs more than did older children; and girls liked the programs more than boys did. See Table 2.

There was also a 3-way interaction of Type by Popularity by Station $F(1,124) = 8.325$, $p < .01$. In order to examine the nature of the 3-way interaction, separate 2-way Popularity by Station ANOVAs were run for each program type. For academic programs there were no significant differences between high versus low popularity programs and network vs. Nick/PBS programs. That is, there were no main effects and no interactions for the academic programs. For the prosocial programs, however, there was a station by popularity interaction $F (1, 137) = 4.732$, $p < .05$. Follow-up contrasts revealed that for unpopular programs, there was no difference in the appeal of Nick/PBS versus Network programming. By contrast, for popular programs, there was a significant difference favoring the appeal of Network over Nick/PBS programs, $t(69) = 2.502$, $p <.05$ ($M = 2.54$, $SD = 0.51$, vs. $M = 2.17$, $SD=0.74$). Put simply, children liked the popular prosocial network programs more than the popular prosocial Nick/PBS programs.

Comprehension of Multiple-Choice Items

The multiple-choice questionnaire consisted of 10 explicit, 7 implicit, and 7 incidental items. Both explicit and implicit items represented information that was essential to understand the program whereas incidental questions were irrelevant to the program point. The number of questions answered correctly was transformed into the total percent correct. As such, means represent the proportion of children who understood each kind of program information.

Memory of explicit content. Explicit questions tapped children's understanding of main themes and facts that were explicitly stated or shown in the program. Scores ranged from 20% to 100%.

The 5 factor mixed ANOVA computed on explicit comprehension scores yielded main effects for type $F(1,125) = 42.823$, $p < .001$; grade $F(1,125)=11.590$, $p < .01$; and popularity $F(1,125) = 8.36$, $p < .01$. As expected, children understood more explicit content from the popular than the unpopular programs, and older children understood explicit content better than did younger children. Children also understood the explicit content in prosocial programs better than the explicit content in academic programs. Overall, children's comprehension of the explicit program content was quite good, typically averaging between 80-90%. See Table 2.

Follow-up contrasts of a type by station interaction, $F(1,125) = 11.511$, $p < .01$ revealed that for academic programs, children understood the explicit program content equally well from either Network or Nick/PBS programs. For prosocial programs, however, children understood explicit program content presented in Nick/PBS programs

better than comparable content presented in network programs $t(139) = -2.916$, $p < .01$ (M= 94%, SD= 9, vs. M= 87%, SD = 15, respectively).

Follow-up contrasts of a popularity by station interaction, $F(1,125) = 8.491$, $p < .01$ yielded no differences in children's comprehension of explicit content from unpopular network and Nick/PBS programs. For popular programs, by contrast, children understood the explicit program content better from the Nick/PBS programs than they understood comparable content from network programs $t(69)=-2.699$, $p <.01$ (M= 92%, SD = 06 vs. M = 86%, SD = 12, respectively).

All main effects and two-way interactions were qualified by a type by station by gender by popularity interaction, $F(1,125) = 5.646$, $p < .05$. Follow-up analyses indicated that for prosocial programs, there was a main effect for station, $F(1, 133) = 8.753$, $p <.01$. Children understood explicit content presented on Nick/PBS better than comparable content presented in network programs (M = 94%, SD = 9 vs. M = 87%, SD = 15, respectively). For academic programs, there was a significant main effect for popularity, $F(1, 133)=8.449$, $p <.01$ favoring children's understanding of popular over unpopular programs (M= 85%, SD= 15 vs. M= 77%, SD = 16, respectively). For academic programs, there was also a significant popularity by station interaction $F(1, 133) = 5.988$, $p < .05$. Follow-up t-tests indicated that children understood the explicit content from popular programs from both kinds of stations equally well; for unpopular academic programs, however, there was a strong difference favoring children's memory of explicit content presented in network over Nick/PBS programs $t(69)=2.936$, $p <.01$ (M= 83%, SD= 14 vs. M= 72%, SD= 16, respectively).

Memory of implicit content. Implicit questions tapped children's understanding of main themes that were implied in the program but were not explicitly shown or stated in the program. This measure tested children's ability to make inferences, to understand character emotions, and to comprehend abstract cause-effect sequences and relations. Scores ranged from 29% to 100%.

The 5 factor ANOVA computed on implicit comprehension scores yielded main effects for type, $F(1,125) = 14.296$, $p < .001$; grade, $F(1,125) = 20.987$, $p < .001$; and station, $F(1,125) = 20.326$, $p < .001$. As expected, older children understood implicit program content better than younger children did. Children also understood implicit prosocial content better than implicit academic content, and understood implicit content presented in network programs better than implicit content presented in Nick/PBS programs. Means and standard deviations are presented in Table 2.

Main effects were qualified by a type by station interaction $F(1,125) = 6.550$, $p < .05$; by a grade by station interaction $F(1,125) = 5.418$, $p < .05$; and by a type by grade interaction $F(1,125) = 5.625$, $p < .05$. Follow up t-tests for the type by station interaction revealed that for the prosocial programs, children understood implicit content presented in the network programs better than implicit content presented in the Nick/PBS programs, $t(139) = 5.785$, $p < .001$ ($M = 95\%$, $SD = 9$, versus $M = 82\%$, $SD = 15$, respectively). There was no such difference for academic programs.

Follow-up contrasts of the grade by station interaction revealed that older and younger children understood implicit content from the network programs; however, older children understood the implicit content on Nick/PBS programs much better than did

younger children $t(69) = -4.272$, $p < .001$ (M = 87%, SD = 10, versus M = 75%, SD = 15, respectively).

Follow-up t-tests of the type by grade interaction revealed that older children understood implicit content in the academic programs much better than the younger children did, $t(139) = -4.216$, $p < .01$, (M = 88%, SD = 14, versus M = 76%, SD = 20, respectively), but there was only a marginal advantage in the older children's understanding of the implicit content in the prosocial programs $t(139) = -1.930$, $p < .06$ (M = 90%, SD = 12, versus M = 86%, SD = 16, respectively).

Memory of incidental content. Incidental content tapped into children's understanding of concretely presented content that was irrelevant to the program point or lesson. Scores ranged from 0% to 100%.

The 5 factor ANOVA computed on incidental memory scores yielded main effects for grade $F(1,125) = 17.314$, $p < .001$; and for popularity, $F(1,125) = 14.437$, $p < .001$. As seen in Table 2, older children remembered more incidental content than did younger children, and children who viewed popular programs remembered more incidental content than did those who viewed unpopular programs.

Main effects were qualified by a gender by station interaction $F(1,125) = 4.4062$, $p < .05$; and by a type by grade interaction $F(1,125) = 8.204$, $p < .01$. Follow-up contrasts of the gender by station interaction revealed that girls remembered a similar amount of incidental content from both Nick/PBS and the networks. Boys, by contrast, remembered more incidental content from Nick/PBS programs than from network programs $t(70) = -2.102$, $p < .05$, (M = 85%, SD = 16 vs. M = 77%, SD = 0.16, respectively).

Follow-up t-tests of the type by grade interaction revealed that older children remembered much more incidental content than did younger children after viewing academic programs, $t(139) = -4.551$, $p < .001$ ($M = 87\%$, $SD = 17$ vs. $M = 74\%$, $SD = 18$, respectively). By contrast, both older and younger grades understood incidental content equally well when viewing prosocial programs.

Picture Sequencing

Children were asked to correctly sequence a series of six pictures. The number of pictures sequenced correctly was transformed into percent correct. Scores ranged from 0% to 100%.

The 5 factor ANOVA computed on picture sequencing scores yielded main effects for type, $F(1,125)=21.333$, $p <.001$; for grade $F(1,125)=5.084$, $p <.05$; and for popularity $F(1,125)=18.001$, $p <.001$. As predicted, older children sequenced more pictures correctly than did younger children. Children also sequenced more pictures correctly after viewing prosocial rather than academic programs, and they sequenced more pictures correctly after viewing popular than unpopular programs. See Table 2.

Main effects were qualified by three two-way interactions and one three-way interaction. Follow up t-tests for a type by popular interaction $F(1,125)=30.452$, $p <.001$, revealed that for prosocial programs, children sequenced more pictures correctly after viewing popular than unpopular programs , $t(139) = -7.836$, $p<.001$ ($M = 91\%$, $SD = 20$ versus 59%, $SD = 28$, respectively). There were no differences in children's picture sequencing scores for the popular and unpopular academic programs. There was a type by station interaction, $F(1,125)= 13.123$, $p < .001$. Follow-up t-tests indicated that children who viewed academic programs sequenced more pictures correctly after viewing

network than Nick/PBS programs, $t(139) = 2.988$, $p < .01$ (M = 68%, SD = 35 versus M = 53%, SD = 26, respectively). There was also a popularity by station interaction, $F(1,125) = 7.187$, $p < .01$. Follow-up t-tests indicated that for unpopular programs, children sequenced more pictures correctly after viewing network than Nick/PBS programs $t(68) = 3.00$, $p<.01$ (M=0.67, SD=0.21 versus M=0.54, SD=0.16, respectively). No such pattern was found for popular programs.

Finally, there was a type by popularity by station interaction $F(1,125) = 5.147$, $p < .05$. For academic programs, there was a significant main effect for station F (1, 137) = 9.54, $p < .01$ in favor of the networks (M = 68%, SD = 35 vs. M = 53%, SD = 26, respectively). For academic programs, there was also a significant station by popularity interaction F (1, 137) = 9.431, $p<.01$. Follow-up t-tests revealed that for unpopular academic programs, children sequenced more pictures correctly after viewing network than Nick/PBS programs, $t(68) = 5.587$, $p < .001$ (M = 78%, SD = 22 versus M = 47%, SD = 24, respectively). For popular academic programs, there was no significant difference in picture sequencing. Surprisingly, when examining each station by popularity, the children who viewed *unpopular* Network programs actually sequenced more pictures correctly than those who viewed *popular* Network programs $t(68) = 2.353$, $p < .05$ (M = 78%, SD = 0.22 versus M = 59%, SD = 43, respectively). The expected inverse pattern was marginally true for Nick/PBS programs, $t(69) = -1.972$, $p < .06$ (M = 58%, SD = 26 versus M = 47%, SD = 24, respectively). For the prosocial programs, there was a main effect for popularity, F (1, 137) = 61.524, $p < .001$. Children sequenced more pictures correctly after viewing popular than unpopular programs, (M = 91%, SD = 20 vs. M = 59%, SD = 28, respectively).

Summary

Overall, children liked prosocial programs more than academic programs, and they also understood prosocial programs better. Girls and younger children liked the programs more than did boys and younger children. Older children understood all kinds of program content more than the younger children did. Popular programs were generally understood better than unpopular programs. Although there were a few instances where Nick/PBS programs were understood better than the network programs, overall children understood the network programs better.

Discussion

The purpose of this study was to examine what children were learning from educational and informational television programs that were mandated by the Children's Television Act. The results suggest that children are learning lessons of value from the commercial networks as well as from those who are leaders in producing quality programs, such as Nickelodeon and PBS.

Consistent with broadcaster beliefs (Jordan, 1996), children were more interested in the prosocial television programs than the academic programs, and younger children were more interested in educational and informational programs than were older children. Girls also liked educational programs more than boys did. Interestingly, children preferred the commercial networks' popular prosocial programs over the Nick/PBS popular prosocial programs. The latter finding suggests that the networks (ABC in our sample) have developed an effective formula for creating engaging educational programs for children.

The second area of interest, and the area that is most germane to this study, examines what children learn from educational television programs. The learning measures, consisting of multiple choice and picture sequencing measures that controlled for verbal skills, revealed that children understood much of the content that they were shown. Comprehension of the central explicit and implicit content, which are most important in understanding a television programs (Collins et al., 1978; Calvert et al., 1982), was often 80% or higher. Prosocial content was better remembered than was academic content, and network programs were often better remembered than were PBS/Nickelodeon programs. The incidental content, which was less important for plot comprehension, was also well understood. Not surprisingly, older children understood all kinds of content better than younger children did, even though the younger children were more interested in the programs. This finding supports the long-standing pattern of older children's superior comprehension of television content when compared to younger children, in large part due to age differences in cognitive skills (Collins, 1970; Calvert et al., 1978).

For picture sequencing, children's comprehension was much more variable. The content that was sequenced the best was from popular prosocial programs. The prosocial programs tended to have plots where the temporal sequence was critical for comprehension whereas academic programs, particularly those from PBS and Nickelodeon, often used a magazine format where temporal sequence was irrelevant to program comprehension. These findings are consistent with others (e.g., Wright et al., 1984) who find better picture sequencing when programs are stories rather than magazines. The particularly positive effects of popular over unpopular prosocial

programs on picture sequencing tasks suggest that children are processing popular prosocial programs optimally because they like them and invest more attentional resources and effort in understanding them. These findings indicate that children are taking away a considerable amount of educational information from the educational television programs they are viewing.

In summary, the Children's Television Act has led commercial broadcasters to create educational and informational programs that children like and can understand. In particular, popular network programs are better liked and often better understood. Although there are many critics of the prosocial over the academic preference of commercial broadcasters, the data provided here suggest beneficial effects of such programs. Even so, academic programs such as the *Magic School Bus* are also popular and well understood by children. That popularity may well reflect the careful depiction of science themes that are well-integrated within stories in a comprehensible and engaging manner. In a market where educational programs are competing against non-educational fare, commercial broadcasters may prefer prosocial rather than academic fare in meeting their CTA requirements because children like prosocial programs more, understand them better, and those programs pull in a larger audience. The Children's Television Act has brought about a new era in children's programs where educational and informational programs can exist in the commercial arena, thereby benefiting the development of our youth. A remaining challenge is to create more academically-oriented programs that attract a large audience while delivering a comprehensible message.

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Table 2.
Means for Motivational Appeal and Percent Correct for Explicit Recall, Incidental Recall, Implicit Recall and Picture Sequencing

	GENDER		GRADE		POPULARITY		PBS/NICK VS. BROADCAST		TOTAL
	Boy	Girl	2-4	5-6	PBS/N	Broad	Low	High	
Motivation: Appeal[a]									
Academic	1.92 (0.67)	2.32 (0.61)	2.40 (0.62)	1.90 (0.62)	2.10 (0.66)	2.13 (0.68)	2.03 (0.72)	2.20 (0.60)	2.11 (0.61)
Prosocial	2.14 (0.68)	2.46 (0.56)	2.60 (0.56)	2.07 (0.61)	2.23 (0.68)	2.37 (0.59)	2.24 (0.62)	2.35 (0.66)	2.30 (0.64)
Total	2.03 (0.56)	2.39 (0.44)	2.50 (0.40)	1.99 (0.52)	2.14 (0.58)	2.27 (0.49)	2.16 (0.54)	2.25 (0.54)	2.21 (0.54)
Explicit Recall[b]									
Academic	80.0% (15.9)	82.3% (15.4)	77.2% (17.1)	84.1% (13.9)	79.2% (14.7)	83.1% (16.4)	77.3% (15.9)	85.0% (14.5)	81.2% (15.6)
Prosocial	89.9% (13.9)	91.3% (12.1)	87.7% (12.3)	92.7% (13.2)	93.7% (9.3)	87.4% (15.4)	88.7% (14.7)	92.4% (10.9)	90.6% 13.0)
Total	84.9% (11.4)	86.8% (11.2)	82.4% (12.2)	88.4% (9.9)	83.0% (11.9)	88.7% (10.0)	86.4% (10.4)	85.3% (12.2)	85.7% (11.3)
Incidental Recall[c]									
Academic	78.7% (20.2)	84.7% (18.6)	73.8% (18.1)	87.5% (17.2)	83.9% (16.9)	79.4% (20.4)	76.1% (19.9)	87.1% (16.0)	81.6% (18.8)
Prosocial	83.1% (18.8)	83.4% (16.2)	80.7% (18.0)	85.2% (17.0)	84.7% (18.3)	81.8% (16.7)	79.6% (21.6)	86.9% (11.2)	83.3% (17.5)
Total	80.9% (16.6)	84.8% (82.5)	77.3% (14.9)	86.3% (14.6)	77.9% (18.4)	87.0% (9.7)	84.3% (15.9)	80.6% (14.6)	82.5% (15.3)
Implicit Recall[d]									
Academic	82.2% (18.4)	84.5% (16.9)	76.4% (20.0)	88.4% (13.8)	81.2% (18.2)	85.5% (16.9)	80.6% (19.0)	86.0% (16.3)	83.3% (17.7)
Prosocial	87.7% (13.6)	89.4% (14.2)	86.0% (16.00)	90.5% (12.2)	82.5% (15.1)	94.7% (9.2)	86.9% (14.9)	90.1% (12.7)	88.6% (14.0)

Total	85.0% (12.7)	87.0% (13.0)	81.2% (14.7)	89.5% (10.0)	83.8% (13.2)	88.1% (12.1)	81.8% (14.0)	90.1% (10.3)	85.9% (12.8)
Picture Sequencing[e]									
Academic	56.3% (30.6)	64.5% (32.2)	55% (33.7)	64.3% (29.5)	52.7% (25.8)	68.1% (35.0)	62.1% (27.8)	58.5% (34.9)	60.3% (31.5)
Prosocial	74.1% (29.1)	76.1% (29.6)	71.9% (29.4)	77.4% (29.1)	78.4% (25.9)	71.7% (32.2)	58.8% (28.3)	91.1% (19.9)	75.1% (29.3)
Total	65.2% (21.0)	70.3% (22.0)	63.5% (23.2)	70.8% (20.0)	60.5% (19.6)	74.8% (21.1)	65.5% (18.9)	69.9% (23.9)	67.7% (21.6)

[a]Prosocial > academic; girls > boys; younger > older.

[b]Prosocial > academic; older > younger; popular > unpopular.

[c]Older > younger; popular >unpopular; boys: Nick/PBS >Networks,

[d]Prosocial > academic; Older > younger, particularly for academic content and Nick/PBS programs;
Broadcast > Nick/PBS, particularly for prosocial programs.

[e]Prosocial > academic; Older > younger; popular > unpopular.

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