



## Children's online reports about educational and informational television programs

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### Abstract

The Children's Television Act of 1990 requires broadcasters to provide programming that furthers the development of children. The purpose of this study was to examine second through sixth grade children's learning from educational programs broadcast by affiliates of ABC, CBS, NBC, and FOX compared to PBS and Nickelodeon. Using the Internet as a data collection tool, 97 children in locations throughout the US reported their viewing patterns and their learning from educational and informational programs. Children viewed about four different educational and informational programs a week, primarily from Nickelodeon and PBS, with the educational strength of children's reports being comparable for the commercial vs. cable/PBS offerings. Children reported more social and emotional lessons and knowledge information lessons than cognitive skills lessons or physical well-being lessons. The results indicate that many children are learning lessons of social and informational value from programs mandated by the Children's Television Act. The implication is that governmental regulation of children's television results in measurable benefits for child viewers. © 2001 Elsevier Science Inc. All rights reserved.

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### 1. Introduction

With television sets in 99% of homes (Roberts, Foehr, Rideout, & Brodie, 1999), television content is readily accessible to almost all American children. Indeed, American children

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spend more time watching television programming than in any other activity but sleeping (Roberts et al., 1999). Moreover, longitudinal follow-ups reveal that children who grow up watching educational television programs such as *Sesame Street* later have better grades in high school (Huston, Anderson, Wright, Linebarger, & Schmitt, 2001). Realizing the unique potential of television as a medium that can educate as it entertains, Congress passed the Children's Television Act of 1990. The law required broadcasters to air educational and informational programs for young viewers as a condition for license renewal (Children's Television Act, 1990).

Although a decade has passed since the Children's Television Act became a law, we still know virtually nothing about what, if anything, children *learn* from these programs. The purpose of this study was to analyze second through sixth grade children's learning from television programs that broadcasters label as educational and informational. To do so, children accessed our Internet site, located at <http://data.georgetown.edu/kidtv>, and reported their viewing patterns and their learning from educational and informational television programs.

## 2. What is an educational television program?

When the Federal Communications Commission (FCC) implemented the Children's Television Act, they defined educational and informational programming as "any content that serves to further the positive development of the child in any respect, including the child's cognitive/intellectual or emotional/social needs" (FCC, 1991, p. 21). This definition set the stage for prosocial as well as academically oriented programs to qualify as educational and informational.

Controversy quickly arose over what an educational program is when some of the initial television programs broadcast to meet the requirements of the Children's Television Act were of marginal educational value (Kunkel & Canepa, 1994). For instance, academic and advocacy groups monitored the kinds of programs that broadcasters listed as educational and informational on their license renewal forms (e.g., Center for Media Education & Institute for Public Representation, Georgetown University Law Center, 1992; Kunkel & Canepa, 1994). One broadcaster claimed that *GI Joe* taught children patriotism. The findings from these kinds of analyses led the FCC to implement more stringent standards, including the Three-Hour Rule that required each broadcaster to provide a minimum of 3 h of educational and informational television programming each week (FCC, 1996).

Content analyses of educational and informational television programs became another focal point of the effort to monitor the quality of children's programs (e.g., Jordan, Woodard, & Schmitt, this issue; Jordan & Woodard, 1997). These content analyses reveal that the major networks provide their affiliate stations primarily with programs that contain social and emotional lessons rather than cognitive skills, knowledge information, or physical skills lessons. The educational strength of these programs, measured by the clarity, salience, involvement, and applicability of program lessons, has varied over time, but about one-fourth of E and I programs are consistently low in educational strength.

Although the body of knowledge about educational and informational programs has flourished in the children's television area, children's learning from these programs has not

been examined. Therefore, feedback from children has not influenced the national debate about the kinds of programs that are and should be available for them.

### 3. Children's learning from educational 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). 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. Studies have documented a developmental increase in children's memory for important over irrelevant program content, particularly for narrative stories (Collins, 1970). Although young children are often deficient in television story comprehension, televised stories are the main type of program being created by broadcasters to meet the requirements of the Children's Television Act (Calvert, 1999a).

Laboratory studies have contributed significantly to our knowledge about what children take away from television viewing experiences, but they are limited in several respects. First, laboratory studies offer the benefit of controlled conditions, thereby increasing the internal validity of the research, but they lack ecological validity, thereby limiting the generalizability of the findings and the external validity of the research. In the laboratory, for example, the researcher selects the program that children view. In real life, children may rarely, if ever, choose to view that program. We need to know more about what children are learning from the programs that they view in their homes, an external validity issue. Second, while delays in testing children's memories are sometimes built into experimental designs (Watkins, Calvert, Huston, & Wright, 1980), most studies collect data only immediately after exposure to a television program (Collins, 1970). Therefore, we know little about the durability of the messages that children take away from television viewing. Third, researchers typically construct measures to assess their own views, rather than children's views, of what should be important and memorable. We need to know more about what children think is important in the television programs they view.

One important exception to this pattern was a longitudinal study that examined the impact of educational television. In this study (Huston et al., 2001), two research teams collected initial data on the naturalistic viewing patterns of children during early childhood and later examined these subjects a decade later, when these children had become adolescents. The researchers found that adolescents who had been frequent viewers of children's informative programs, such as *Sesame Street* and *Mister Rogers' Neighborhood*, had better grades in high school than those who had been infrequent viewers of this kind of educational fare. These differences held up even when other important family characteristics — such as family income and parental education — were taken into consideration. *Sesame Street* focuses on traditional academic lessons, such as number and letter identification, decoding, subtraction, counting strategies, and addition whereas *Mister Rogers' Neighborhood* focuses on prosocial

themes (Calvert, 1999a). The long-term naturalistic findings document the enduring impact of high-quality children's television programming on the academic achievement of our youth.

Our project was especially interested in what children were learning during middle childhood, an age group for whom relatively few quality educational programs have been created. Younger children, particularly boys, watch more Saturday morning cartoons than older children do (Huston & Wright, 1998). Educational and informational programs created by three of the four major commercial networks are broadcast by their affiliates on Saturday morning (though NBC chose to create a live action rather than an animated program line-up). Therefore, we expected that younger children would view more of the presented educational programs than would older children. However, developmental differences in children's comprehension of essential plot-relevant television content and in verbal skills, which have long been documented in the literature, led us to predict advantages favoring older children in the number of lessons learned and in the educational strength of their reports.

#### **4. Gender differences**

Gender differences in computer usage patterns document that boys are more likely to use computers than girls (Calvert, 1999a). However, this pattern often emerges because computer software is generally directed at male interest patterns (Calvert, 1999a). Girls become interested in computers if they perceive the activity as relevant for them.

One computer activity that both boys and girls do is word processing (Calvert, 1999a). Therefore, the Internet computer game that we created for data collection involved writing stories. As both boys and girls use computers for writing activities, we expected similar involvement for both genders. Because girls often have better verbal and expressive skills than boys do early in development (Ruble & Martin, 1998), we also expected girls' reports to have greater clarity, integration, and applicability than boys' reports.

#### **5. Hypotheses**

Our main hypotheses were: (1) younger children would view more educational and informational programs than older children, primarily because younger children are more likely to view cartoons which are typically broadcast on Saturday morning television programs (though the NBC line-up was in a live-action format); (2) older children would learn more academic and social lessons than younger children, primarily because older children can understand and convey lessons better; (3) older children would generalize program themes better than younger children, again because of their superior skills at understanding, integrating, and conveying lessons; (4) children who viewed more PBS and Nickelodeon than network programs would learn more academic (PBS) and social lessons (Nickelodeon) and generalize program themes better than would frequent viewers of commercial programs, primarily because PBS and Nickelodeon broadcast more educational and informational programs on a daily basis; and (5) girls would write reports with greater

clarity, integration, and generalizability than boys because of girls' greater verbal and expressive skills.

## 6. Method

### 6.1. Participants

Children accessed our web site primarily from their schools, thereby allowing us to gather information about boys and girls representing various socioeconomic groups. Because developmental changes take place in children's comprehension of television programs (Calvert, 1999a), we compared two age groups: second/third/fourth (13 boys, 19 girls) vs. fifth/sixth graders (30 girls, 35 boys). For Year 1, the 97 children visited our site primarily from public schools in Shaker Heights, OH; West Chester, PA; Silver Springs, MD; Norwalk, CT; and private schools in Tampa, FL and Salt Lake City, UT.

### 6.2. Procedure and Internet web site for *The Georgetown Hoya TV Reporters*

Our web site, located at <http://data.georgetown.edu/kidtv>, is part of the Georgetown University site. Georgetown athletic teams are called *Hoya Bulldogs*. Hence, the Internet site is called *The Georgetown Hoya TV Reporters*.

The child-friendly web site, used to evaluate children's learning from educational and informational television programming, is designed as a game in which children become *Hoya Reporters*. Children reported from their schools or homes to tell us about: (1) what they viewed, (2) what their favorite program was, and (3) what they learned from their favorite program.

Using the Internet has distinct methodological advantages over other techniques. The Internet promotes: (1) ecological validity based on assessments of naturalistic viewing patterns, (2) immediate data transmission, (3) ease of reporting for children, and (4) interest value for children.

The first time that children entered the *Hoya Reporter* web site, new reporters went to a page that described what we were doing, and then went to a page where they provided descriptive information about themselves. After identifying information was provided, children moved to the *TV Guide* page. Here children selected the names of the weekly educational and informational programs that they had viewed the preceding week.

Because most network affiliates are broadcasting network feed for their educational and informational programs (Schmitt, 1999), a finite set of television programs was studied. For comparison purposes, educational and informational programs targeted at grade-school children from PBS and Nickelodeon were included in the sample. There were 30 programs on the site during Year 1. Network programs were selected based on educational and informational labels that were provided at the beginning of programs, as mandated by FCC requirements. The PBS and Nickelodeon programs were selected by our research team. Initially, our research team used descriptions and ratings from the October 1998 *Kidsnet Media Guide*, a computerized clearinghouse for children's television programs, to select

potential programs for our sample. Then a panel of six judges from our project selected the actual programs for our study by viewing and classifying sample episodes of these programs for educational and informational content.

For the 1998–1999 season, our 30 target programs for second through sixth grade children were as follows: ABC: *Disney's Doug*, *Disney's Pepper Ann*, *Disney's Recess*, *Squigglevision*, *Disney's 101 Dalmatians*; CBS: *Anatole*, *Flying Rhino Junior High*, *Birdz*, *Mythic Warriors*; FOX: *Magic School Bus*, *Life with Louie*; NBC: *City Guys*, *Hang Time*, *Saved by the Bell*, *NBA Inside Stuff*, *One World*; PBS: *Bill Nye, the Science Guy*, *Where in Time Is Carmen Sandiego?*, *Wishbone*, *Kratt's Creatures*, *Zoom*; NICKELODEON: *Hey Arnold!*, *The Mystery Files of Shelby Woo*, *The Secret World of Alex Mack*, *Nick News*, *Clarissa Explains it All*, *Cousin Skeeter*, *Adventures of Pete and Pete*, *My Brother and Me*, *The Wild Thornberrys*, *Doug*. Overall, there were 14 PBS/Nickelodeon programs and 15 network programs. *Doug* was a network, a Nickelodeon, and a syndicated program, and *Bill Nye, the Science Guy* also appeared in syndication.

The Annenberg Public Policy Center (APPC) coding system, a reliable system that has face validity, was selected for coding the programs and adapted for coding children's reports (see Jordan et al., this issue). Using the APPC content coding system, two independent raters classified all programs for: (1) *genre*, the kind of program, and (2) *program structure*, expository (lessons shapes content) or narrative (lesson woven into a story). For genre, 13 programs (45%) were animated comedies, 11 (38%) were live-action comedies or dramas, two (7%) were news, one (3%) was a quiz game show, one (3%) was a magazine, and one (3%) was a mixture of two or more genres. For program structure, 24 programs (83%) were narratives and five (17%) were expository. Interobserver reliability was 93% for genre and 97% for program structure.

After television viewing patterns were reported, children selected their *Favorite Program* for the past week. Then children went to the *Reporting* page where they described the lessons that they *learned* from their favorite program. Finally, children posted their reports to an animated boy or girl reporter on the site.

Reward structures were embedded within the game to sustain children's interest. Children who wrote the best reports at their grade levels became one of *The Top Dogs*, and their reports were published in our Internet "newspaper." These weekly winners received *Blue Ribbon and Gray Ribbon Awards*, the colors of Georgetown University. Children also could view their own reports in an individual, cumulative file.

### 6.3. Scoring system: dependent variables

The dependent variables were: (1) the number of educational and informational programs viewed by each child; (2) the favorite educational and informational programs viewed by each child; (3) the kind of lessons learned by children, a measure adapted from the APPC content analysis consisting of (a) cognitive skills, (b) knowledge information skills, (c) social emotional skills, and (d) physical well-being/motor development skills; (4) the educational strength of children's reports, another measure adapted from the APPC television content analyses, consisting of (a) lesson clarity: Does the child present a clear lesson in his or her report? (b) lesson integration: Does the child discuss the lesson consistently throughout his or

her report? (c) lesson involvement: Does the child report the lesson in an engaging manner, e.g., excitement? and (d) lesson applicability/generalizability: Does the child describe the lesson in relation to his or her own life, drawing links between the television content with events that have or could happen to them? The definitions of integration and involvement varied from the APPC definition because we were studying children's reports and they were studying the actual programs (see Jordan et al., this issue). We also examined the kinds of programs that children were viewing (i.e., narrative vs. expository and the program genre).

Interobserver reliability, calculated as  $2 \times$  the number of agreements divided by the total number of scores for Observer 1 and Observer 2, was computed on 20% of the data. Interobserver reliability for the kinds of lessons learned was 93% for cognitive skills, 95% for knowledge/information skills, 100% for social and emotional skills, and 100% for physical well-being skills. Interobserver reliability for the components of educational strength was 93% for the educational goal, 84% for lesson clarity, 84% for lesson integration, 80% for lesson involvement, and 84% for lesson generalization.

## 7. Results

This study examined age and gender differences in: (1) the educational and informational programs children view; (2) their favorite educational programs; (3) the kinds of lessons they learn from favorite programs; and (4) the strength of the lessons. Only first reports are analyzed.<sup>1</sup>

### 7.1. Number and types of educational programs viewed

Children viewed an average of 3.81 (S.D. = 3.01) educational programs per week. Eight children reported that they did not view any of the educational and informational programs.<sup>2</sup> A  $2$  (Sex)  $\times$   $2$  (Age: second–fourth vs. fifth–sixth graders) analysis of variance was conducted to examine whether there were sex and age differences in the number of educational programs viewed. There was a marginal main effect for age [ $F(1,93) = 2.972$ ,  $P < .10$ ]. Younger children viewed slightly more educational and informational programs than the older children did ( $M = 4.59$ , S.D. = 3.75 vs.  $M = 3.43$ , S.D. = 2.52, respectively).

To examine sex and age differences in whether children watched educational and informational programs on commercial broadcast stations vs. Nickelodeon/PBS, a  $2$  (Sex)  $\times$   $2$

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<sup>1</sup> Because *Doug* was broadcast almost daily on Nickelodeon and once a week on ABC, we estimated that children viewed *Doug* on Nickelodeon seven times for every one time they viewed *Disney's Doug* on ABC. This formula was supported when compared to Year 2 of our data collection when there were separate icons for *Doug* and *Disney's Doug*. When programs were syndicated, we defaulted to the primary major networks where the programs were broadcast for analyses.

<sup>2</sup> For all other ANOVAs, only children who watched at least one program were included because those who did not watch any of these television programs could not be classified as viewing a particular category of programming, and they did not submit a report that could be analyzed for the lesson type or for its educational strength.

2 (Age)  $\times$  2 (Station: commercial broadcast vs. Nickelodeon/PBS) mixed analysis of variance was conducted with sex and age as the between-subjects factors and station as the within-subjects factor. The dependent variable was the number of programs children viewed on the two types of stations. There was a significant main effect for station [ $F(1,85)=27.04$ ,  $P<.001$ ]. As predicted, children watched more programs from PBS and Nickelodeon than from broadcast stations ( $M=2.75$ , S.D. = 2.21 vs.  $M=1.39$ , S.D. = 1.44, respectively).

A 2 (Sex)  $\times$  2 (Age)  $\times$  2 (Genre: animated vs. live action vs. magazine vs. mixed vs. news) mixed analysis of variance was conducted with the number of programs viewed as the dependent variable. Sex and age were between-subjects factors and genre was a within-subjects factor. The analysis yielded a main effect for genre [ $F(4,82)=31.52$ ,  $P<.001$ ]. Simple contrasts indicated that children watched significantly more animated comedies and dramas ( $M=1.98$ , S.D. = 1.61) than any other type of program. Children also viewed more live-action comedies and dramas ( $M=1.31$ , S.D. = 1.38) than magazine ( $M=0.33$ , S.D. = 0.52), mixed ( $M=0.37$ , S.D. = 0.51), or news ( $M=0.11$ , S.D. = 0.32) genres.

A 2 (Grade)  $\times$  2 (Sex)  $\times$  2 (Structure: narrative vs. expository) mixed ANOVA was computed with the number of programs viewed as the dependent variable. Structure was the within-subjects factor and sex and age were between-subjects factors. The analysis yielded a significant main effect for structure [ $F(1,85)=93.51$ ,  $P<.001$ ]. Children viewed more narrative programs than expository programs ( $M=3.55$ , S.D. = 2.67 vs.  $M=0.60$ , S.D. = 0.82, respectively).

In summary, children viewed more Nickelodeon and PBS programs than broadcast programs; they viewed more narrative than expository programs; and they viewed more animated and live action programs than other types of programs.

#### 7.1.1. Most frequently viewed programs

For each program, we computed the percentage of child viewers. As seen in Table 1, the most frequently viewed programs were: *Doug*, *Hey Arnold!*, *Saved by the Bell*, *Recess*, *Cousin Skeeter*, and *Wishbone*. Other popular programs for subgroups of children included: *Bill Nye*, *The Science Guy* for boys; *The Wild Thornberrys*, *Zoom*, and *Magic School Bus* for young girls; and *Clarissa Explains It All* for older girls.

#### 7.1.2. Least viewed programs

Some programs were rarely viewed by children. These programs were: *Squigglevision*, *Birdz*, *Flying Rhino Junior High*, *One World*, *Where in Time Is Carmen Sandiego?*, and *Mythic Warriors*. In addition, younger boys never watched *City Guys*, *Hangtime*, or *Life with Louie*; younger girls never watched *NBA Inside Stuff* or *Bobby's World*; and older girls never watched *City Guys* (see Table 1).

#### 7.1.3. Favorite programs

The top five favorite programs chosen by children were: (1) *Doug*, (2) *Hey Arnold!*, (3) *Saved By the Bell*, (4) *Bill Nye*, *The Science Guy*, and (5) *Cousin Skeeter*. *Doug* was the favorite program of all age groups except for older girls who liked *Saved by the Bell*. Other favorite programs included *Zoom* and *The Wild Thornberrys* for younger girls and *Recess* for older girls (see Table 1).



Table 1  
Frequencies of programs viewed and favorites by age and sex<sup>a</sup>

	Total children (N = 97)	Younger boys (n = 13)	Younger girls (n = 19)	Older boys (n = 35)	Older girls (n = 30)
Most frequently viewed programs	Doug (49.5%) Hey Arnold! (39.2%) Saved by the Bell (24.7%) Recess (23.7%) Skeeter (22.7%) Wishbone (20.6%)	Doug (46.2%) Bill Nye (38.5%) Saved by the Bell (38.5%) Hey Arnold! (38.5%) Recess (25%)	Doug (62.5%) Hey Arnold! (50%) Wild Thorn (37.5%) Zoom (37.5%) Wishbone (37.5%) Magic Bus (37.5%)	Doug (44.4%) Hey Arnold! (41.7%) Skeeter (30.6%) Bill Nye (19.4%) Saved by the Bell (19.4%)	Doug (55.2%) Hey Arnold! (34.5%) Saved by the Bell (34.5%) Recess (31%) Clarissa (24.1%) Wishbone (20.7%)
Least viewed programs <sup>b</sup>	Squigglevision (1%) Birdz (2.1%) Flying Rhino (2.1%) One World (2.1%) Carmen Sandiego (3.1%) Mythic Warr. (3.1%)	City Guys Flying Rhino Hangtime Life With Louie	Carmen Sandiego Flying Rhino NBA Inside Stuff Squigglevision	Birdz Carmen Sandiego Flying Rhino One World Squigglevision	Birdz City Guys One World Mythic Warriors Squigglevision
Favorite programs <sup>c</sup>	n = 89 Doug (15.7%) Hey Arnold! (12.4%) Saved by the Bell (10.1%) Bill Nye (9%) Skeeter (6.7%)	n = 12 Doug (16.7%) Hey Arnold! (16.7%)	n = 18 Doug (16.7%) Zoom (16.7%) Wild Thorn (16.7%)	n = 31 Doug (16.1%) Hey Arnold! (16.1%) Bill Nye (12.9%) Skeeter (9.7%)	n = 28 Saved by the Bell (21.4%) Doug (14.8%) Recess (11.1%)

<sup>a</sup> The percentages represent the proportion of children who indicated that they viewed each program.

<sup>b</sup> The total column indicates the least viewed programs for all children. The breakdowns by age and sex indicate which shows were not viewed at all.

<sup>c</sup> Favorite programs were only computed for children who watched at least one program.

## 7.2. Lessons learned from favorite program

To examine the types of lessons children learned from their favorite program, a 2 (Sex)  $\times$  2 (Age)  $\times$  4 (Lessons: cognitive, knowledge/information, social and emotional, and physical well-being) mixed ANOVA was conducted with sex and age as between-subjects factors and lessons as the within-subjects factor. The dependent variable was the presence or absence of each lesson type (scored 0 vs. 1) in the children's reports. It was expected that children would report more social and emotional lessons than any other type of lessons, that older children would learn more lessons than younger children, and that girls' reports would have the most educational strength.

The means for lessons learned by sex and grade are presented in Table 2. As expected, there was a significant main effect for sex [ $F(1,85)=6.377, P<.05$ ]. Girls reported learning more lessons than boys ( $M=0.86, S.D.=0.71$  vs.  $M=0.53, S.D.=0.55$ , respectively). There was also a significant main effect for lesson [ $F(3,83)=13.270, P<.001$ ]. Simple contrasts indicated that social and emotional lessons were reported more often than cognitive skills lessons [ $F(1,85)=24.395, P<.001$ ], and physical lessons [ $F(1,85)=20.995, P<.001$ ], but not significantly more often than informative lessons [ $F(1,85)=1.959, P=ns$ ]. Additional simple contrasts indicated that informative lessons were reported more often than cognitive lessons [ $F(1,85)=8.542, P<.01$ ] and physical lessons [ $F(1,85)=4.457, P<.01$ ]. Lessons involving physical well being and cognitive skills were rarely reported. In short, a diversity of lessons was found in children's reports. Most lessons probably reflect social and emotional lessons because the majority of educational programs (67%) posted on this site are designed to teach social and emotional lessons.

Table 2

Means and standard deviations for lessons learned and educational strength of report

	All children ( $N=89$ )	Younger boys ( $n=12$ )	Younger girls ( $n=18$ )	Older boys ( $n=31$ )	Older girls ( $n=28$ )
<i>Lessons learned</i>					
Cognitive skills	0.06 (0.23)	0.08 (0.29)	0 (0)	0 (0)	0.14 (0.36)
Knowledge/information skills	0.19 (0.40)	0.25 (0.45)	0.33 (0.49)	0.16 (0.37)	0.11 (0.32)
Social and emotional skills	0.38 (0.49)	0 (0)	0.33 (0.49)	0.39 (0.50)	0.58 (0.50)
Physical well-being skills	0.06 (0.23)	0 (0)	0.11 (0.32)	0.06 (0.25)	0.04 (0.19)
<i>Educational strength</i>					
Clarity	0.91 (.89)	0.50 (0.80)	1.28 (0.89)	0.77 (0.85)	1.00 (0.90)
Integration	0.79 (.80)	0.50 (0.80)	1.00 (0.84)	0.68 (0.79)	0.89 (0.79)
Involvement	0.88 (.77)	0.67 (0.78)	0.94 (0.73)	0.71 (0.69)	1.11 (0.83)
Applicability	0.84 (.92)	0.08 (0.29)	1.22 (0.88)	0.68 (0.87)	1.11 (0.96)

Only children who chose a favorite program were included in the means. For lessons learned, scores were 0 (*not present*) or 1 (*present*). For educational strength, scores were 0 (*not at all*), 1 (*somewhat*), or 2 (*very well*). Means are presented without parentheses and standard deviations are presented within parentheses.

Although there was no main effect for age, there was an Age  $\times$  Sex  $\times$  Lesson interaction [ $F(3, 83) = 2.916, P < .05$ ] and an Age  $\times$  Lesson interaction [ $F(3, 83) = 3.315, P < .05$ ]. To examine the direction of these interactions, each lesson type was examined separately in a 2 (Sex)  $\times$  2 (Age) ANOVA. For social and emotional lessons, there were significant Sex [ $F(1, 85) = 6.046, P < .01$ ] and Age [ $F(1, 85) = 8.819, P < .01$ ] main effects. Girls reported more social and emotional lessons than boys ( $M = 0.48, S.D. = 0.51$  vs.  $M = 0.28, S.D. = 0.45$ , respectively). Older children reported more social and emotional lessons than younger children ( $M = 0.48, S.D. = 0.50$  vs.  $M = 0.20, S.D. = 0.41$ , respectively). For knowledge/information lessons, there was a marginal age main effect [ $F(1, 85) = 3.105, P = .10$ ]. In contrast to the results for social and emotional lessons, younger children tended to learn more informative lessons than older children did ( $M = 0.30, S.D. = 0.47$  vs.  $M = 0.14, S.D. = 0.35$ , respectively). For cognitive lessons, there was a significant Sex  $\times$  Age interaction [ $F(1, 85) = 4.838, P < .05$ ]. Older girls reported more cognitive lessons than any other group followed by younger boys ( $M = 0.14, S.D. = 0.36$  vs.  $M = 0.08, S.D. = 0.29$ , respectively); older boys and younger girls did not report any cognitive skills lessons. There were no significant effects for physical well-being lessons.

### 7.3. Educational strength

Differences in educational strength were examined by a 2 (Sex)  $\times$  2 (Age) MANOVA with the four measures of educational strength (i.e., clarity, integration, involvement, and applicability) as dependent variables. Each measure of educational strength had scores that could range from 0 (*not at all*) to 1 (*somewhat*) to 2 (*very well*). As seen in Table 2, older children's reports were not of significantly greater quality than the younger children's reports. As predicted, there was a main effect for sex [ $F(4, 82) = 5.020, P < .01$ ]. Univariate tests indicated that girls' reports scored higher than boys' reports on clarity [ $F(1, 85) = 6.463, P < .05$ ], and applicability [ $F(1, 85) = 16.445, P < .001$ ]. There was a marginal sex effect for integration [ $F(1, 85) = 3.862, P < .06$ ], and involvement [ $F(1, 85) = 3.849, P < .06$ ], both in favor of the girls' reports.

A one-way MANOVA analysis, controlling for sex, examined the difference between PBS/Nickelodeon programs vs. the four major commercial broadcasters on the four measures of educational strength. Contrary to prediction, reports about PBS/Nickelodeon programs were no stronger than reports about ABC, CBS, NBC, or FOX offerings. Moreover, reports about PBS programs were no stronger than reports about Nickelodeon programming.

### 7.4. The relation between lessons learned and educational strength

Partial correlations controlling for sex and grade examined the relation between lessons learned and educational strength. Reports citing social and emotional lessons learned were related to all measures of educational strength. Such reports of social/emotional lessons tended to be clear ( $r = .590, P < .001$ ), integrated ( $r = .498, P < .001$ ), demonstrated involvement ( $r = .268, P < .05$ ), and demonstrated that children generalized the messages ( $r = .701, P < .001$ ). Reports citing informative lessons learned were positively related to how clear ( $r = .317, P < .01$ ) and how integrated ( $r = .320, P < .01$ ) children's reports were but were not

related to involvement or generalization. Children's reports citing cognitive or physical well-being lessons were unrelated to any measure of educational strength. In summary, children were most involved with and learned most from programs with social and emotional themes but also clearly understood knowledge/information lessons presented in the programs they viewed.

## 8. Discussion

The Children's Television Act of 1990 encourages greater availability of educational and informational television offerings for children over the nation's free airwaves, but independent evaluations are needed to ensure that broadcasters' claims that their programs are educational and informational, are in fact, valid. By providing a web site where children can report their viewing behavior, we can determine if educational television programs are attracting an audience and providing any lessons of value for the viewing audience.

Our findings generally support broadcast industry claims of educational value for their "educational and informational" offerings with children primarily learning social and emotional lessons. PBS and Nickelodeon programs, particularly Nickelodeon programs, are viewed more than those broadcast by the affiliates of the four major networks, perhaps because ABC, CBS, and NBC run their programs against each other on Saturday mornings. By contrast, programs on Nickelodeon, PBS, and FOX are broadcast throughout the week, allowing children greater access to these educational offerings. Even so, there were no differences in the educational strength of reports written about Nickelodeon/PBS programs vs. the four major networks.

The kinds of reports that children wrote dovetail with the kinds of programs being made for them by most broadcasters. Specifically, most reports are story narratives focusing on social and emotional themes. Consider the following social and emotional theme reported by a fifth grade boy about *Hey Arnold!*, a Nickelodeon program: "I watched *Hey Arnold!* It was about Arnold and his class going to an aquarium. There was a big turtle that was at the aquarium and they kept it in horrible condition. There was gerfidity on his shell and a kid threw an ice cream cone at the turtle. Arnold felt sorry for the turtle. When he got home he told his grandmother about what happened and they went to the aquarium to rescue the turtle. They got the turtle out and put it in the ocean. I learned that you need to take good care of animals in this episode."

By contrast, cognitive skills or physical skills are rarely learned from educational and informational television programming, a finding that supports the APPC report that prosocial rather than traditionally academic programs are the focus of broadcaster offerings (Jordan et al., this issue). Even so, some of the favorite educational programs of boys, such as *Bill Nye*, *The Science Guy* (a PBS and syndicated offering), are academic in nature, and young girls like *Magic School Bus*, a science program that is now broadcast on FOX. Commercial broadcasters might find an audience for well-made academic programs as well as for the prosocial stories.

The developmental prediction that younger children would view more educational programs than older children was partially supported, but the hypothesis that older children

would generalize program messages better than younger children was not supported. Older children did learn more social and emotional lessons than the younger children, but the younger children learned more knowledge/information lessons than did older children. These findings probably reflect the kinds of programs children chose as favorites at varying ages. More specifically, older children chose more favorite programs with social and emotional themes, such as *Saved by the Bell*, whereas younger children selected more academically oriented programs such as *Wishbone*, a program focusing on the language arts integrated with social and emotional themes. The broadcasters' belief that younger children like academically oriented programs more than older children do (Jordan & Sullivan, 1997) is partially supported by our research.

Gender differences were prevalent throughout our findings. Although both boys and girls viewed an equal amount of educational programming, girls' reports demonstrated more educational strength. Specifically, girls' reports were clearer, more integrated, and had more applicability to their real-life activities than the reports of boys. These findings are consistent with literature that documents the advanced verbal and expressive skills of girls over boys during middle childhood (Ruble & Martin, 1998). Moreover, viewing patterns suggest that unlike strictly commercial entertainment cartoons, which draws a boy audience (Huston & Wright, 1998), girls and boys are equivalent viewers of educational and informational programs. These findings suggest that educational television has a male and a female audience, making its benefits equally available for all children.

The lesson emphasis of and character gender of the programs seemed to influence the kinds of programs children viewed and selected as their favorites. The finding that girls like more socially oriented areas of achievement and enjoy arts and crafts areas are supported by the kinds of programs that they selected as favorites. Older girls liked *Saved by the Bell* the most while younger girls liked *Zoom* and *The Wild Thornberrys*, programs which feature female interest patterns and female characters. Only boys frequently viewed *Bill Nye, the Science Guy*, and only young girls frequently viewed *Magic School Bus*. Both programs are about science, but boys choose the program with the male host whereas young girls choose the program featuring a female lead and a multiracial cast of boys and girls. In 1999, both of these programs received awards from the APPC as excellent educational and informational programs. Perhaps the appeal of each is more determined by the gender of the host and cast than by the content area of science, an area that has traditionally been stereotyped as a male domain. The implication is that girls may become more interested in science programs if they see other girls and women involved in enjoyable science lessons. Both age groups did like *Doug* and *Hey Arnold!*, perhaps because the stories conveyed social and emotional themes that involve both boys and girls, even though male leads are featured.

Using the Internet as a research tool has distinct advantages over traditional data collection techniques. Children from across the US could transmit their viewing preferences and knowledge about programs by having a computer interface with our site. This type of methodology provides a future way to sample children from a wide range of locations, but is limited in that adults have to coordinate children's participation, at least initially.

Another methodological issue was that many schools are not yet wired to the Internet, and teachers do not always have the computer skills to bring their children online. Many of the

wiring and training problems will be resolved in the early part of the 21st century, making the Internet a viable research tool for collecting data throughout this country and the world.

In conclusion, this study demonstrates that children benefit from viewing the educational and informational television programs that are the result of the Children's Television Act of 1990. Broadcasters have found an effective way to meet their obligation to the child audience while entertaining them with engaging prosocial content. Whether broadcasters will make the investment to create comparable academically oriented fare remains a question, particularly if there are no additional requirements from the Federal Communications Commission to do so.

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