EXTENDING THE LESSONS
OF EDUCATIONAL TELEVISION
WITH YOUNG AMERICAN CHILDREN

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As the availability of children's educational television has increased, initiatives to expand the educational impact of programs have emerged. One such initiative is experiential mediation, a form of mediation in which the viewer physically engages with materials designed to extend the program's educational content. Limited research on the effectiveness of experiential mediation exists. A quasi-experiment was conducted with 138 American children (M = 5.32 years) to evaluate the effectiveness of such mediation with the literacy-based television program Between the Lions. Viewing plus mediation was hypothesized to provide greater support for literacy skills than no viewing or unaided viewing. Further, mediation that incorporated character-branded materials was hypothesized to be superior to mediation that relied upon generic materials. Results suggest that the benefits of experiential mediation may be tied to (1) the connection between the mediation materials and television content and (2) the complexity of the educational content.

KEYWORDS children; learning; mediation; television; capacity model

In light of the plethora of new media that surround children today, it may seem counterintuitive to investigate the “old” medium of television. However, recent media use data suggest that television continues to have a strong foothold in the daily lives of young children. Results from a representative survey of American children illustrate that television is, by far, the most popular medium used by preschool aged-children (Lapierre, Piotrowski, & Linebarger, 2010). Children between the ages of 4 and 6 years view an average of 90.4 minutes of television on a typical day followed up by 22.8 minutes of DVD/video viewing and about 10 minutes of video game playing. Although these estimates reflect American children’s media usage, similar patterns have been documented across other industrialized countries (Szybist, 2011). In an analysis of media use habits across eleven countries, researchers concluded television is a universally used medium to which children allot the most time (Beentjes, Koolstra, Marseille, & van der Voort, 2001). In addition to television’s global popularity, the availability of educational television for preschoolers has exploded in the past decade. This growth is attributable to changes in the regulatory environment (Jordan, 2004), the growth in niche cable channels targeting preschoolers (e.g., Home, 2011;
Szybist, 2011), a surge of research on the importance of early childhood development, and
lastly, a realization by television producers that preschool television can make money
(Hendershot, 2004; Hendriyani, Hollander, d’Haenens, & Beentjes, 2011). The resulting
preschool television landscape is a crowded one with a variety of educational options. This
crowded landscape highlights the need for research on ways to support the educational
outcomes that preschoolers can experience when viewing educational television.

Theoretical Understanding of Experiential Mediation

Along with the growth of educational television, initiatives to extend the education
beyond the program have emerged. Rather than viewing television content as the sole
educational content, television-based interventions couple the program with ancillary
materials to enhance and extend children’s learning of program content as well as
courage transfer of the program-specific content to more generalized outcomes
(Linebarger, Piotrowski, & Vaala, 2007). Coined “experiential mediation”, parents, teachers,
and caregivers are encouraged to use the television content as a platform to foster
children’s real-world experiences and interactions (Jennings & Walker, 2009, p. 5).

To fully understand how experiential mediation with educational television is
proposed to work, it is important to understand how children are thought to learn from
educational television. Fisch’s Capacity Model (Fisch, 2000, 2004), with its roots in
information processing research, explains that educational television consists of two forms
of content: the narrative content (i.e., the story presented in the program) and the
educational content (i.e., the intended lessons that are embedded within the story). The
capacity model posits that a critical issue in determining comprehension is the degree to
which working memory (a limited resource) is devoted to comprehending the narrative
content in the program versus the embedded educational content. When the educational
content is tangential to the narrative, the two parallel processes are said to compete for
limited resources in working memory. When the educational content is integral to the
narrative, the parallel processes are said to be complementary and comprehension
strengthened. Factors that allow for more efficient processing of either the narrative or
educational content will reduce the demands of processing that type of information. The
strongest comprehension of educational content is expected when demands of processing
both content types are low, and the distance between them is small. The weakest
comprehension is expected when processing demands of each are high, and the distance
between them is large.

While learning the content within the show is both important and necessary, the
ultimate goal of educational television is transfer—in other words, the application of the
skills learned in the television context to a new, different problem or situation (Fisch, 2004).
Transfer requires more than just learning the educational content within a show. It requires
the viewer to construct a mental representation of that content and subsequently apply
that content in a novel situation (Bransford, Brown, & Cocking, 1999). This mental
representation must be abstracted beyond the initial context in which it was encountered
so that it can be applied in other situations (Singley & Anderson, 1989). Content that is
overly contextualized when initially presented may impede the potential for transfer
(Bransford & Schwartz, 1999) because it can inhibit the necessary abstraction. And yet, the
capacity model suggests that successful educational television programs will contextualize
(i.e., integrate) the educational content within the narrative (Fisch, 2004). How can this
contradiction between successful comprehension and transfer be resolved? Fisch (2004) suggests that the optimal solution may lie in tying the educational content and narrative closely together, but also presenting the same educational content multiple times in different contexts throughout the show (e.g., teach the letter C in the context of several different words such as “cow”, “car”, and “cookie”). Experiential mediation can provide this varied practice.

Varied practice, defined as the use of multiple examples and/or repeated exposure in a variety of different contexts, is frequently highlighted as a successful technique for supporting learning transfer (Salomon & Perkins, 1989; Singley & Anderson, 1989). Varied practice forces the underlying mental representation to adapt in subtle ways to each new context, eventually yielding a representation that is more detached from specific contexts and thus more easily applied in new situations (Fisch, 2004). By its definition, experiential mediation of educational television is a form of varied practice in which viewers are encouraged to physically interact with, or experience, the educational television content in different ways. Viewers participate in a non-television activity (or set of activities) designed to provide opportunities for varied practice with the educational content in the television show. For example, if a program is designed to support children’s phonics skills, experiential mediation activities would offer viewers opportunities to practice phonics skills through hands-on activities such as arranging plastic alphabet letters to create words.

Parents, teachers, and caregivers often find ideas for fostering experiential mediation on a program’s website or even through the local television station’s outreach efforts. The specific format of experiential mediation depends upon the educational content of the show, as well as other factors such as child’s age and the location of the mediation (e.g., home or school). What is critical, however, is that the mediation provides viewers with the opportunity to engage with alternative examples of the program’s educational content. By doing so, the viewer’s underlying mental representation of the concept should be a broader representation that is more easily applied in new situations (i.e., transfer) as opposed to a program-specific representation.

**Experiential Mediation Research**

The *Sesame Street* Preschool Education Program (PEP) is considered the first program to formally rely on experiential mediation to extend educational television. Active viewing of *Sesame Street* in preschool classrooms served as a springboard to both active reading of children’s books and developmentally appropriate hands-on activities that supported the educational goals of the television content (Yotive & Fisch, 2001). Quasi-experimental research suggested that the PEP was a success with children acquiring many of the embedded educational skills (Mindel & Dangel, 1990; RMC Research Corporation, 1993).

Following the success of PEP and its corollary, *Building on Sesame Street*, the Corporation for Public Broadcasting, the United States Department of Education, and the United States Congress established the Public Broadcasting Service’s *Ready To Learn (RTL)* Television Service. The *RTL Television Service* was created to (1) support the development of children’s educational television programs and online resources, and (2) to provide outreach and resources for parents and early childhood educators about ways to use the television programs as teaching tools to ensure that the children in their care enter school ready to learn (Boller et al., 2004). Core to RTL was the notion that children learn best through experiential mediation. To this end, PBS developed community workshops to
teach parents and caregivers experiential mediation skills to use with their children. One of the main goals was to explain and model the “RTL Learning Triangle: View, Do, Read”. Research on the workshops found that while parents demonstrated behavior change such that they were engaging in some experiential mediation, this change did not translate to measured gains on any of the school readiness skills that the television content was expected to support (Boller et al., 2004). The researchers (Boller et al., 2004) suggested that intensity of training may have been insufficient and/or the focus of the program too broad.

At the end of the granting period in 2005, the Corporation for Public Broadcasting announced a new initiative, the Ready to Learn Literacy Initiative, that redirected efforts in the United States to focus specifically on supporting early literacy skills through program content and experiential mediation (Corporation for Public Broadcasting, 2005). A large-scale experimental evaluation of these efforts indicated that experiential mediation with several educational literacy-based television programs was effective (Penuel et al., 2009).

Research with specific programs also supports the use of educational television in conjunction with experiential mediation. For example, experimental research on the effectiveness of Kilimani Sesame has demonstrated that exposure to the program plus supplementary activities supports young Tanzanian children’s healthy development (Borzekowski & Macha, 2010). School-aged English language learners who participated in a classroom intervention anchored by the program Postcards from Buster (PFB) demonstrated superior performance on tests of receptive and productive vocabulary (Piotrowski, Vaala, & Linebarger, 2009) when compared to a non-viewing group and an alternative science-focused intervention. The intervention consisted of viewing PFB along with completing “extend and make connections” activities that encouraged children to practice program and program-similar vocabulary in different ways. Lastly, a large body of research with the literacy-based program Between the Lions has demonstrated that program exposure, when combined with book reading and hands-on literacy activities, has a meaningful impact on the literacy skills of at-risk children (Linebarger, 2006; Linebarger & McMenamin, 2010; Prince, Grace, Linebarger, Atkinson, & Huffman, 2002).

The Contribution of Experiential Mediation

The studies presented thus far suggest that educational television can be successfully combined with experiential mediation to yield positive outcomes. However, the studies do not address whether the combination of television and experiential mediation is superior to unaided viewing. In fact, studies formally evaluating the additive impact of experiential mediation are nearly non-existent. While researchers have found that discussion of television content is an effective way to extend educational television (also known as active mediation, Valkenburg, Krcmar, Peeters, & Marseille, 1999), only one study evaluated the contribution of experiential mediation. Singer and Singer (1994) examined the impact of watching Barney & Friends alone, watching Barney & Friends and participating in content-related activities, or no viewing at all. Results supported experiential mediation efforts. Preschoolers in the viewing + activities condition learned significantly more content than their viewing-only peers. The limited scope of this literature, however, highlights a need for additional research.
The Type of Experiential Mediation

In this study, we operationalized experiential mediation as children’s use of manipulatives designed to extend the educational content of the program that they viewed. Manipulatives, or objects that children can use to experience and understand an abstract concept more concretely (e.g., puzzles, toys, books; McNeil & Jarvin, 2007), are frequently found within the preschool classroom with the intention of providing students the opportunity to explore educational concepts both visually and tactibly. Despite some concerns (e.g., distraction, McNeil & Jarvin, 2007), researchers have supported the use of manipulatives to augment children’s learning for decades. Manipulatives are an appealing way to extend educational television for several reasons. First, manipulatives allow for varied practice of the concept across multiple modalities that should facilitate comprehension (Fisch & Truglio, 2001). Manipulatives also often encourage physical action leading to enhanced memory and understanding (Glenberg, Gutierrez, Levin, Japuntich, & Kaschak, 2004). Finally, they allow children to draw on and make connections to their current knowledge leading to deeper and more permanent learning (Bransford et al., 1999).

While manipulatives are often used to facilitate experiential mediation in television-based interventions, there is no research as to the most effective type of manipulative. Recall that Fisch (2004) posits that television programs that successfully encourage learning transfer are likely those in which the educational content is presented in varied ways throughout the program. Fisch & Truglio (2001), however, offer the caveat that viewers must recognize the link among the multiple presentations in order for the strategy to be effective. Extrapolating from this premise, it seems fair to suggest that a similar link is necessary to maximize mediation—a link, for example, in the form of character branding. To that end, we evaluated whether the relationship of the manipulative to the television program impacted mediation effectiveness by comparing the use of character-branded manipulatives (i.e., manipulatives that incorporate a character from the television program) to generic manipulatives (i.e., manipulatives without an explicit program connection).

Research by Greenfield et al. (1990) lends some support to the use of character-branded manipulatives. Working with first and second grade children, they found that the combination of watching a toy-based cartoon and playing with cartoon-related toys inhibited creative imagination while stimulating imitative imagination (Greenfield et al., 1990). The findings for imitative imagination suggest that the use of character-branded manipulatives may foster greater repetition of the television content, including the educational content. A review of child-directed marketing practices also suggests that character-branded manipulatives may be more effective than generic. In child-targeted marketing, spokes-and trade-characters are frequently employed branding strategies (Calvert, 2008). The presence of these characters is thought to help viewers identify and remember the associated product (Kunkel et al., 2004). Compared to verbal descriptions that can be challenging for young children to remember, visual cues in the form of a friendly character help children remember the information presented in an advertisement (Lapierre, Vaala, & Linebarger, 2011; Ross et al., 1983). Roberto and colleagues (Roberto, Baik, Harris, & Brownell, 2009) found that children significantly preferred the taste of foods that had cartoon characters on the packaging compared to the same foods without characters. Likewise, Lapierre et al. (2011) and Kotler, Schiffman, and Hanson (2012) found that the simple inclusion of media characters on food packaging affected children’s
assessment of taste. Beloved characters on foods led to increased preference for those foods.

Children make connections between television characters and products. Just as environmental print (e.g., signs, logos) is argued to help children “form a bridge from the known to new” (Reutzel, Fawson, Young, Morrison, & Wilcox, 2003, p. 160), character-branded manipulatives should foster connections between the program and the manipulatives resulting in greater extensions from the television content when compared to generic manipulatives.

**Study Hypotheses**

In an effort to address gaps in the potential of experiential mediation, we conducted a quasi-experiment with 4–6-year-old children using the literacy-based television show *Between the Lions*. We posited three hypotheses for the study:

**H1:** *Children who view Between the Lions and participate in experiential mediation will demonstrate greater literacy skills than children who did not view the program nor participate in experiential mediation.*

**H2:** *Children who view Between the Lions and participate in experiential mediation designed to support literacy skills will demonstrate greater literacy skills than children who engage in unaided viewing of Between the Lions.*

**H3:** *Children who engage in experiential mediation that utilizes character-branded manipulatives will demonstrate greater literacy skills than children who engage in experiential mediation that utilizes generic-branded manipulatives.*

**Methods**

**Research Design**

A quasi-experimental design was implemented. Random assignment to one of four conditions (control, viewing only, viewing + generic manipulatives, viewing + character-branded manipulatives) was completed at the classroom level. Teacher preference and classroom logistics prohibited assignment to condition at the individual level. The major disadvantage of this is that the classrooms may have differed from one another in substantial or meaningful ways. To reduce this problem, we collected extensive pretest information from each child in order to evaluate and control for initial differences.

**Participants**

After the Institutional Review Boards at the sponsoring institutions approved the study procedures, children were recruited from thirteen classrooms across four schools in both rural and suburban districts in a large mid-western city in the United States. Seven classrooms were prekindergarten and six were kindergarten. Participating classrooms were compensated with educational literacy manipulatives and $50 in the form of a gift certificate. Children were compensated with an age-appropriate book.

A total of 138 preschool and kindergarten aged children were recruited for participation. Seventy-six children attended prekindergarten ($M = 4.65$ years, $SD = .58$) and
sixty-two children attended kindergarten ($M = 6.13$ years, $SD = .29$). Condition assignment was stratified by grade level. Random assignment at the classroom level resulted in fairly equal group sizes, although there was a significant difference in condition by grade level, $\chi^2(3, N = 138) = 7.73, p < .05$. Slightly more prekindergarteners than expected were in the three of the four conditions (Control, Viewing Only, and Viewing with Character-based Manipulatives). Slightly more males ($n = 74$) than females ($n = 64$) participated in the study. There were no differences in gender by grade level, $\chi^2(1, N = 138) = .594, p = .44$, or condition, $\chi^2(3, N = 138) = 1.29, p = .73$. See Table 1.

Parents of eighty-seven participating children (63 per cent return rate) returned a survey designed to capture demographic information and previous stimuli exposure. All parents indicated that English was the primary language spoken at home, and identified themselves as White. Education for the reporting parent was slightly less than a college degree ($M = 15.29$ years, $SD = 2.9$). Of those that reported annual household income ($n = 67$), the average was $82,649.25$ ($SD = 37,684.79$). The majority of respondents indicated their child had never seen *Between the Lions* (58.8 per cent) or viewed the program infrequently (1–3 times per month, 24.7 per cent). There were no differences in exposure to *Between the Lions* by condition, $\chi^2(6, N = 85) = 10.04, p = .12$.

**Experimental Stimuli**

*Between the Lions* is a children’s television program designed to support the early literacy skills of its young viewers. Targeting children aged four through seven, the program features a family of lions who manage a library. The program highlights literacy skills while presenting reading as an enjoyable activity. There is substantial evidence documenting the success of *Between the Lions* in helping young children acquire early literacy skills (Linebarger, Kosanic, Greenwood, & Doku, 2004; Uchikoshi, 2006).

Teacher preference prohibited viewing full-length episodes during the school day. To resolve this, sixteen edited versions were created by dividing along the natural midpoint within the full-length episode to create 12–15-minute mini-episodes. Children in viewing classrooms viewed one mini-episode of *Between the Lions* per day, 4 days per week, for 4 weeks. Each mini-episode contained the opening song, plot introduction and reading of one book, supporting songs and segments for the target word or target sound, and one of two recurring segments. All mini-episodes ended with credits to increase the resemblance to the original 24-minute version.

**Table 1**

Participant assignment by gender and grade level.

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>VO</th>
<th>VGM</th>
<th>VCM</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
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<td><strong>Prekindergarten</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10</td>
<td>13</td>
<td>9</td>
<td>11</td>
<td>43</td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>11</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>21</td>
<td>14</td>
<td>22</td>
<td>76</td>
</tr>
<tr>
<td><strong>Kindergarten</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>4</td>
<td>14</td>
<td>7</td>
<td>31</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>7</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>10</td>
<td>24</td>
<td>14</td>
<td>62</td>
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<tr>
<td><strong>Total</strong></td>
<td>33</td>
<td>31</td>
<td>38</td>
<td>36</td>
<td>138</td>
</tr>
</tbody>
</table>
Experimental Manipulation

Classrooms were randomly assigned to one of four conditions: control, viewing only, viewing + generic manipulatives, viewing + character-branded manipulatives. Children in the control condition were not exposed to any episode of Between the Lions in their classrooms nor were they provided literacy manipulatives designed to encourage experiential mediation. These children participated in typical classroom activities only. Children in the Viewing Only condition (VO) viewed Between the Lions but were not provided literacy manipulatives. Children in the viewing + generic manipulatives (VGM) condition viewed Between the Lions and worked with literacy manipulatives that did not feature characters from the show. Children in the viewing + character-branded manipulatives (VCM) condition viewed Between the Lions and worked with literacy manipulatives featuring characters from the show.

Classrooms assigned to viewing conditions with manipulatives (VGM and VCM) received (1) weekly posters with poems utilizing concepts or letters explored in the Between the Lions episodes, (2) weekly books that were recommended reading from the Between the Lions website as well as supportive of the concepts viewed that week, (3) weekly craft activities that extended the concepts of the viewed episodes, (4) magnetic dry-erase laptop boards, and (5) age-appropriate literacy materials from the scientifically based reading research program The Little Red Toolbox (Scholastic n.d.). VCM classrooms received materials that contained images of the four main characters (Theo, Cleo, Lionel, Leona) from Between the Lions.
the Lions while VGM classrooms received materials without characters. This was accomplished by either digitally adding images to the posters (for example, see Figure 1) or by use of stickers on the literacy materials (for example, a sticker of one of the Between the Lions characters was placed on each of the pages of the Mini-Box sets for the VCM classrooms).

Teachers of the VGM and VCM classrooms were instructed to integrate the materials into their classrooms by (1) displaying the weekly poster in a prominent place in the classroom for the entirety of each week, (2) reading the weekly books to the children, (3) completing the weekly craft activities with the children, and (4) adding the provided literacy materials to their existing literacy centers. Books and craft activities were only given during the week in which similar concepts were seen in the Between the Lions videos. For example, during 1 week, one of the videos featured a book called Yo! Yes? (Raschka, 2007). During that week, teachers read and discussed that book with their class and each child received a personal copy of the book to take home. Each week, a member of the research team provided additional craft materials, posters, and books to the teachers. When teachers received the materials, they would report the use of the materials from the previous week. The research team member also observed the poster display and use of the literacy materials in the classrooms. Teacher report and researcher observation indicated that the materials were used in both experiential mediation classrooms.

**Measures**

*Between the Lions* is designed to help children acquire key early literacy skills associated with emergent literacy. Because experiential mediation is thought to support more general learning transfer as opposed to learning of specific program content, all assessments measured literacy broadly rather than focused specifically on program content. The assessments have been used extensively in studies evaluating literacy skills, and all have been used in previous evaluations of Between the Lions.

**Letter naming fluency.** The Letter Naming Fluency (LNF) task is an individually administered and timed subtest from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002). It measures children’s ability to rapidly name both upper- and lowercase letters. Children are given a sheet of paper with upper- and lowercase letters and asked to name as many as they can in 1 minute. The 1-month, alternative-form reliability is estimated to be .88 and validity estimates range from .65 (predictive validity) to .70 (concurrent, criterion validity) (Good et al., 2004).

**Early literacy skills.** Early literacy skills were measured using the Get Ready to Read! Screener (GRTR; Whitehurst, 2001). This screener evaluates print knowledge, book knowledge, phonological awareness, phonics, and writing. The child receives one point for each item identified correctly, with a maximum score of 20. Split-half reliability was .80 and concurrent validity estimates with the Developing Skills Checklist (CTB/McGraw-Hill, 1990) range from .70 to .79.

**Initial sounds fluency.** The Initial Sounds Fluency (ISF) task is an individually administered and timed subtest from the DIBELS (Good & Kaminski, 2002). It measures children’s ability to recognize and produce the initial sound in an orally presented word. The examiner presents four pictures, names each picture, and then asks the child to identify the picture that begins with the sound produced orally by the examiner. The child’s score reflects the number of initial sounds correct in a minute. Alternative-form reliability is
estimated to be .91 (Nunnally, 1978) and validity estimates range from .48 (concurrent, criterion validity) to .45 (predictive validity) (Good et al., 2004).

Rhyme awareness. The Nursery Rhyme (PNR) subtest of the Phonological Awareness Literacy Screening (Invernizzi, Sullivan, Meier, & Swank, 2004) evaluates children’s knowledge of nursery rhymes, which in previous research has been shown predictive of later reading success. Children are read a familiar nursery rhyme and are asked to fill in a missing word that rhymes with the previous stanza. Children receive 1 point for correct response with a maximum score of 10 on the assessment. Internal consistency estimates for this subscale are .77 (Cronbach’s alpha) and .75 (Guttman split-half) (Invernizzi et al., 2004).

Procedure

After receiving classroom and parental consent, trained data collectors conducted pretest assessments with the children using the measures described above. Following pretesting, children began the intervention phase of the project completing specific group activities. The intervention phase of the project was led by the classroom teacher. In viewing classrooms, the teacher was instructed to show one episode of Between the Lions per day. In experiential mediation classrooms, the teacher was also provided the appropriate materials and instructed to integrate the materials into their classrooms (see the description of mediation above). At the conclusion of the intervention, data collectors conducted posttests assessments with the children.

Analytic Approach

Analyses were completed using Analysis of Covariance (ANCOVA) models with planned contrasts. Because assignment to condition was based on stratified sampling at the classroom level resulting in imperfect random assignment, and in order to maximize the likelihood that the effects of the manipulation were the ones reflected in our outcome measures, we included a covariate for what the child already knew or did at the pretest for each outcome. Although children were sampled from prekindergarten and kindergarten classrooms to increase the range of represented ages, we opted to test for grade-level differences by including grade level as a factor. In our final models, the between-subjects factors were condition (4 Levels; 1 = control, 2 = VO, viewing only, 3 = VGM, viewing + generic manipulatives, 4 = VCM, viewing + character-branded manipulatives) and

<table>
<thead>
<tr>
<th>Source</th>
<th>LNF (N = 130)</th>
<th>GRTR (N = 131)</th>
<th>ISF (N = 117)</th>
<th>PNR (N = 129)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>241.15***</td>
<td>141.98***</td>
<td>21.67***</td>
<td>229.87***</td>
</tr>
<tr>
<td>Grade (2 levels)</td>
<td>3.73* (.18)</td>
<td>2.96* (.16)</td>
<td>9.92** (.30)</td>
<td>.25 (.04)</td>
</tr>
<tr>
<td>Condition (4 levels)</td>
<td>2.13 (.23)</td>
<td>1.56 (.20)</td>
<td>1.09 (.17)</td>
<td>1.84 (.21)</td>
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<tr>
<td>Grade × Condition</td>
<td>1.09 (.16)</td>
<td>2.57* (.25)</td>
<td>5.49** (.39)</td>
<td>1.56 (.20)</td>
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<tr>
<td>Error</td>
<td>86.61</td>
<td>.05</td>
<td>1.85</td>
<td>.02</td>
</tr>
</tbody>
</table>

Note. Effect sizes (Cohen’s $f$) for between-subjects factors are reported in parentheses next to F-statistic. Reported values for error are mean square errors. ***$p$ < .001, **$p$ < .01, *$p$ < .05, +$p$ < .10.
grade level (2 levels; PreK and K). Gender was included in the preliminary analyses; however, it was unrelated to any of the outcome variables and dropped from the final models.

The distributions of GRTR, ISF, and PNR scores evidenced deviations from normality that violated assumptions of parametric analyses; therefore, transformations were necessary (Tabachnick & Fidell, 2007). A reflective log transformation was used to correct the negative skew of GRTR and PNR scores while a square root transformation was used to correct the positive skew of the ISF scores. To ease interpretation, the covariate-adjusted non-transformed values are presented. When pairwise comparisons were made, corrections were performed using Bonferroni adjustments of the alpha level (Jaccard, 1998). To estimate practical significance, Cohen’s $f$ was calculated for omnibus tests (Cohen, 1988) and the effect size $r$ for planned contrasts (Rosnow, Rosenthal, & Rubin, 2000). Table 2 presents ANCOVA results while Table 3 presents group means and planned contrasts.

### Results

Recall that hypothesis 1 predicted that children in viewing groups with experiential mediation (VCM and VGM) would outperform their control group peers on tests of literacy skills, while hypothesis 2 predicted that any experiential mediation (VCM and VGM) would lead to better literacy performance when compared to unaided viewing (VO). Hypothesis 3 predicted that type of mediation would matter such that children in the character-branded manipulation group (VCM) would outperform children in the generic-branded manipulative group (VGM). Results for each hypothesis, by literacy outcome, are detailed below.

### TABLE 3

Overall means, means by grade, and planned contrast results for all outcome measures.

<table>
<thead>
<tr>
<th></th>
<th>LNF</th>
<th>GRTR</th>
<th>ISF</th>
<th>PNR</th>
</tr>
</thead>
<tbody>
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<td>7.12</td>
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<td>9.95</td>
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<td>Kindergarten</td>
<td>29.68</td>
<td>17.89</td>
<td>8.14</td>
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<th>$F$</th>
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<tr>
<td>$H1$</td>
<td>.29 (.05)</td>
</tr>
<tr>
<td>$H2$</td>
<td>4.61*(.19)</td>
</tr>
<tr>
<td>$H3$</td>
<td>1.88 (.12)</td>
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Note. Means are covariate-adjusted. Non-transformed values have been presented to aid interpretation. Effect sizes ($r$) for planned contrasts are reported in parentheses under $F$-statistic. *$p < .05$. 

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Letter Naming Fluency

Results from the 4 (group) × 2 (grade) ANCOVA with condition-related planned contrasts on LNF supported H2. Children in viewing groups with experiential mediation (VCM and VGM) outperformed their VO peers, \( F(1,121) = 4.61, p < .05, r = .19 \). Planned contrasts did not support H1 and H3, although means were in the expected direction for H3. Children in the VCM condition performed the highest, followed by children in the control condition, children in the VGM condition, and children in the VO condition, \( F(3,121) = 2.13, p = ns, f = .23 \). Grade level was significant, \( F(1, 121) = 3.73, p < .05, f = .18 \). Kindergarteners outperformed their prekindergarten peers. The interaction between condition and grade level was not significant, \( F(3, 121) = 1.09, p = ns, f = .16 \).

Early Literacy Skills

The 4 (group) × 2 (grade) ANCOVA with planned contrasts among the four groups on GRTR scores did not support the study hypotheses, although means were in the expected direction. Children in the VCM condition performed the highest, followed by children in the VGM condition, children in the control condition, and children in the VO condition, \( F(3,122) = 1.56, p = ns, f = .20 \). Grade level was marginally significant with children in kindergarten performing slightly better on the assessment, \( F(1,122) = 2.96, p < .10, f = .16 \). Finally, there was a marginally significant interaction between condition and grade level, \( F(3,122) = 2.57, p < .10, f = .25 \). Univariate tests suggest that kindergarteners with any mediation performed slightly better than viewing only and control group children \( F(3,122) = 2.40, p < .10 \) whereas there were no differences for prekindergarteners by condition \( F(3,122) = 1.34, p = ns \).

Initial Sounds Fluency

Results from the planned contrasts among conditions generated by the 4 (group) × 2 (grade) ANCOVA for ISF did not support study hypotheses, although means were in the expected direction for H1 and H3. Children in the VO condition performed the highest, followed by children in the VCM condition, children in the VGM condition, and children in the control condition, \( F(3,108) = 1.09, p = ns, f = .17 \). Grade level was significant such that kindergarteners outperformed their prekindergarten peers, \( F(1,108) = 9.92, p < .01, f = .30 \). This main effect was qualified by a significantly significant interaction between condition and grade level, \( F(3,108) = 5.49, p < .01, f = .39 \). Univariate tests reveal that, for kindergartners, children in the VO and VCM condition significantly outperformed children in the VGM condition \( F(3,108) = 4.85, p < .01 \) whereas there were no differences for prekindergarteners by condition \( F(3,108) = 1.16, p = ns \).

Nursery Rhyme Awareness

The 4 (group) × 2 (grade) ANCOVA with group-related planned contrasts for PNR did not support study hypotheses, although means were in the expected direction for H1 and H3. Children in the VO condition performed the highest, followed by children in the VCM condition, children in the VGM condition, and children in the control condition, \( F(3,120) = 1.84, p = ns, f = .21 \). Grade level was not significant \( F(3,120) = .25, p = ns \),
Discussion

Using the literacy-based children's program *Between the Lions*, we tested three hypotheses associated with experiential mediation. While the pattern of results favored two hypotheses, statistical significance was not uniformly achieved. However, when considering several factors, findings offer practical importance regarding experiential mediation.

Experiential Mediation with Educational Television

We expected children who viewed *Between the Lions* and participated in either form of experiential mediation to outperform the control group (H1). A trend in favor of this hypothesis occurred for three of four outcomes, but effect sizes were small (see Table 3). In previous research (see Linebarger & McMenamin, 2010), findings in favor of the program have been stronger than the findings presented here. This is likely a confluence of two factors: stimuli exposure and child risk status. Shortened episodes of *Between the Lions* were used in this study and the duration of the intervention period was briefer than previous work. This decreased exposure translated to weaker performance on measured outcomes. Furthermore, the children in our sample began the study with greater literacy skills than in previous studies. When converting the pretest *Get Ready to Read!* scores to indicators of literacy risk, only 11 per cent of our sample was considered “low performing” while 36 per cent of our sample was “average performing” and 53 per cent “high performing”. In a series of studies, researchers (Linebarger et al., 2004; Prince et al., 2002) have found that performance differences attributable to *Between the Lions* occurred mainly for children whose pretest literacy skills would place them moderately at-risk for reading failure whereas those children identified as at-risk or not-at-risk benefited little from the program. At-risk children are thought to lack a minimal level of experience with print rendering the program content too difficult whereas, consistent with the results presented here, the not-at-risk children already had most of the skills measured and, consequently, did not have that far to move.

After testing whether television and experiential mediation were better than receiving neither, we tested whether this coupling was better than unaided viewing of the program (H2). Limited research suggested that the inclusion of experiential mediation would lead to greater learning. Findings for two of the four outcomes lent minimal support to this hypothesis. When evaluating letter naming fluency, results illustrate that all children were able to capitalize on the inclusion of experiential mediation. On the *Get Ready to Read* assessment, kindergarteners were able to capitalize on the added experience of experiential mediation while younger children were not. Alternatively, for both initial sounds fluency and rhyme awareness, means were in the reverse direction such that unaided viewing was more effective than viewing coupled with experiential mediation. While these findings were unexpected, consideration of the associated skill levels of the assessments as well as the hypothesis 3 findings offer some insight.

In terms of associated skill level, letter naming skills are one of the earliest to develop and were the easiest of the skills measured here. The early literacy assessment (i.e., GRTR) was slightly more challenging as it includes a sampling of literacy skills ranging from easy to
more difficult. Initial sounds fluency and rhyme awareness represented the most complex skills measured in the study. The hypothesis 2 findings suggest that the benefits of experiential mediation might be present for easier rather than more challenging skills. The grade by condition findings on Get Ready to Read would seem to support this assertion as prekindergartners found this skill to be significantly more complex than their kindergartener peers ($F(1,136) = 50.05, p < .001, f = .60$). For kindergartners, the varied practice offered by the manipulatives likely increased the amount of experience and the connections that they were able to make across televised and manipulative-supported content. For younger children, however, the increased complexity of the content combined with the manipulative use may have taxed their limited cognitive capacity such that no benefits from mediation emerged.

For the more challenging skills, initial sounds and rhyme awareness, the pattern of results for hypothesis 2 indicates that experiential mediation might suppress performance. However, the analyses testing hypothesis 3 suggest that the relationship is more complex than that. We expected that experiential mediation which utilized character-branded manipulatives (VCM) would translate to greater learning when compared to experiential mediation which utilized generic-based manipulatives (VGM; H3). Although our planned contrasts did not reveal significant differences, the means were in the expected direction for all outcomes. For early literacy skills (i.e., GRTR; an easier skill in which only kindergartners seemed to benefit from mediation), means suggest that prekindergartners actually performed similarly in both the VO and VCM conditions whereas there was a decrease in performance for children in the VGM condition. Similarly, for the more complex initial sounds fluency and rhyme awareness skills, all children in the VCM condition performed similarly to their VO peers while their VGM peers performed worse than both groups. This was especially pronounced for kindergartners on the initial sounds fluency task. While we hypothesized that any manipulatives designed to foster experiential mediation would be better than none, and character-branded better than generic, our results suggest otherwise.

These contrary patterns seem to indicate that children’s developmental abilities and the associated complexity of the desired skill play a role in how experiential mediation may work. Fisch’s capacity model (2000) posits that children have a limited cognitive capacity and, when this capacity is exceeded, comprehension is impaired. For content that is easier to learn (e.g., letter naming skills), the findings here illustrated that children were able to benefit from any form of mediation. Extrapolating from Fisch’s model, it seems likely that this is because their cognitive base was not strenuously tapped by the content. As the content complexity increased, cognitive capacity was taxed to a greater extent. This decreased capacity likely increased the challenges associated with maximizing experiential mediation. Further, these challenges were faced sooner by prekindergartners who had more limited prior knowledge when compared to kindergartners. Content connections, however, seemed to mitigate some of these challenges.

Recall that educational television research suggests that connections must be made across content for varied practice to be effective (Fisch & Truglio, 2001). While our findings suggested that, for the easiest content, this connection was not critical (although it did seem to help), the lack of connection between the program content and generic manipulatives seemed to have inhibited the benefits of varied practice. The presence of new complex material may have resulted in cognitive overload rendering children unable to connect the new content delivered via the program with the new content derived from
the manipulatives. Without this connection, children may have used the materials for reasons other than those that would extend the lessons of *Between the Lions*. McNeil and Jarvin (2007) suggest that caution be used with manipulatives because children may (1) focus on fun at the expense of learning and (2) experience greater learning challenges because the manipulatives require dual representation. Character-branding may have facilitated this dual representation by bridging the program content to the use of the manipulatives in a more appropriate way. In doing so, experiential mediation through character-branded manipulatives extended content associated with easier skills and neither supported nor suppressed content associated with more challenging skills.

**Limitations**

This study offered a preliminary look at the role of experiential mediation in extending educational television. While the pattern of results favored two of three hypotheses, statistical significance was not uniformly achieved. The amount of exposure to program content and manipulative use was likely insufficient. Over time and with greater experience, we would hypothesize more pronounced effects. Additionally, due to limited time within the schools and the need to minimize teacher involvement, we did not collect detailed data on fidelity of intervention implementation. Thus, we were unable to contextualize our findings with descriptions of the amount of viewing, or the quality and frequency of manipulative use in the classrooms. Finally, we experienced a relatively low parent survey return rate (63 per cent return rate) precluding us from evaluating our findings in the context of critical home, parent, and child variables. Future studies should make increased efforts to secure a higher response rate in order to better understand how these important variables may affect the outcome of the intervention.

**Practical Implications**

We were surprised to learn how few investigations existed on the impact of experiential mediation involving educational television. The trends identified here support the growing research body that posits that television can be an effective vehicle for delivering educational content (Fisch, 2004). The findings also suggest that all experiential mediation is not alike, and that its impact is, in part, based on content complexity. When opting to employ experiential mediation opportunities with young children, the patterns in favor of character-branded manipulatives over generic manipulatives suggest that it is necessary to ensure that the materials used to encourage experiential mediation are explicitly connected to program content. Moreover, considering that generic manipulatives may in fact detract from learning more complex mediated content, careful consideration of skill complexity is advisable in terms of both the skill itself as well as the developmental abilities of the target audience. For complex content, the patterns suggest that even when the mediation is clearly connected with the content, its benefits may be null. It may be that the benefits associated with connected experiential mediation take longer for more complex skills. More research is needed, both on the role of experiential mediation and content complexity. In addition, research could help to discern whether these patterns remain with older children and with other media. For now, this study offers a practical direction for the creation of future educational television interventions targeting young children.
REFERENCES


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