# The influence of educational television programming on preschoolers' emergent literacy: A review of the literature

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## Abstract

For over two decades educational researchers and practitioners have placed tremendous emphasis on ensuring children acquire a solid literacy foundation during the preschool years in order to successfully learn to read once in school (Pelletier, 2008). This focus is predicated on research that suggests children who enter school without a literacy-rich foundation on which to build rarely catch up to their peers who have acquired such a foundation, placing them at risk for a myriad of difficulties across subject areas (Desrochers & Glickman, 2008). The purpose of this systematic aggregative review was to summarize research reporting the effects of educational television viewing – an increasingly prevalent approach to promoting preschoolers' cognitive development – on preschool viewers' emergent literacy growth. Review findings may provide a range of educational partners, including early childhood educators, teachers and parents, further information on which to draw when planning activities for more fully supporting children's early reading development.

## Introduction

Meta-analysis of over 30 years of research on the popular children's program *Sesame Street* indicates that children can learn various concepts and skills, including important language and literacy skills, from viewing educational television (Mares & Pan, 2013). In spite of this research, little has been done in Canada on a wide-scale to capitalize on the potential of television for teaching preschoolers literacy concepts that are related to later literacy success, however. This represents a missed educational opportunity for preschoolers as one in four Canadian children arrive at school without the literacy foundation they require for learning to read (Pelletier, 2008).

Purcell-Gates (1996) proposes that the most influential cultural contexts impacting young children's language and literacy learning are the home and community, with television and other screen-media increasingly forming a key part of these environments. Data aggregated from the *Canadian Health Measures Survey* (Statistics Canada, 2009, 2010, 2011) reporting on the activity levels of Canadian preschoolers, reveals that Canadian children aged 3-4 years spend an average of 2.2 hours in front of a screen each day (Active Healthy Kids Canada, 2013). A review conducted by Common Sense Media (CSM) (2011) in the United States specified that American children 0-8 years spend an average of 1 hour 44 minutes watching television in a typical day, and that television viewing continues to dominate their screen usage representing 74% of their media diet versus just 13% for the computer and 4% for cell phones, iPods, and iPads.

Despite preschoolers' continued preference for television, a limited number of empirical studies have explored the influence of contemporary educational programs on viewers' cognitive development, including literacy. New research in this area is necessary to determine whether contemporary television programs, particularly those being promoted as educational, achieve their goals or claims of teaching various concepts and skills to young viewers. The amount of time preschoolers spend watching television underscores the importance of conducting this review as an exploratory first step in determining whether television can be used as a more deliberate and widely-scaled learning context for preschool children who may not otherwise receive the quality and quantity of emergent literacy exposure and stimulation necessary in the early years to prepare them adequately for formal schooling and learning to read.

In the following section, the theoretical framework and research questions guiding this review's approach and focus are described. Methods for conducting the review are then delineated followed by review results, which are organized into three main sections described in more detail below. The research literature examined indicates that an evidence-based foundation exists for exploring further the instructional and outreach potential of utilising educational television as an emergent literacy intervention context for young children.

## Theoretical Framework and Research Questions

Emergent literacy theory as it relates to children's reading development provides the conceptual frame for this literature review. Emergent literacy theorists believe that young children begin to acquire literacy from birth and that certain emergent literacy skills are foundational to children's learning to read (Hammill, 2004; Justice, 2006; Lever & Sénéchal, 2010). Empirical and theoretical prediction studies have demonstrated that nearly every literacy behaviour children exhibit in the preschool years is linked to later literacy achievements (e.g. National Early Literacy Panel, 2008). Research indicates, for example, that a child's knowledge of letter names and forms in kindergarten can be used to predict, with great accuracy, their ability to master the alphabetic principle – a critical skill that facilitates the encoding and decoding of text (Adams, 1990; Stahl & Murray, 1994). In fact, children's emergent phonological awareness, print knowledge, and oral language development have all been causally associated with children's success in learning to read (Storch & Whitehurst, 2002).

To determine whether and to what extent preschoolers' television viewing influences their literacy development, it was necessary to aggregate literature exploring the cognitive effects of children's television viewing on various emergent literacy skills. Specifically, this literature review sought to summarize what researchers have demonstrated regarding the influence of contemporary television programs on preschoolers' emergent literacy and the implications of this literature for policy and practice. This literature review is part of a larger research study exploring the educational merit of a screen-based intervention program for positively influencing preschoolers' emergent literacy. As such, investigating the role of contemporary television programs on child emergent literacy skill acquisition was necessary.

## Method

### *Search Strategy and Inclusion Criteria*

An aggregative approach to conducting a systematic review (Gough, Thomas, & Oliver, 2012) was followed for searching the Education Resources Information Centre (ERIC), the Cumulative Index of Nursing and Allied Health Literature (CINAHL) and the Psychological Information Database (PsycInfo) for sources related to preschoolers' emergent literacy and television exposure. The following search terms were used in various combinations: 'emergent literacy', 'early literacy', 'literacy', 'reading', 'preschool', 'kindergarten', 'television', 'educational television', and 'media'. Date parameters were limited to 1999 to 2013 for conducting a recent review given the rapid pace with which media offerings for children, including television programs, change. Many television programs viewed by preschoolers more than 14 years ago are qualitatively different from those offered today. Contemporary educational television programs such as *SuperWhy!, Between the Lions* and *Martha Speaks* were also included as part of the search since these programs specifically target preschool audiences and children's literacy development. Subsequently, relevant websites associated with *Ready-to-Learn Television,* a multi-million dollar public media initiative sponsored by the U.S. Department of Education, were reviewed to ascertain relevant research. Finally, reference lists of the identified sources were examined to identify additional sources not identified in the previously described database searches.

To be included in this review, studies had to be publicly accessible and experimental or quasi-experimental in their design. The review includes international investigations published in English. Finally, included studies must have explored whether viewing a television program positively or significantly influenced one or more emergent literacy skills among a population of preschool children. For the purposes of this review, preschoolers were defined as

children aged 2-6 years of age. Sources included were comprised of both research articles and research reports on the topic of emergent literacy development and television viewing. Table 1 summarizes included studies.

### *Analysis*

Each source was examined through the lens of the two research questions described above. A matrix was developed to organize studies and to delineate the literacy skill or skills investigated, the stimulus television program viewed, mean age of participants, and main findings. The matrix was then reviewed to identify the emergent literacy skills investigated among the included sources. Quality assurance tests were not conducted on each identified source because concepts examined through an aggregative review process typically include predefined concepts (e.g. specific emergent literacy skills) that are investigated in a specific and predefined manner (e.g. through an experimental design), as was the case in this review. In this way, the inclusion criteria adequately address quality assurance issues. Configurative reviews, in contrast, explore concepts or ideas that are examined through various methods and more iterative processes (Gough, Thomas & Oliver, 2012; Volis, Sandelowski, Barroso & Hasselblad, 2008); therefore, it is necessary to examine each individual study for quality, and thus inclusion, more closely.

## Findings

All of the television programs investigated in the included studies were educational – that is, they were produced with the intent of teaching a specific skill or concept to viewers. This qualitative distinction is important since not all television programs are made alike. Many are entertainment programs that generally do not promote children's development, cognitive or otherwise (Fisch, 2004). Data analyzed from the 10 experimental studies included in this review indicated that for the majority of literacy indices, viewers outperformed non-viewers on various literacy tasks after a predetermined intervention or viewing period. Gains were statistically significant among experimental viewing groups on many measures, though findings were mixed in some cases, while in other cases findings were moderated by specific indicators, such as reading-risk status (See Linebarger, Kosanic, Greenwood & Doku, 2004). The emergent skills investigated represent well the range of literacy skills that have been causally linked to early and conventional reading achievement (NELP, 2008; Justice, 2006), including children's emergent phonological awareness, vocabulary, and narrative understanding.

The following sections summarize relevant research investigating the capacity of educational television to support preschoolers' emergent vocabulary growth, narrative knowledge and phonological awareness. Skills are presented in this manner to capture effectively and efficiently the range of skills targeted by the included sources. An additional important dimension of emergent literacy targeted by many contemporary television programs for children is print knowledge, which includes comprehension of both letters and print concepts, for example, that print is read from left to right. Given the wealth of studies focused on this construct, an entire separate manuscript has been developed for detailing this research in detail. In brief, however, findings from that review indicate that children can acquire foundational print knowledge from viewing educational television programs, including letter names, letter sounds and various print concepts (Linebarger, 2000; Linebarger, Kosanic, Greenwood, & Doku, 2004; Uchikoshi, 2006). In the following section, findings as they relate to children's emergent vocabulary development are described.

### *Vocabulary*

Prince, Grace, Linebarger, Atkinson and Huffman (2002) investigated the influence of viewing *Between the Lions* (*BTL*) on children's receptive vocabulary using the Peabody Picture Vocabulary Test (PPVT-III) (Dunn & Dunn, 1997). Two distinct populations of young children, those living in the Mississippi Delta (N= 69) and those living on Mississippi Choctaw Indian Reservations (N= 93) were examined. Because of the highly unique characteristics of each sample, comparisons were not made across groups; essentially, two separate studies emerged from this research. Participants in each sample (Mississippi Delta and Mississippi Choctaw) included 4-year-old preschoolers, kindergarteners, and grade one children. Once pre-testing was completed, the experimental group

from each sample viewed *BTL* at least two episodes per week for a 7-month period, read a book related in some way to the episode, and completed a related hands-on activity. Control sample children continued to receive standard educational practices from their teachers.

In terms of generalized vocabulary growth, for both the Mississippi Delta and Choctaw samples, there were no significant main effects for condition as measured by the PPVT-III. However, when considering the effects of viewing by grade, some significant interactions were detected for the Delta group though the relationship was not stable. At the preschool level a significant main effect for group emerged whereby the control group outperformed the experimental group; at the kindergarten level a significant main effect for group emerged again, but this time in favour of the experimental group; at the grade 1 level, no significant main effects were detected. Results from this study must be interpreted with caution since the intervention also included the use of books and activities led by teachers.

Another television program being actively investigated by *Ready-to-Learn Television* is *Martha Speaks.* Linebarger, Moses and McMenamin (2010) investigated the impacts of viewing this program on preschoolers' vocabulary development. Much like Prince (2002), two distinct samples of children participated in the study with no cross-sample comparisons conducted. The samples were labelled *urban* and *rural*. Because the focus of a larger study being conducted by the authors (Linebarger, Moses, Liebeskind & McMenamin, 2013) was to determine whether placing on-screen print of target vocabulary words enhanced vocabulary acquisition, groups were divided into: 1) viewing with no print; 2) viewing with print; and 3) control condition who received no instructions to view the program at all.

For both the urban and rural groups, viewers outperformed control peers on the post-test with researcher-developed measures of program-specific receptive and expressive vocabulary. While there were no direct effects of viewing group for either urban or rural children on PPVT-4 raw scores, the authors' analyses of potential moderating factors including age, gender and family socio-economic status revealed that program-specific vocabulary knowledge translated into higher standardized vocabulary scores for urban boys and for rural low socio economic status (SES) participants. The importance of analyzing potential moderating factors is highlighted by these findings, especially when examined in comparison to Prince et al. (2002) where it is unknown whether such moderators exist.

Baydar, Kagitcibasi, Kuntay and Goksen (2008) examined the effects of a local television program on at-risk preschoolers in a large metropolitan area of Turkey. Children and their mothers were randomly assigned to one of three conditions: 1) an experimental group who watched *Will You Play With Me?* every weekday for 13 weeks; 2) a control group who watched an alternative entertainment program that was broadcasted at the same time as *Will You play With Me?* on a different channel for 13 weeks, and; 3) a natural observation group informed about *Will You Play With Me?* and its potential benefits for children but who were not asked to watch. As part of their pre- and post-testing, children's receptive vocabulary knowledge was measured using tests developed by the researchers given the absence of standardized cognitive tests in Turkey for this age group. Additionally, to determine whether frequency of exposure to the program moderated study results, mothers were contacted via telephone to report on how many times during the week they watched *Will You Play With Me?* with their child.

Post-test data indicated that the experimental group exhibited significant gains in their vocabulary development compared to the control group regardless of exposure level. More specifically, while children in the experimental group who had high exposure (viewed three or more times a week) exhibited significant gains in their vocabulary, so did children in the experimental group who watched the stimulus program only once or twice a week. The significant impact of exposure to *Will You Play With Me?* on participants' emerging receptive vocabulary, regardless of exposure level, is particularly noteworthy. A key question for researchers, educators and parents alike in utilising television as an informal "teacher" are questions of intensity for ensuring children are watching the desired program frequently enough for significant effects to manifest.

### *Narrative*

Employing a quasi-experimental design, the study by Linebarger and Taylor-Piotrowski (2009) exposed preschoolers aged 3 to 4 years (N= 311) to either expository stimuli (*Zoboomafoo*), embedded narrative stimuli (*Pinky Dinky Doo*), or traditional narrative stimuli (*Clifford the Big Red Dog*) once a day for 40 school days. While

narrative structures typically employ "dialogue and recurring characters" (Linebarger & Piotrowski, 2009) to tell a story, expository stimuli seek to provide information about a particular topic using a more explanatory or descriptive approach, while embedded narratives incorporate stories within an already existing narrative –that is, a story within a story.

Once random assignment to condition was completed at the classroom level and pre-testing completed, children in viewing classrooms watched one television episode per day for 40 days. Post-tests were completed after viewing 20 episodes and again after viewing all 40 episodes using alternate forms of the pre-assessment measures. Post-test data indicated that children in both narrative groups significantly outperformed children in the non-narrative groups on measures of story structure. Narrative involvement and comprehension data were less straightforward and were not significant in all cases, though the narrative groups again outperformed the expository groups on all of the narrative-based skills measured, including story knowledge, narrative retelling and narrative comprehension.

In addition to examining the implications of program structure on children's narrative development, researchers have also examined commercially available programs that specifically target children's narrative through their stated curricular goals. One such children's television program is *Arthur.* Uchikoshi (2005) examined the effects of *Arthur* on children's development of narrative skills over one academic year. Participants were recruited from Spanish-English kindergarten classrooms in the United States. Using stratified random sampling, half of the students in each of the six participating classrooms were assigned to watch *Arthur* (N= 51) while the other half were assigned to view *Between the Lions* (N= 57) three times a week from October to May.

Pre-, mid-, and post-tests were used to collect data on children's narrative skills using a researcher-developed measure. To examine data, a descriptive analysis was conducted on the "total number of words, the mean clause length, and the combined narrative measure" (Uchikoshi, 2005; p. 468). Individual growth modeling was then employed to examine differences in the level and rate of change on the narrative measure among participants. Compared to the control group who viewed *Between the Lions, Arthur* viewers had steeper narrative learning trajectories at both the mid- and post-tests, indicating that children who viewed *Arthur* learned more narrative skills than children who viewed *Between the Lions*.

Finally, to explore the innate role that the television medium may play in teaching narrative concepts to viewers Kendeou et al. (2005) presented children aged 4-6 years with narratives either on the television or on the radio. Then, after either viewing or listening, children were asked to recall the story and answer basic comprehension questions. The authors found that measures of narrative comprehension across television and oral presentation were highly interrelated, indicating that the mode of presentation was irrelevant. Interestingly, at follow-up 2 years later, Kendeou et al. determined that, "narrative comprehension of aural and television narratives at age 6 directly predicted reading comprehension at age 8, over and above the effect of word identification and vocabulary" (p. 95).

### *Phonological Awareness*

Given the importance of developing strong phonological awareness skills in the early years, many contemporary television programs focus on influencing children's literacy by explicitly targeting phonological awareness skills. Summative evaluations on the popular television program *Between the Lions* and *Super WHY!* have concluded that both programs positively and significantly foster children's phonological awareness (see Linebarger, 2000; Linebarger, McMenamin, & Wainwright, 2008) utilising a range of phonological tasks, including rhyme and initial sound measures.

In fact, empirical studies examining educational television and phonological awareness frequently make use of excerpts from *Between the Lions* or entire episodes, given that the program explicitly targets children's emerging phonological awareness as evidenced by the program's stated curricular goals. Linebarger et al. (2004), for example, developed an intervention study using excerpts of *BTL* episodes to explore whether and to what extent improvements in phonological awareness would be detected, and further, whether gains varied as a function of children's initial reading risk status. Consistent with research findings examined here, gains were mediated by initial reading risk status; however, all children exhibited significant phonological awareness development regardless of their risk-status.

Prince et al. (2002) also examined children's phonological awareness over the course of their study, discussed earlier, that included children from the Mississippi Delta and Choctaw Reservation. There was no main effect for condition (control or experiment) for Delta participants as measured by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS); however, viewers' learning growth was significantly steeper and consequently post-test scores exceeded non-viewers on both the initial sound fluency and non-sense word fluency tasks, a task designed to measure children's emerging decoding and encoding abilities. Data for the Choctaw participants revealed no significant effects for condition on any of the DIBELS tasks.

Also utilising *BTL* content, Uchikoshi (2006) examined individual growth rates of phonological awareness of Spanish-English kindergartners attending 10 public schools in the United States (N= 150), as a result of viewing either *Between the Lions* or *Arthur – a* popular children's program designed to foster children's social and narrative skills, discussed earlier – three times per week over an entire school year. Individual growth modeling analysis demonstrated that children who viewed *Between the Lions* had steeper growth trajectories than those who viewed *Arthur* for each of the phonological awareness measures examined, including blending, segmenting, and matching of initial and ending sounds of words. While lending support to the notion that children can learn foundational phonological awareness skills from viewing television, this study also accentuates the importance of considering content and purpose of the specific television program when attempting to foster skill development amongst viewers.

## Discussion

The sources just reviewed suggest that preschool children can learn many foundational emergent literacy skills from viewing television programs that are produced with the intention to teach. Television programs used as stimuli in the preceding studies included North American productions *Martha Speaks, Super Why!, Between the Lions* and *Arthur* as well as one international production from Turkey titled *Will You Play with Me?* Each of these programs successfully imparted key emergent literacy knowledge to viewers, including increased phonological awareness, vocabulary and narrative understanding among viewing groups. This review updates and extends the research base for understanding the important and significant contributions that appropriately designed television programs contribute to young children's emergent literacy skills.

For vocabulary growth, all viewers outperformed control group peers at the post-test in terms of program-specific vocabulary (Linebarger, Moses & McMenamin, 2010) and expressive vocabulary growth (Baydar et al., 2008). Receptive vocabulary scores were not significantly influenced by viewing as measured by the standardized Peabody Picture Vocabulary Test (Linebarger et al., 2010; Prince et al., 2002), however. Televised narratives (Kendeou et al., 2005) and traditional narrative structures (Linebarger & Taylor-Piotrowski, 2009) were shown to support children's narrative understanding while commercially available programs such as *Arthur*, produced with the intention of teaching children narrative skills, were also documented to positively influence development (Uchikoshi, 2005). Finally, studies investigating the relationship between television viewing and phonological awareness revealed that children's phonological skills, including initial sound fluency, blending and segmenting can be positively and significantly influenced by viewing certain television programs (Prince et al., 2002; Uchikoshi, 2006, respectively). While in some instances moderating variables existed, such as initial-reading risk status (Linebarger, Kosanic, Greenwood & Doku, 2004), overall findings across this review suggest that television programs can positively and significantly influence preschoolers' emergent literacy development across a range of key early skills.

One limitation of the studies described in this review is the frequent use of researcher-developed measures designed to capture whether viewers learn specific concepts targeted in one episode, or across a number of episodes. Linebarger et al. (2004), for instance, measured direct learning of program content through five different research-developed tests including a *speech to print matching* test that was designed to measure various phonemic awareness indicators, including children's ability to discriminate initial consonants, final consonants, vowels and blends. Linebarger and colleagues explicate that children were shown cards with three words printed on them and asked to point to the word that the examiner said. The stimulus words were terms discussed in the *Between the Lions* episodes that children in the experimental viewing group viewed over an intervention period. A major limitation of these researcher-developed tests is that information concerning their validity and reliability is unknown.

## Conclusion

Examining the capacity of educational television to serve as an informal literacy teacher addresses a significant gap in the literature around emergent literacy intervention models. Providing preschoolers with quality language and literacy models on which they can build is imperative for facilitating their learning to read once in school (Justice, 2006). Focusing efforts on designing, piloting, and refining outreach models that are accessible to children requiring this type of support is essential, especially given that nearly one quarter of Canadian children enter school without the requisite language and literacy knowledge that enables them to learn to read (Jamieson, 2009).

Inherent in the notion of designing and implementing outreach models to better prepare more children before school entry, whether at home or in daycare, is the issue of access. Concomitantly, then, outreach models investigated need to be low-cost to end-users, whether that be early childhood educators or parents who are able to stay home with their children. Cost-intensive interventions risk failing to reach all children requiring supplemental support in the early years aimed at acquiring essential foundational literacy skills. Employing educational television as a purposeful literacy support medium and strategy may address issues of reach and cost that existing curricula and interventions typically do not.

The instructional potential of educational television to teach young children foundational early literacy concepts was supported by the literature examined in this review and provides a compelling case for exploring further the capacity of educational television to serve as an early literacy teacher for young children who may not otherwise receive the quality and quantity of early language and literacy instruction they require in their regular care and educational environments. Review findings may provide a range of educational partners, including early childhood educators, teachers and parents, further information on which to draw for planning their activities with young for more fully supporting children's early reading development. Future research investigating the impact of interventions that have incorporated components of educational television programming is necessary for more fully understanding the educational potential of this medium and the efficacy of its integration into more explicitly educational contexts (e.g. Schryer, Sloat & Letourneau, forthcoming).

Table 1
Summaries of the 10 studies included in this review concerning preschoolers' television viewing and emergent literacy development

| Author(s) | Year | Sample Size | Mean Age | Program Type | Outcomes |
|---|---|---|---|---|---|
| Baydar, N., Kagitcibasi, C., Kuntay, A., & Goksen, F. | 2008 | N=399 | 5.3 | Educational | Phonological awareness<br>Vocabulary |
| Linebarger, L., & Piotrowski, J. | 2009 | N=311 | 4.54 | Educational<br>Entertainment | Narrative involvement, recall and comprehension |
| Linebarger, D., Kosanic, A., Greenwood, C., & Doku, N. | 2004 | N=164 | Kindergarten = 6.02<br>Grade 1= 7.10 | Educational | Phonological awareness<br>Concepts of print<br>Letter naming |
| Uchikoshi, Y. | 2005 | N=108 | Boys= 5.7<br>Girls= 5.6 | | Narrative recall and comprehension |
| Uchikoshi, Y. | 2006 | N=150 | Boys= 5.7<br>Girls= 5.6 | Educational | Phonological Awareness<br>Letter recognition |
| Linebarger, Moses, & McMenamin | 2010 | N= 290 | 6.1 | Educational | Receptive Vocabulary<br>Expressive Vocabulary |
| Linebarger, D. | 2010 | N= 141 | 6.61 | Educational | Phonological Awareness<br>Letter Knowledge<br>Print concepts<br>Writing |
| Linebarger | 2000 | N= 164 | Kindergarten= 6.02<br>Grade 1= 7.10 | Educational | Concepts of print<br>Phonological awareness<br>Alphabet knowledge |
| Prince, Grace, Linebarger, Atkinson, & Huffman | 2002 | N= 162 | Kindergarten= 5.20<br>Grade 1= 6.40 | Educational | Receptive vocabulary<br>Phonological awareness<br>Alphabet Knowledge<br>Print Concepts |
| Borzekowski & Henry | 2010 | N=160 | 4.9 | Educational | Letter recognition<br>Early reading and writing |

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