The impact of media literacy on children's learning from films and hypermedia

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A B S T R A C T
Within the extensive literature on the role of educational media in children's learning and the factors influencing that learning, the possible impact of media literacy remains unexamined. The present study examines the influence of media literacy on learning from television and hypermedia environments. In a sample of 150 children with a mean age of 5.33, a computer-based test was used to assess media literacy, and recognition and inference questions were used to measure learning. The influence of intelligence, media usage, and socioeconomic status as independent variables was also assessed. Hierarchical regression analyses showed that media literacy was a significant predictor of learning from media, even when controlling for other relevant factors such as intelligence.

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Ever since television and computers became widely available to a broad public, researchers have examined their effects on children's development. Both of these media have given rise to concerns based on assumptions or evidence of their negative influence on children's development in the suppression of other activities (Cantor, 2012; Koolstra, van der Voort, & van der Kamp, 1997) or in creating a disposition to aggressive behavior (Bushman & Huesmann, 2012). However, other research, focusing on the educational impact of media, suggests that well-designed and age-appropriate educational media can impart knowledge (e.g., Mares, Sivakumar, & Stephenson, 2015; Tamiim, Bernard, Borokhovski, Abrami, & Schmid, 2011). Aside from the characteristics of educational media that influence learning, researchers have also examined personal characteristics of learners such as demographics, age, and gender (for an overview, see Kirkorian & Anderson, 2008). The present study examines the effect of media literacy as another personal characteristic that has not to our knowledge been examined to date.

1. Media literacy

Definitions of media literacy change often as existing technologies evolve and new technologies appear (Guernsey & Levine, 2015). Such definitions usually include competencies like accessing, understanding, analyzing, and evaluating media messages; creating media messages; participating; and reflecting (e.g., Hobbs & Moore, 2013; Rogow, 2015). In the current article, we will depend mainly on Potter's (1998, 2013) concept of media literacy, as it adopts a developmental perspective. According to this conception, children between the ages of 3 and 5 years develop the so-called "rudimentary skills" of media literacy. Between 5 and 9 years, children begin to develop critical evaluation skills, which become ever more important in adolescence and adulthood, when "advanced skills" are acquired. Rudimentary skills relate to the fundamental capability to read media symbols, to recognize the patterns those symbols create, and to ascribe meaning to those patterns. We (Nieding & Ohler, 2008) encapsulated these abilities in the term media sign literacy ("Mediale Zeichenkompetenz") (p. 382), proposing that this is the most important aspect of media literacy development in young children.

1.1. Development of media sign literacy

The first milestone in the development of media sign literacy (MSL) is the ability to use symbols. This ability is closely linked to other developmental markers such as understanding of intentionality, mental states, cultural conventions, and iconicity (Namy & Waxman, 2005). The understanding that symbols (e.g., pictures or films) refer to something other than themselves is referred to as representational insight (DeLoache, 2002). International comparative studies have shown that this capability is not innate but is based on experience of pictures;
infants in Western cultures show earlier understanding of the representational nature of pictures than children who have had no previous experience of pictures (Callaghan, Rochat, & Corbit, 2012; Walker, Walker, & Ganea, 2013). The way in which infants grasp at photographs as if they were objects (e.g., DeLoache, Uttal, & Pierrouatsakos, 1998) is further evidence that infants do not yet understand that photographs are representational. By the age of 18 months, however, children rarely grasp pictures in this way; instead they begin to point and attempt to talk about the represented objects (Uttal & Yuan, 2014). However, the child's understanding of the representational nature of photographs is not fully developed at 18 months, as they have yet to learn exactly how photographs relate to their referents. Even 3-year-olds still make errors in this regard, believing for instance that photographs taken in advance will change if the represented scene changes (Donnelly, Gjerse, & Hood, 2013). Similarly, 3-year-olds assumed that popcorn would spill out of a televised popcorn bowl if the television was turned upside down (Flavell, Flavell, Green, & Korfmacher, 1990). These and other results show that the development of representational insight follows a similar course for video as for still images; while 9-month-old infants try to grasp objects on the screen, between 15 and 19 months of age, they will instead begin to point at the screen (Pierrouatsakos & Troseth, 2003).

Note that our concept of media sign literacy is related to what DeLoache called “symbolic sensitivity”—“a general expectation or readiness to look for and detect the presence of symbolic relations between entities” (DeLoache, 1995, p. 112). Evidence for the connection between MSL and symbol reading comes from a longitudinal study (Nieding et al., 2016), which showed that children’s MSL at age 4 years predicts their competence in precursors of reading and writing as well as mathematics—skills that rely heavily on the understanding and manipulation of symbol systems.

However, our conception also encompasses more complex symbol systems such as formal features and early skills of critical evaluation, such as the reality-fiction distinction, as outlined in the following sections.

1.1.1. Understanding formal features of television

Viewing films and related media requires an understanding of the visual production and editing techniques characteristic of such symbol systems. Because film’s formal visual features (Rice, Huston, & Wright, 1986) are often used to compress time and space or to emphasize certain information, comprehension of such features is a crucial component of film literacy. This facility has become increasingly important as the pace of editing in modern formats accelerates, even in children’s programs—for instance, the editing pace of Sesame Street increased from 4 cuts per minute in 1977 to 8 cuts per minute in 2003 (Koolstra, van Zanten, Lucassen, & Ishak, 2004).

Understanding of editing techniques develops significantly between the ages of 3 and 7 years (Smith, Anderson, & Fischer, 1985). At first, children learn to comprehend the so-called first-order editing rules (“matching the position” and “matching the movement”; d’Ydewalle & Vanderbekeen, 1990), which incur relatively low-level cognitive demands, as they are fairly close to natural perception. In the next step, children come to understand second-order editing rules, related to spatial relations (e.g., movement or viewing direction in dialogue scenes). Finally, rules relating to the continuity of actions (flashback, flash-forward, cross-cutting1 etc.; third-order editing rules) are understood. These findings are supported by eye movement data for film cuts (Munk, Rey et al., 2012) and by children’s re-enactments of film sequences (Munk, Diergarten, Nieding, Ohler, & Schneider, 2012; Smith et al., 1985).

Understanding of formal features is closely linked to children’s level of cognitive development. For instance, understanding zoom shots

1 This technique establishes action occurring at the same time in two different locations. The camera cuts away from one action to another, suggesting simultaneity.
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