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What's next for research on young children's interactive media?

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ABSTRACT

Since early in the development of children's television, research has informed policy and practice involving young children's media use. To increase the likelihood that new media support children's development, research in the coming decade must stay current with advancing technology. With the advent of various forms of interactive digital media, key research questions involve social and physical interactivity. How should adults appropriately support children's use of different kinds of media to promote children's creativity, learning, and development? How does co-viewing (social interaction) overlap with and differ from contingency built into the medium itself? When a device interacts, does that change the kind of support required of a co-viewing adult, or eliminate the need for such support? How does the introduction of new technology impact the lives of families? Issues related to video chat, touchscreen and motion capture technology, artificial intelligence, and electronic books and games are discussed.

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In the last decade, scientific research has influenced policy and practice involving young children's media use. For example, research showing the importance of direct social interaction for cognitive, emotional, and social development informed the 1999 American Academy of Pediatrics recommendation discouraging the replacement of interpersonal time with the use of passive screen media for children under two years. In reaffirming this position, the AAP (American Academy of Pediatrics, Council on Communications and Media, 2011) cited research-based evidence not only of little learning from video at this age (see Troseth, 2010), but also the negative effects of background TV, including disruption of both parent–child conversation and children's focused attention on play (Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009). Acknowledging the reality of media exposure for many families, the Academy encouraged parents whose young children used screen media to watch along with them. Similarly, a 2012 joint statement of the National Association for the Education of the Young Child and the Fred Rogers Center emphasized limiting technology for infants and toddlers to experiences in which adults "appropriately support responsive interactions." In line with these policy statements, recent research shows the value of active parental co-viewing

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in promoting learning from video even into the preschool period (Strouse, O'Doherty, & Troseth, 2013).

Moving forward, researchers can offer empirically based answers to policy-makers, content creators, and practitioners to increase the likelihood that new digital technologies support children's development. With the advent of touchscreen technology, a prominent pediatrician (Christakis, 2014) recommended that the Academy rethink their screen-time policy. He reasoned that interactive, responsive features make touchscreen use more similar to playing with traditional toys than passive video viewing. Research to support or refute this directive is just emerging.

Key questions for the coming decade involve how the effects of physical and social interactivity overlap and differ, as well as children's need for one or both kinds of support for learning and development at various ages. A central aspect of interactivity is the production of a contingent response, as simple as touching a screen to cause an interesting effect or flicking a light switch to turn a light on and off—favorite pastimes of many toddlers. New devices offer physical contingency through touch screens, motion sensors, and webcams. Social contingency has historically been provided to children by a human partner. Because some media now include built-in interactivity, research is needed to determine how physical and social interaction each support children's learning, the effect of introducing such technology into the lives of families, and whether or not built-in technological interactions reduce the need for in-person social support.

Examining social interaction

Regarding effective co-viewing of media (or active mediation), research has begun to examine three mechanisms by which social interaction supports children's learning (Strouse et al., 2013). First, adults provide a scaffold to keep children focused, pointing and talking to *direct attention* to important screen-based content. Adults' own attentiveness serves as a model; for instance, young children frequently look at television in response to their parents' looks (Demers, Hanson, Kirkorian, Pempek, & Anderson, 2012). *Cognitive support* is direct instruction adults provide during co-viewing. By asking questions about on-screen content or relating it to prior events, adults encourage children to retrieve from memory and rehearse information. They may support vocabulary development by asking children to repeat words used on the screen, or support symbolic insight by drawing direct connections between on-screen and real-world items. Finally, adults' *social feedback* cues (e.g., gaze direction, use of child-directed speech, contingent responsiveness to children's actions) highlight learning opportunities. These natural adult behaviors indicate to children that the adult has information to share with them, making learning more efficient (Gergely, Egyed, & Király, 2007).

In a study of 12- to 18-month-old infants, parental scaffolding (questions, labels, and descriptions) while co-watching video was related to infants' attentiveness and responsiveness to the screen (Barr, Zack, Garcia, & Muentener, 2008). In another study, active parental co-viewing of video storybooks (pausing the videos and asking questions) increased preschool children's vocabulary learning and story comprehension compared to solo viewing (Strouse et al., 2013). Thus, active mediation is effective. However, video watching serves a different purpose in the family than bedtime co-reading does. Parents typically regard video watching as an activity children can do alone, and do not support learning from video the

way they co-read books; therefore, public education is needed regarding the benefits of active co-viewing.

Going forward, research should extend what we know about effective co-reading and active co-viewing to what we are calling "co-playing"—social engagement with children while using touchscreen apps and other interactive media. Adults may regard such play as another solo experience for children. They may be hesitant to break the flow of a game, assuming that it has been designed for optimal solitary use. Based on research showing the benefits of social engagement while viewing video with children, however, we must depart from this outlook. Apps designed to accommodate multiple players are on the rise, enhancing opportunities for co-play with family members and friends. Researchers should therefore not only investigate co-play between adults and children, but between peers as well.

Quasi-social interaction on video

When Steve from *Blue's Clues* first looked at viewers, asked a question, and paused as if waiting for an answer, he ushered in one of the biggest innovations in children's television history. Using the natural turn-taking of interactive communication, this new format offered a seemingly responsive social partner on screen, although not one who could respond contingently to the child. Research indicated that children became more responsive to the TV character after watching repeatedly, and that repeated viewings led to more learning of the episode content (Crawley, Anderson, Wilder, Williams, & Santomero, 1999).

Although pre-taped video cannot offer contingency, could it include some of the features that make active mediation/co-viewing effective? Strouse and colleagues (2013) had an actress appear in a picture-in-picture window in the corner of a briefly paused storybook video. "Miss Sue" made apparent eye contact with viewers, asked questions about on-screen story content, and paused for a response. Parents reported that during home viewing, their children responded to some of Miss Sue's prompts. After several viewings, children saw a new video of the same storybook in which Miss Sue posed more cognitively challenging questions; in essence, the videos (like effective parental scaffolding) "adapted" to children's new level of familiarity with the story vocabulary and content. Children who experienced quasi-social interaction and cognitive supports (questions varying in difficulty) from Miss Sue learned almost as much new vocabulary and story content as those who co-viewed with their parents. This suggests the possibility that apparent social interaction that includes features of active mediation, even without contingency, may assist children's learning from video. New research indicates that there is an optimal amount of interaction that supports children's learning; too much can be distracting (Nussenbaum & Amso, 2015). Future research should develop measurable criteria to evaluate program features that would encourage viewers' interaction with the screen.

Video chat: social interaction via live video

Actual contingent responsiveness from a person on video is now possible due to another technological innovation. Live video chat (e.g., Skype, FaceTime) is used by many families to communicate with relatives who live far away. Young children seem to learn readily in this context: interacting with a social partner on closed-circuit video (especially with an adult

co-viewer present) helped children learn what the on-screen person taught and apply it in the real world (e.g., Roseberry, Hirsh-Pasek, & Golinkoff, 2014; Strouse, Troseth, O'Doherty, & Saylor, 2015; Troseth, Saylor, & Archer, 2006). In contrast, children in these studies did not learn from pre-taped video. New research indicates that toddlers learn from people they interact with solely on video chat at home over the course of a week, and recognize people and objects from the video when encountering real-life counterparts in the lab (Myers, LeWitt, Gallo, & Maselli, 2015).

Will there be long-term effects of exposure to live video chat? Possibly, children will learn better from video or screens in general, either because this experience helps them to recognize video as a symbolic medium or because real-time contingency encourages children to look past the two-dimensionality of screen images and perceive the reality of on-screen events (e.g., Troseth, 2003). A very important area of future research is how both close and extended family relationships might be affected by the widespread availability of video chat. Grandparents in an American survey reported "living too far away" as the major reason they did not visit their grandchildren more often (American Association of Retired People [AARP], 2002). Given research indicating that even very young children are as comforted by a parent on video chat as when the parent is physically present (Tarasuik, Galligan, & Kaufman, 2011, 2013), it will be important to examine how this technology might affect emotional ties between children and their parents separated by frequent business travel, divorce, incarceration, or military service.

Although much more research is needed, the wide availability of this new technology also holds promise for children who lack access to regular in-person co-reading time. As the price of tablet computers continues to decrease and educational content increases, it becomes more realistic to think of distributing tablets to low-SES children in need of extra support. Imagine a child being able to video chat with a tutor for individualized reading or "co-play" of an educational game. New developments are making such ideas reality. For example, the application "Kindoma" (2015) allows shared reading via video chat, with eBook and chat partner both appearing on the screen. New technology thus may allow a skilled co-reader/viewer/player to support children's learning from a distance. Others are exploring how video chat may enable virtual play dates between children (e.g., Yarosh, Inkpen, & Brush, 2010). As technology advances, we likely will see more integration of co-reading, co-viewing, and particularly co-playing through video chat.

Interactive innovations: physical (and social?) interaction from a screen

A new kind of interactivity became possible with the introduction of the iPad and of motion capture devices such as the Wii and Xbox with Kinect technology. Touch screens (including tablet computers and smartphones) and motion capture offer new interactive features for children to explore on their own. Touchscreen technology, for instance, differs from older media in ways that might offer both advantages and concerns for child development. An obvious advantage is the need for engagement: children's responses to prompts are required for progress of the game or story, offering true "cause and effect." Moreover, touchscreen technology has the potential to be adaptive, uniquely responding to children's responses. For example, if they do not answer, they can be prompted again; if they answer incorrectly, they can receive repeated hints. Finally, if children answer correctly, this is acknowledged and rewarded, with subsequent questions being posed at an

appropriate level of difficulty. Similarly, motion capture technology responds directly to children's various physical movements and actions. This type of contingency not only requires children's active engagement, it also can help foster learning and comprehension. Compared to simply watching video, the responsiveness of interactive media can also provide children a feeling of accomplishment (Christakis, 2014).

Traditional screen media have not provided the social cues a real person can offer, such as contingent eye gaze, responsiveness to the viewer, or incorporating personal details (e.g., the viewer's name). In contrast, modern touchscreen devices can offer the contingency and responsiveness of a skilled adult scaffolder in a way that supports children's learning. For example, an app or eBook can direct attention using a hotspot (interactive feature) to draw children's attention to particular content; cognitive support can be provided through adaptive questions relevant to the content and the individual child's level and interests; and some aspects of social feedback can be delivered through individualized responses that change in response to the child's responses and performance.

Research to date suggests that for young children, interactive technology holds promise of better learning compared to passively watching video (e.g., Kirkorian, Choi, & Pempek, in press; Lauricella, Pempek, Barr, & Calvert, 2010). However, built-in contingency does not entirely eliminate the need for parental supervision. Parent support may be needed to help young children understand device mechanics and the rules of the game, to avoid frustration and ensure the intended benefits. In a study with traditional and electronic books, the amount of active parent involvement (including conversing about the story and discussing eBook mechanics) was related to children's story comprehension, regardless of the type of book (Lauricella, Barr, & Calvert, 2014). Thus, social support from a real person promotes children's learning from interactive media. Future research should determine if this parental support (like that offered during picture book interactions) also enhances socio-emotional development (Laible & Song, 2006).

Not all interactive features are beneficial; some may be distracting. For example, research with traditional paper books indicates that poorly designed manipulative features, such as flaps to lift, impede learning (Tare, Chiong, Ganea, & DeLoache, 2010). This unintended consequence also has been documented with eBooks: interactive features often detract from beneficial parent–child conversation. Talk focuses more on eBook mechanics (e.g., where to tap) than on story content, potentially jeopardizing children's learning (Chiong, Ree, & Takeuchi, 2012; Parish-Morris, Mahajan, Hirsh-Pasek, Golinkoff, & Collins, 2013). In other research, parent responsiveness and teaching, and toddlers' language production, were lower when playing with electronic books and toys than with non-electronic versions (Wooldridge & Shapka, 2012). More research is needed to determine whether this tendency extends to all types of eBooks and devices and other age groups. As interactive products continue to flood the market, public awareness and training may be needed to support adults in providing more content-rich talk during electronic book reading.

There is a great need for research to investigate which features of interactive technology are most beneficial (and for what ages), which ones detract, and which are simply neutral. Especially at very young ages, children's learning is not always facilitated by touchscreen interactivity (e.g., Zack, Barr, Gerhardstein, Dickerson, & Meltzoff, 2009). Merely having a story on a screen is not enough; 17- to 23-month-olds who were read a non-interactive touchscreen book were less likely to learn a new word than those read a traditional-format book (Strouse & Ganea, 2015). However, requiring children to touch a relevant image on a tablet to advance a video facilitated toddlers' word learning (possibly because this focused

attention on the target event); touching elsewhere on the screen or watching passively did not (Kirkorian et al., in press). Like three-dimensional toys and books, touch screens allow children to manipulate the contents of the screen in various ways, including tapping, swiping, and dragging, and even tipping the device. However, the efficacy of such features must be explored. Some researchers have hypothesized that thoughtfully placed manipulatives could highlight content and promote learning, but research is sparse (Chiong & DeLoache, 2013).

It is also important to consider how individual differences in children's interaction with various technological features might impact their use of a product. Children learn that tapping the screen often produces an exciting result (e.g., a rewarding noise or graphic). How might young children's impulsivity limit the instructional value of a screen that responds to any touch? In particular, younger children, children with low self-regulation, and boys are prone to excessive tapping of a touchscreen (Russo, Duncan, & Troseth, 2015). If taps during the instructions advance the app to the next screen, children may not know how to play the game, leading to more undirected taps, frustration, and little learning. However, interactivity also has the potential to support children's learning despite individual differences (e.g., in working memory capacity) when built correctly (Choi, Kirkorian, Pempek, & Schroeder, 2015).

Some express concern that getting a response from a device triggers brain reward pathways, making interactive devices potentially addictive (Christakis, 2014; Rosin, 2013). Related research is in its infancy, with the few studies to date targeting adults and adolescents playing video games (e.g., Kühn et al., 2011). Given parent concerns and policy implications, neuroscience research with children engaged with interactive technology is vital. Additionally, home-based observations and surveys are needed to understand how new interactive technology affects children's play and family life. Some questions to be addressed involve comparisons of how and when children play with 3D toys vs. 2D apps, the relation between parents' use of particular devices and their children's interest in those devices, and factors (e.g., time of day) that may determine if use of a device is beneficial or detrimental (e.g., when night use impacts sleep). Qualitative investigations of families' behaviors while using interactive technology, in conjunction with lab- and home-based experiments, may enable researchers to interpret their results in light of the social and physical context of use (see Fidler, Zack, & Barr, 2010, for an example).

Conclusion: looking ahead

The past decade has seen vast changes in children's media, including the release of modern smartphones and tablets, as well as countless other digital devices specifically for children. The pace of new industry breakthroughs is likely to continue at an exponential rate and it is crucial that research stays current. No matter what new technology is developed, content for children will quickly appear. The market is huge: parents and educators are constantly looking for new ways to boost young children's learning. Parents today are bombarded with more conflicting information than ever before about what is best for their child. Therefore, unbiased scientific research is in high demand.

Unfortunately, it is extremely difficult for research to keep up the same pace. Researchers spent five decades exploring the effects of television and video on children's learning and development. Today, the stakeholders of scientific research (industry, parents, and teachers) expect and need answers specific to new technology soon after its development. Therefore, in addition to training more researchers from various disciplines to investigate these crucial

topics from multiple points of view, it is important to explore questions that can be generalized to multiple platforms. This will ensure that device-specific research will not immediately be outdated by new tech advances.

New technology continues to push the frontier of the kinds of interactivity a device can offer. The "quasi-social" interaction of *Dora the Explorer* pausing for a child's answer—a hugely influential innovation in its time—has been trumped by technology affording contingent responses to a child's swipe, voice, or body motion. The line between representation and reality continues to be blurred by new advances: forget digital avatars, now children can appear on the TV screen in real time as they play games (e.g., on LeapTV). Soon, children will be able to manipulate the outcome of a TV program as they watch. We will also see artificial intelligence play a large role in children's learning through technology, resulting in even more personalized, adaptive, and effective built-in scaffolding. For instance, CogniToys (Elemental Path: Connected Smart Toys that Grow, 2015) is using IBM's Watson artificial intelligence technology in an interactive dinosaur toy. Similar to the iPhone's "Siri," the dinosaur responds immediately to children's questions and comments, adapting to the child's cognitive level and encouraging educational growth. For example, a child can practice addition with the toy, which will provide subsequent questions based on the child's responses. Children's tendency to develop close "parasocial relationships" with virtual characters may be heightened when their toys respond to them (Calvert, Richards, & Kent, 2014); research will be needed to determine if interacting with this new kind of social partner affects development.

The next decade will undoubtedly witness exciting advances in children's interactive media. This kind of technology could be a boon to teachers struggling to provide individualized support for dozens of children simultaneously, and to parents who are overwhelmed with responsibilities or need new ideas of how to support their child's learning. The challenge for researchers will be to provide useful, timely information to industry, parents, and teachers to help ensure that new media are beneficial to children.

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References

American Academy of Pediatrics, Committee on Public Education. (1999). Media education. *Pediatrics, 104*, 341–343. doi:10.1542/peds.2010-1636

American Academy of Pediatrics, Council on Communications and Media. (2011). Media use by children younger than 2 years. *Pediatrics, 128*, 1040–1045. doi:10.1542/peds.2011-1753

American Association of Retired People. (2002). *The grandparent study 2002 report*. Retrieved from: http://assets.aarp.org/rgcenter/general/gp_2002.pdf

Barr, R., Zack, E., Garcia, A., & Muentener, P. (2008). Infants' attention and responsiveness to television increases with prior exposure and parental interaction. *Infancy, 13*, 30–56. doi:10.1080/15250000701779378

Calvert, S. L., Richards, M. N., & Kent, C. (2014). Personalized interactive characters for toddlers' learning of seriation from a video presentation. *Journal of Applied Developmental Psychology, 35*, 148–155. doi:10.1016/j.appdev.2014.03.004

Choi, K., Kirkorian, H. L., Pempek, T. A., Schroeder, E. L. (2015, March). *Toddlers' object retrieval using touchscreens: The role of working memory skills*. Paper presented at the biennial meeting of the Society for Research in Child Development, Philadelphia, PA.

Chiong, C., & DeLoache, J. S. (2013). Learning the ABCs: What kinds of picture books facilitate young children's learning? *Journal of Early Childhood Literacy, 13*, 225–241. doi:10.1177/1468798411430091

Chiong, C., Ree, J., & Takeuchi, L. (2012). *Quick report: Print books vs. e-books*. Retrieved from: http://www.joanganzcooneycenter.org/publication/quickreport-print-books-vs-e-books/

Christakis, D. A. (2014). Interactive media use at younger than the age of 2 years. *JAMA Pediatrics, 168*, 399–400. doi:10.1001/jamapediatrics.2013.5081

Crawley, A. M., Anderson, D. R., Wilder, A., Williams, M., & Santomero, A. (1999). Effects of repeated exposures to a single episode of the television program Blue's Clues on the viewing behaviors and comprehension of preschool children. *Journal of Educational Psychology, 91*, 630–637. doi:10.1037/0022-0663.91.4.630

Demers, L. B., Hanson, K. G., Kirkorian, H. L., Pempek, T. A., & Anderson, D. R. (2012). Infant gaze following during parent-infant coviewing of baby videos. *Child Development, 84*, 591–603. doi:10.1111/j.1467-8624.2012.01868

Elemental Path: Connected Smart Toys that Grow. (2015). Retrieved from: http://www.elementalpath.com

Fidler, A. E., Zack, E., & Barr, R. (2010). Television viewing patterns in 6- to 18-month-olds: The role of caregiver-infant interactional quality. *Infancy, 15*, 176–196. doi:10.1111/j.1532-7078.2009.00013.x

Gergely, G., Egyed, K., & Király, I. (2007). On pedagogy. *Developmental Science, 10*, 139–146. doi:10.1111/j.1467-7687.2007.00576.x

Kindoma. (2015). Retrieved from: http://kindoma.com

Kirkorian, H. L., Pempek, T. A., Murphy, L. A., Schmidt, M. E., & Anderson, D. R. (2009). The impact of background television on parent-child interaction. *Child Development, 80*, 1350–1359. doi:10.1111/j.1467-8624.2009.01337.x

Kirkorian, H. L., Choi, K., & Pempek, T. A. (in press). Toddlers' word learning from contingent and non-contingent video on touchscreens. *Child Development*.

Kühn, S., Romanowski, A., Schilling, C., Lorenz, R., Mörsen, C., Seiferth, N., … Gallinat, J. (2011). The neural basis of video gaming. *Translational Psychiatry, 53*, 1–5. doi:10.1038/tp.2011.53

Laible, D., & Song, J. (2006). Constructing emotional and relational understanding: The role of affect and mother-child discourse. *Merrill-Palmer Quarterly, 52*, 44–69. doi:10.1353/mpq.2006.0006

Lauricella, A. R., Barr, R., & Calvert, S. (2014). Parent-child interactions during traditional and computer storybook reading for children's comprehension: Implications for electronic storybook design. *International Journal of Child-Computer Interaction, 2*, 17–25. doi:10.1016/j.ijcci.2014.07.001

Lauricella, A. R., Pempek, T. A., Barr, R., & Calvert, S. L. (2010). Contingent computer interactions for young children's object retrieval success. *Journal of Applied Developmental Psychology, 31*, 362–369. doi:10.1016/j.appdev.2010.06.002

Myers, L. J., LeWitt, R. B., Gallo, R. E., & Maselli, N. M. (2015). Baby facetime: Can toddlers learn from online video chat? *Manuscript submitted for publication*.

National Association for the Education of Young Children & Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College (2012). Technology and interactive media as tools in early childhood programs serving children from birth through age 8. Retrieved from: http://www.naeyc.org/content/technology-and-children

Nussenbaum, K., & Amso, D. (2015). An attentional Goldilocks effect: An optimal amount of social interactivity promotes word learning from video. *Journal of Cognition and Development,*. doi:10.1080/15248372.2015.1034316

Parish-Morris, J., Mahajan, N., Hirsh-Pasek, K., Golinkoff, R. M., & Collins, M. F. (2013). Once upon a time: Parent-child dialogue and storybook reading in the electronic era. *Mind, Brain, and Education, 7*, 200–211. doi:10.1111/mbe.12028

Rosin, H. (2013, April). The touch-screen generation. *The Atlantic,* 56–65.

Roseberry, S., Hirsh-Pasek, K., & Golinkoff, R. M. (2014). Skype me! Socially contingent interactions help toddlers learn language. *Child Development, 85*, 956–970. doi:10.1111/cdev.12166

Russo, C. E., Duncan, C., & Troseth, G. L. (2015). iTap on a touchscreen: Factors that affect children's interaction and learning. *Manuscript in preparation*.

Strouse, G. A., & Ganea, P. A. (2015). Prior experience predicts infants' word learning from touchscreen and traditional format books. *Manuscript submitted for publication*.

Strouse, G. A., O'Doherty, K., & Troseth, G. L. (2013). Effective coviewing: Preschoolers' learning from video after a dialogic questioning intervention. *Developmental Psychology, 49*, 2368–2382. doi:10.1037/a0032463

Strouse, G. A., Troseth, G. L., O'Doherty, K. D., & Saylor, M. M. (2015). Co-viewing and contingency support toddlers' word learning from video. *Manuscript submitted for publication*.

Tarasuik, J. C., Galligan, R., & Kaufman, J. (2011). Almost being there: Video communication with young children. *PLoS ONE, 6*, 1–8. doi:10.1371/journal.pone.0017129

Tarasuik, J. C., Galligan, R. F., & Kaufman, J. (2013). Seeing is believing, but is hearing? Comparing audio and video communication for young children. *Frontiers in Psychology, 4*, 1–6. doi:10.3389/fpsyg.2013.00064

Tare, M., Chiong, C., Ganea, P., & DeLoache, J. (2010). Less is more: How manipulative features affect children's learning from picture books. *Journal of Applied Developmental Psychology, 31*, 395–400. doi:10.1016/j.appdev.2010.06.005

Troseth, G. L. (2003). TV guide: Two-year-old children learn to use video as a source of information. *Developmental Psychology, 39*, 140–150. doi:10.1037/0012-1649.39.1.140

Troseth, G. L., Saylor, M. M., & Archer, A. H. (2006). Young children's use of video as a source of socially relevant information. *Child Development, 77*, 786–799. doi:10.1111/j.1467-8624.2006.00903.x

Troseth, G. L. (2010). Is it life or is it Memorex? Video as a representation of reality. *Developmental Review, 30*, 155–175. doi:10.1016/j.dr.2010.03.007

Wooldridge, M. B., & Shapka, J. (2012). Playing with technology: Mother-toddler interaction scores lower during play with electronic toys. *Journal of Applied Developmental Psychology, 33*, 211–218. doi:10.1016/j.appdev.2012.05.005

Yarosh, S., Inkpen, K. M., & Brush, A. J. B. (2010, April). Video playdate: Toward free play across distance. Paper presented at the Computer Human interaction, Atlanta, Georgia, USA.

Zack, E., Barr, R., Gerhardstein, P., Dickerson, K., & Meltzoff, A. N. (2009). Infant imitation from television using novel touch screen technology. *British Journal of Developmental Psychology, 27*, 13–26. doi:10.1111/sjop.12001