Article

Young Children's Engagement With E-Books at School: Does Device Matter?

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Abstract

Differences between digital devices on children's engagement with e-books are examined. The sample included 24 typical 4-year olds enrolled in Head Start. Over a 1-month period, video captures of children's multi-sensory behaviors during shared reading at a tabletop touchscreen computer and teacher-facilitated book browsing with iPads and iPods were obtained. Data were coded on each child at 1-min intervals, examining the simultaneity of behaviors present, then aggregated to determine frequencies of each behavior by device and format. Differences between media devices on median percent of observation time were evaluated. Looking, touching, moving, and gesturing behaviors were significantly different among different devices. Large effect sizes indicated considerable variability attributable to the device. Mobiles support more looking and touching but less moving and gesturing than the tabletop touchscreen; none of the devices favored listening over another. Given the role of haptic perception in digital reading experience, access to mobiles may favor behaviors that support literacy motivation, sense of control, and interaction.

Keywords

engagement, e-book, early literacy, digital devices, multi-sensory behaviors

For young children, electronic tools will be a chief source of textual information at school and in life. Whether stationary or mobile, the range of electronics from smart boards to hand-held devices already deliver an ever-increasing number of e-books, e-texts, and games. Moreover, the virtual explosion in apps has transformed the traditional storybook of early childhood into a highly interactive, multi-media literacy experience.

Much remains unknown, however, as to the impact of the digital medium on children's early literacy knowledge, skills, and print motivation. What, for example, do we really know about the ways in which young children interact with these knowledge objects and their content—and do we understand the impact of this new media on the learn-to-read process. Research shows differences in such variables as child regulation skills (Kegel, van der Kooy-Hofland, & Bus, 2009), e-book features (e.g., hotspots; Shamir & Korat, 2009), online tutorial assistance (Kegel & Bus, 2012), and adult mediation (Korat & Shamir, 2007). Even less is known, though, about how these new literacy tools "work" in different activity settings in preschools, that is, how they capture and hold children's attention to stories and print. In brief, there is much to learn about the digital medium and its tools if we are to make the best use of all that this new age text resource has to offer in the early learning environment.

This report is part of a series of studies (Roskos et al., 2011; Roskos & Brueck, 2011, 2012, Roskos, Burstein, & You, 2012) examining the use of electronic books (e-books) as a curricular resource in the preschool literacy and language program, specifically focused on the need for basic pedagogic principles of child e-book interaction as a foundation for preschool literacy. From an ecological psychology perspective (Barker, 1968), a preschool contains both open (e.g., Centers) and closed (e.g., Circle Time) activity systems. Each contains certain formats (e.g., shared book reading) and objects (e.g., books), the characteristics of which support interaction with/toward the purpose of the situation (e.g., reading and learning from storybooks). These characteristics of format and object are affordances in the learning environment that individuals use to engage in activity—the signals, so to speak—provided the individual *picks up on* this information (Gibson, 1977; Greeno, 1994). In short, what the environment has to offer (affordances) coupled with individual abilities are in a proportional, dynamic relationship—one dependent on the other. Conditions that support the young child's engagement in e-book reading activity, for example, include some abilities of the child and some objective features of the setting (format; tools). Considerable preschool and early literacy research provides evidence of the

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dynamics between affordances and individual abilities in early childhood activity (e.g., Kounin & Gump, 1974 on signal systems in lesson settings; Bus & van IJzendoorn, 1995, on affective dimensions of mother-infant picture book reading). That environmental affordances and individual abilities are available is no guarantee, however, that a desired activity will follow (e.g., engagement in e-book reading). To that purpose, the individual must be motivated to use both abilities and affordances to actively engage with what settings have to offer.

In this study, we focus on children's engagement behaviors with electronic devices for e-book reading and browsing by examining the opportunities these tools offer for participation in literacy experience in the preschool classroom. The research asks whether digital tools influence children's engagement behaviors with e-books and if so in what ways might this be supportive of literacy learning (e.g., listening). Answers along these lines contribute to an understanding of pedagogic principles for early literacy instruction, as well as design features of digital tools.

Method

In earlier research, we derived a typology for observing preschool children's engagement behaviors with e-books in two preschool activity settings: shared book reading during Circle Time and book browsing during Center Time.

The shared book-reading setting included a stationary desktop touchscreen computer (TS; Asus Eee Top all-in-one PC; 19.5 × 0.80 × 14.60 inches (L × W × H) and was used for small group e-book reading. Two times each week, the teacher gathered three children around the TS computer (either on a desk or wall-mounted) and shared an e-book with them by listening to the narration and pausing periodically to discuss screen pages of the story. The book-browsing setting included mobile devices, iPads (PA; generation 1 [width = 7.31"; height = 9.50"; weight = 1.5 pounds) and iPods (PO; width = 2.31"; height = 4.86"; weight = 3.10 oz.), that were used for individual or paired e-book browsing. Twice a week, the teacher directed the same three children to the Library Center and provided them with assistance in using a mobile device (e.g., turning on the device; adjusting head sets) to enjoy an old favorite or new e-books, and occasionally conversed with the children about e-book content. Basic features of the two activity settings are described in Figure 1.

Teacher/child verbal communications, props (objects), and the format (general patterns of behavior) of each setting provided affordances within these activity settings for engagement in the e-book reading activity, with those of shared book likely more *continuous* due to format than those of book-browsing, which were more *open* to distractions in the environment (e.g., other Centers for activity; Kounin & Doyle, 1975).

Grounded in prior research on young children's engagement with traditional books (DeBruin-Parecki, 1999; Moody, Justice, & Cabell, 2010; Sipe, 2002), the original typology observation scheme consisted of 3 behavioral categories (control, multi-sensory behaviors, communication) and 11 behavioral actions. (see Table 1.) Applied to a small preschool child sample (n = 24), it was found to be reliable (inter-rater agreement = 86%), yielding descriptive evidence of children's engagement behaviors in the two preschool settings. Several observations from this earlier research warranted further investigation. One is that the control of the digital device influenced children's multi-sensory and language behaviors with it in the setting, corroborating prior research (Calvert, Strong, & Gallagher, 2005). Another is that children's looking, touching, and listening behaviors tended to increase with greater control of the tool while moving and gesturing tended to decrease; the smallest device, the iPod (PO), supported the highest incidence of looking-touching-listening behaviors. A third observation is that children's verbal communication shifted from more to less in the shared

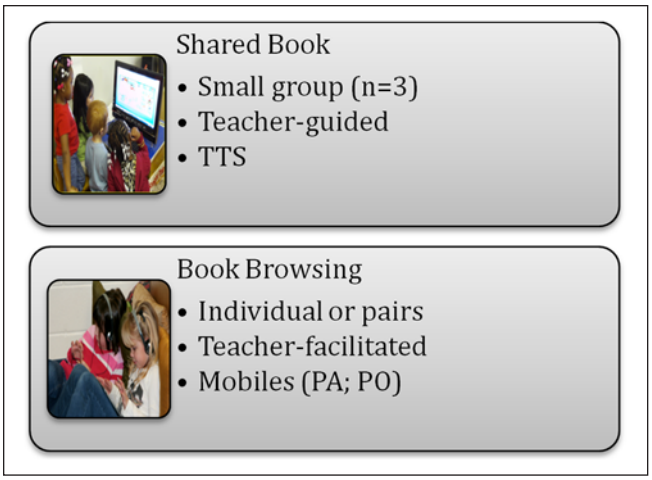

Figure 1. Preschool settings for e-book reading.

Table 1. Typology of Engagement With E-Books.

Typology of engagement with e-books	
Category	Salient behaviors
Control	Operating the device
Multi-sensory behaviors	Looking
	Touching
	Listening
	Moving
	Gesturing
Communication	Making facial expressions
	Making noises
	Using language
	Commenting
	Answering questions
	Asking questions

book-reading format and the book-browsing format, respectively, and across devices. The smallest device, the iPod (PO), supported the least verbal language use. In this study, these observations are re-examined to further test the typology and to better understand digital tool usability in the preschool literacy environment.

Participants

The preschool sample consisted of 24 children attending eight Early Reading First classrooms—four located in the Midwest and four in the Southwest United States. Teachers selected three children from their respective classrooms for participation in e-book-reading sessions based on (1) average or better performance in most learning domains; (2) generally appropriate behavior in small group settings; and (3) self-regulation in independent activities. The child sample was diverse (17% Hispanic; 33% White; 50% African American); included a majority of boys; had a mean age of 54 months and vocabulary scores in the average range of the Peabody Picture Vocabulary Test, Fourth Edition (PPVT-IV; $M = 90$ standard score).

Data

Over a 1-month period, video captures of e-book reading were obtained twice weekly in two settings—small group shared book reading around the TS and individual/pair child book-browsing during Center Time using PA and PO, totaling 547 min (see Roskos, Burstein, & You, 2012, for a detailed description of the data collection). Using the typology, observational data were coded at 60-s intervals by a three-member research team and entered into NVivo-8 for analysis (QSR International, 2007). At each 60-s interval, data were coded on each child, recording the instance and simultaneity of salient behaviors present in that interval, that is, determining engagement in an array of non-exclusive multi-sensory behaviors (see Table 1), non-exclusive communication behaviors, and one of mutually exclusive language behaviors (e.g., commenting). For example, a child could simultaneously be coded as looking, touching, listening, using language, and making a comment (see coding rules in appendix A; coding sample in appendix B). The analysis yielded frequency counts of individual child behaviors by type defined in the typology. Data were then aggregated; the mean frequency of each behavioral indicator and the total percent of time it occurred were calculated for the child sample in each setting format (shared book reading; book browsing/reading) and with each digital tool (TS; PA; PO).

Analysis

For the purposes of this study, the analysis was limited to those data describing children's multi-sensory behaviors (listening, looking, touching, moving, gesturing) and two communication-type behaviors (making noises; facial expressions) per the typology scheme because these engagement behaviors could be compared across settings. Analyses of control (operating the device) and verbal language (asking, answering, and commenting) as engagement indicators are reported in a prior study (Roskos, Burstein, & You, 2012). Both were considered as primary features of format (arrangement) rather than of device, per se, in the setting.

The original data set was re-organized to examine the percent of time within an e-book session by setting each child demonstrated the focal engagement behaviors with the digital devices (TS; PA; PO). Kruskal-Wallis tests were conducted to evaluate the differences between digital tools on the median percent of each observable behavior as a function of the total number of behavioral observations in a session (percentage of total number of behaviors observed per child per session). A total of seven different engagement behaviors were evaluated using the non-parametric Kruskal-Wallis test: listening, looking, touching, moving, gesturing, making noises, and average of facial expression (0 = negative, 1 = neutral, and 2 = positive). A Bonferroni post-hoc test was used to indicate significant differences between digital tools when demonstrating significance; the Mann-Whitney U test was used to determine the effect size (attributable difference).

Results

Do Devices Influence?

In general, the Kruskal-Wallis tests indicate that the digital devices had a significant influence on a majority of the observed engagement behaviors (four out of seven). Test results are summarized in Table 2.

In brief, *looking, touching, moving*, and *gesturing* behaviors were significantly different in the presence of different devices. Evaluation of the differences between devices (TS; PA; PO) on the median *looking* percent as a function of the total number of observations was significant $\chi^2(2, N = 45) = 11.28$, $p < .01$; the proportion of variability accounted for by device type was 0.26, indicating a moderate relationship between device type and the percent of time the child spent looking. On the median *touching* percent, the test was significant $\chi^2(2, N = 45) = 30.91$, $p < .01$; the proportion of variability accounted for by device was 0.70, indicating a strong relationship between device type and the percent of time the child spent touching. On the median *moving* percent, the test was significant $\chi^2(2, N = 45) = 21.70$, $p < .01$; the proportion of variability accounted for by device was 0.49, indicating a moderately strong relationship between device type and the percent of time the child spent moving. And on the median *gesturing* percent, the test was significant $\chi^2(2, N = 43) = 10.29$, $p < .01$; the proportion of variability accounted for by device type was 0.25, indicating a modest relationship between device type and the percent of time the child spent gesturing.

Table 2. Test Statistics.[a,b]

	Listening percent	Looking percent	Touching percent	Moving percent	Gesturing percent	Noises percent	FacialExp Avg
χ^2	1.644	11.280	30.910	21.701	10.297	1.166	4.617
Df	2	2	2	2	2	2	2
Asymptotic significance	.440	.004	.000	.000	.006	.558	.099

[a]Kruskal Wallis Test.
[b]Grouping variable: digital device.

The strong influence of device on time spent touching during the e-book reading or browsing experience is impressive, given the key role of touch in early learning (Carlson, 2006; see also Gallace & Spence, 2008, for an in-depth review of tactile perception in human development and learning) and the increasing interactivity with e-book content in the early reading experience (e.g., swiping, tapping, dragging, dropping, pulling). Moderate to stronger influences on time spent looking, moving, and gesturing in the presence of the devices are also notable and show the *coercive pull* of device on these multi-sensory behaviors.

Evaluations of the differences between the devices (TS; PA; PO) on the *listening, making noises*, and *facial expressions* median percents were not significant—listening: $\chi^2(2, N = 45) = 1.64$, $p > .05$; making noises: $\chi^2(2, N = 43) = 1.17$, $p > .05$; facial expressions: $\chi^2(2, N = 43) = 4.62$, $p > .05$. This finding clarifies our earlier observation of an increase in time spent listening between the shared book and book-browsing settings, as well as time spent using certain communication-like behaviors, indicating that these increases were not affected by device. That time spent listening was not affected by device, albeit time spent looking was, maybe reflective of vision's dominance over audition in general among multi-sensory behaviors. Considerable modality research demonstrates the preference for vision over audition in allocating attention, and this preference may have modulated the role of listening for engagement across devices in the two formats (shared book; book browsing; Spence, 2010).

From an early literacy perspective, it also could be argued that listening behavior in this instance may represent the communication category of the "working" typology—an option that aligns with the National Early Literacy Panel (2008) report, which places listening (comprehension) in the oral language composite (p. 74) for measuring early literacy development and learning. Following this argument, device appears to have no impact on children's use of listening, making noises, and facial expression as forms of communication for engagement. That gesturing was moderately influenced by device, however, works against this argument with respect to the typology because it, too, could be categorized as a form of communication.

Table 3. Differences Between Devices on Engagement Behaviors.

	Z scores		
Behavior	TS-PA	TS-PO	PA-PO
Looking	−1.455	−3.071*	−2.340
Touching	−5.059*	−4.721*	−2.136
Moving	−1.011	−4.508**	−3.165**
Gesturing	.000	−3.307*	−1.956

Note. TS = touchscreen computer; PA = iPads; PO = iPods.
*$p < .05$. **$p < .01$.

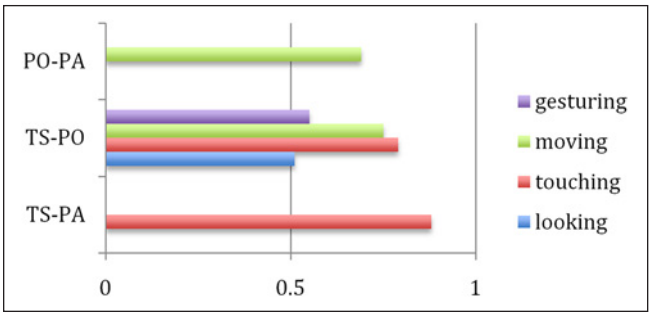

Figure 2. Effect sizes of differences between devices on engagement behaviors.

Do Devices Differ?

Together, results of the Kruskal-Wallis tests indicate that at least one of the devices is different from the others in relation to the percent of time children spend on particular engagement behaviors. They do not indicate, however, which devices are different or whether these differences are meaningful, nor does it specify how the devices are different from one another. Bonferroni post-hoc test was conducted to investigate pairwise differences among the different devices and to control for Type I error across tests; Mann-Whitney *U* tests indicated effect sizes. These results are reported in Table 3 and Figure 2 respectively.

These results yield several interesting findings. Not unexpectedly, the differences between the TS and PO indicate that children touch more when using the PO; thus, device exerted

the greatest influence on this sensory mode for engagement. Like findings indicate that moving, gesturing, and looking behaviors are also affected by device type in favor of PO. These two devices (TS;PO), in brief, differentially constrained the multi-sensory behaviors children used for purposes of engagement in the settings. This result corroborates our earlier descriptive observations where time spent touching and looking increased across devices, an estimated 40% and 60% of time, respectively, from TS to PO (Roskos, Burstein, & You, 2012).

Only touching behavior was significantly different between the TS and PA, also supported in our earlier research where we observed an increase in time spent touching from <1% to 18% of time from TS to PA.

The significant difference in moving behaviors between the mobiles sheds new light on our earlier observation, which showed a general decrease in time spent moving from TS to PA to PO. That moving behavior is affected significantly between the TS and PO and between the PA and the PO suggests that the affordances of the TS and PA may be more alike than the PA and PO in supporting moving behavior for purposes of engagement with e-books.

Together, this set of results shows that (1) these three devices significantly influence a cluster of multi-sensory behaviors for engaging in e-book reading activities and (2) the devices differentially influence this behavioral cluster in e-book-reading and browsing settings.

Discussion

Taking the ecological psychology position that arrangements and objects of settings afford behaviors, we examined an observational data set of children's engagement with digital devices for e-book reading in two popular preschool settings—shared reading and book browsing. In an earlier study, we had developed a typology for observing children's engagement behaviors in these settings and applied it to a preschool sample of 4-year olds. Based on these results, we theorized that children's engagement behaviors with e-book reading activity are influenced to some degree by affordances present in the setting, and, in particular, by the digital device. The results support this general idea, showing that devices do influence a cluster of engagement behaviors in e-book activity, that is, they matter; and that they support these behaviors differentially in settings, that is, how they matter differs. This has pedagogical implications for when and how devices are used for educational purposes. Larger touch screens, for example, may be less supportive of certain multi-sensory behaviors that children use for engagement and thus, may require instructional accommodation by the teacher—increasing the opportunity for touching, for example. Mobile devices, too, may favor some behaviors over others, such as the opportunity to move and shift position, which may warrant consideration when planning e-book activities. To this bigger picture, we consider two lines of thinking in light of the results—one more abstract and the other more practical—that offer direction for further research.

On a theoretical level, the results have implications for early literacy research related to cross-modal attention in the e-book reading environment for young children. Recent studies of young children's e-book reading/browsing show the benefits of audiovisual synchrony in supporting attention to e-book content to achieve early literacy outcomes (e.g., Kegel & Bus, 2012; Kegel et al., 2009; Smeets & Bus, 2012; Van der Kooy-Hofland, Kegel, & Bus, 2011). In this line of research, the highlighting of print and the temporal contiguity of audio (narration, music) with visual information (illustrations) appears to draw children's visual attention to pictures and print in ways that concretize the text, making it more real for them and more memorable (Verhallen & Bus, 2011, 2012). The work of Korat and Shamir (2007) corroborates this general hypothesis, showing that the availability of *read with dictionary* and *read and play* activity modes embedded in the e-book design increased early literacy skills over a *read story only* mode, especially for low socioeconomic status (SES) children.

Much of this pioneering research has focused on audiovisual information in the e-book environment, observing when these media sources (stimuli) attract or distract children's attention from the print (e.g., see Zucker, Moody, & McKenna, 2009). There is a growing body of multi-modality research, however, that shows similar constraints operating between many other pairs of sensory modalities (see Spence & Gallace, 2008, for a review). Some research, for example, shows that tactile-visual synchrony guides attention in dynamic, cluttered environments, such as the screen page, by increasing the saliency of visual events (Van der Burg, Olivers, Bronkhorst, & Theeuwes, 2009). More recently, studies indicate that changes and shifts in posture (movement) may have a bearing on cross-modal attention (Spence & Santangelo, 2009). Our study's results link to the research on cross-modal attention, describing the role of device in attentional capture for purposes of engagement in e-book reading in the preschool classroom. While the devices do not appear to influence listening behaviors, they do appear to differentially support specific multi-sensory behaviors, such as looking, touching, moving, and gesturing, and with an especially strong effect on touching behaviors. This raises the question as to how the device supports pairs or clusters of sensory modalities for the control of attention and, subsequently, motivation that prompts engagement with e-book text. We speculate that the spatial and temporal synchrony of looking (visual), listening (audition), *and* touching (haptics) may be the *sweet spot* that garners the young child's attention to e-text in ways that support early literacy experience and learning. Some argue (e.g., Ben-Shaul, 2004), however, that even as touching may re-kindle attention, it can lead to split attention between mind and hand, i.e., between the cognitive

interaction with text that looking and listening support and the playful discovery of what the screen page can do—a tendency observed in prior research (Kegel et al., 2009). Yet, as some studies of interactive media suggest (Ben-Shaul, 2004; Mayer & Moreno, 2003), if behavioral actions remain simple to physically engage the user through sound, movement and tactile activities (touching the screen, clapping hands, varying voice pitch, or moving around to interact with the text) *and* if physical actions offer a good cognitive and sensual "fit" with an unfolding narrative, then they may enhance engagement and deepen experience. In short, multi-sensory behaviors of engagement do not conduce to multi-tasking split attention and distraction if there is a goodness of fit. Further research is needed to examine the influence of device on those multi-modal clusters that engage and support attention to print and story in ways that promote literacy motivation, that is, the desire to read books, and engagement with e-book text in ways that promote early literacy skill.

At a practical level and in service to the theoretical, the results have implications for the typology framework and its content categories, pointing to the need for revision of the typology. They suggest, first, that the categories of control and communication may relate more to affordances of format than device, and that for purposes of clarity the communication category (in the typology framework) should be limited to verbal communication behaviors (asking, answering, commenting). These two categories, in sum, may be better suited to observations of format affordances in activity. The multi-sensory behaviors of listening, looking, touching, moving, gesturing, making noises, and facial expression more directly relate to affordances of the digital object in the e-book-reading and browsing activity at preschool, and could represent a major multi-sensory behavior category. Within this category, listening, looking, and touching could be considered primary modalities in line with cross-modal attention research (Spence, 2010) and early literacy research on e-book design (e.g., de Jong & Bus, 2003), and moving (positioning), gesturing, making noises, and facial expressions as secondary modalities. This categorization scheme is more evidence-based and orderly, and may be more productive in future research on observations of children's engagement in e-book reading and browsing activities in the preschool setting. It would allow observations of different behavioral clusters with devices and how these coordinate to support engagement with e-books in different settings. Arranging for children to listen-look-touch-move (shift position) with iPads, for instance, may stimulate motivation, improve attention, and increase opportunities for learning from e-book reading and browsing.

Limitations

The limitations of this study include those from the earlier study in which it is grounded, namely, the use of a small convenience sample of 4-year olds selected from two preschools participating in an Early Reading First project (U.S. Department of Education. n.d.); this set of factors may have compromised the validity of the typology as an observation tool. Observational data for analysis, therefore, may not have included the full range of engagement behaviors possible in preschool settings, although the typology did represent the key categories observed in traditional book reading that may apply to the e-book-reading and browsing environment. This noted, the analytic focus on device sidelined the role of format as a contributor to engagement behaviors and thus, provided only a partial description of environmental influences on engagement behaviors in the two preschool settings. Future research should examine what format affords (control; verbal language) children's engagement with e-book reading and browsing in the settings, and consider how format and device coordinate to support engagement. In addition, the analysis did not take into account individual attributes (e.g., self-regulation) and preferences that affect attention to devices and the use of engagement behaviors. What the individual brings to the dynamics of the e-book-reading and browsing learning environment also needs to be considered when weighing the role of device on the engagement behaviors children use.

Conclusion

Increasingly young children recognize and use electronic devices as sources of information and entertainment. In an information age, the trend is irreversible. We are just beginning to learn how children interact with these digital devices as meaning-making tools and the influence they have on how children develop and learn literacy skills. Results of this small-scale study illustrate the contributions of digital device on several key multi-sensory behaviors that children use to engage with e-book content in the preschool setting. The larger desktop touch screen, it appears, supports different modalities than the smallest device, the iPod, while the iPad and iPod (mobiles) support comparable behaviors, that is, they do not differ very much. All three devices support listening relatively evenly, which has implications for instruction in oral language comprehension for literacy, suggesting that tried and true techniques may apply to e-book pedagogy. The large effect of device on time spent touching, however, bears watching given the emerging role of haptic perception in digital reading (Mangen, 2008). The moderate effects on moving and gesturing are also notable and provoke interesting pedagogical questions as to how devices might support these behaviors for purposes of engagement with e-book content. In sum, we learned some, but need to learn more, about these digital resources and what they can do (and cannot) to motivate and support the early literacy environment at preschool.

Appendix A

Coding Definitions and Rules

Category	Definition	Salient behavior(s)	Definition	Rule
Control	Power to take meaningful action and see the results of decisions and choices	Operating the device	Quick, easy access to and use of control buttons on devices; direct participation	Code CON if operating the device the majority of the time
Multi-sensory Behaviors	Using visual, auditory, and haptic-kinesthetic senses	Looking	Eyes directed to the screen	Code L if eyes & position are oriented to the screen
		Touching	Fingers applied directly to the screen	Code T if holding the device and/or touching, tapping, scrolling, swiping the screen
		Listening	Attending to the audio stream of the e-book, not talking	Code LIS if not talking, but looking at the screen
		Moving	Positioning to view the screen	Code M if moving the body to orient to the screen by wiggling, shifting, rolling, sitting, standing
		Gesturing	Using bodily actions to communicate	Code G when using hands & body to make motions; may be talking
Communication	Using verbal and non-verbal behaviors to respond to language and express comprehension	Facial Expressions	Using facial gestures to express thought and feelings,	Code P (positive) if smiling or puzzling; Code N (neutral) If no expression; gazing; Code Neg (negative) if appears angry, sleepy, frowning
		Making Noises	Using sounds to express thought and feelings, such as squealing, laughing, gasping, etc.	Code S if making sounds that are not words
		Language	Using speech to comment, answer questions, and ask questions	Code C for Commenting; A for Answering questions; Q for Asking questions

Appendix B. Coding Sample (1-min intervals).

A	B	C	D	E	F	G	H	I	J	K	L
Child	Media	Agency	Teacher	Week	Lesson	Looking	Touching	Moving	Gesturing	Facial expressions	Making noises
1	1		1	1	1	0	0	1	0	−1	0
1	1	1	1	1	1	0	0	1	0	0	0
1	1	1	1	1	1			0	0		0
1	1	1	1	1	1	0	0	1	0	1	0
1	1	1	1	1	1	0	0	0	0	0	0
1	1	1	1	1	1	1	0	1	0	0	0
1	1	1	1	1	1	0	0	1	0		0
1	1	1	1	1	1			0	0		0
1	1	1	1	1	1			0	0		0
1	1	1	1	1	1			0	0		0

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