AN ANALYSIS OF MOTHER-CHILD INTERACTIONS DURING AN iPAD ACTIVITY

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ABSTRACT

Positive parent-child interactions play an important role in fostering the development of pre-schoolers’ knowledge and understandings of their world. Due to the relatively recent launch of touch screen tablets (e.g., iPads) little is known about how parents scaffold their children’s learning with tablets. A mother and her two young children were observed interacting during a joint iPad activity and their verbal utterances were recorded and analysed. A coding system was designed to measure cognitive, affective, and technical scaffolding (CATs) strategies the mother used to support her children’s interactions with a literacy app. The findings showed the mother made more utterances than each of the children. The mother used cognitive scaffolding most frequently, affective scaffolding second most frequently, and technical scaffolding least frequently. Maternal scaffolding provided to young children may be important to support early learning with iPads and other touch screen devices. Further research is needed using a larger participant sample to validate the CATs coding system and to examine the different ways that parents provide cognitive, affective, and technical scaffolding to their children.

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INTRODUCTION

Touch screen tablets such as iPads are becoming increasingly popular with young children because of their intuitive touch screen interfaces and engaging multi-modal features (Goodwin, 2012; McManis & Gunnewig 2012; Michael Cohen Group & US Department of Education, 2011). As young children are increasingly using tablets in the home (Livingstone, Marsh, Plowman, Ottovordemgentschenfelde, & Fletcher-Watson, 2014; Marsh et al., 2015; Neumann, 2014) it is important to examine how parents are supporting their children’s interactions with these devices. Parents play a key role in children’s learning prior to the beginning of formal schooling (Kluczniok, Lehrl, Kuger, & Rossbach, 2013; Otto, 2008). For example, parents support the development of children’s early language and literacy skills through a range of activities such as playing games, labelling objects, drawing, writing, and shared book reading (Adams, 1990; Neumann, Hood, & Neumann, 2009; Neumann & Neumann, 2010; Purcell-Gates, 1996). Through socio-cultural interactions (Kermani & Brenner, 2000; Vygotsky, 1978), parents use non-digital (e.g., wooden puzzles) and digital (e.g., computers) tools to teach children about their world (Aram, 2010; Danby et al., 2013; Dodici, Draper, & Peterson, 2003; Downes, 2002; Kucirkova, Messer, Sheehy, & Flewitt, 2013; Lauricella, Barr, Calvert, & 2014; Vandermaas-Peeler, Nelson, Bumpass, & Sassine, 2009; Wood, 2002).

Due to the relatively recent release of touch screen tablets, little is known about how parents scaffold their young children’s learning experiences when children use apps[^1^] on these devices (Neumann, 2014; Neumann & Neumann, 2014). Scaffolding is the process whereby a child’s learning is supported by a more knowledgeable or skilful person, such as a parent (Wood, Bruner, & Ross, 1976). The scaffolding is no longer required once the child has mastered the specific skill. Vygotsky (1978) also developed the concept of the Zone of Proximal Development (ZPD) that highlights the important role that a parent has in using scaffolding to extend children beyond their current abilities and foster further learning.

Yelland and Masters (2007) discuss the importance of scaffolding primary school students’ learning when using computers. The authors highlight how the role of the teacher is potentially more critical than the software itself. In their study, Yelland and Masters (2007) describe three different types of scaffolding that a teacher should provide during a computer-based activity. The first is cognitive scaffolding, which involves helping children solve problems and develop knowledge and skills about their world (e.g., mathematics, literacy, language, science). The second is affective scaffolding, which provides children with positive encouragement and feedback with the aim of preventing child frustration if they encounter a more challenging task. The third is technical scaffolding whereby the inbuilt features of the computer software facilitate children’s learning. The teacher may also highlight technical features of the software to the student and in this way can provide technical scaffolding to enhance learning outcomes.

We aimed to extend Yelland and Masters’ (2007) work on teacher scaffolding during computer use to examine parent scaffolding during joint-iPad activities. As early literacy development is important for future reading ability (Adams, 1990), we examined parent scaffolding of young children during iPad use.

[^1^]: Apps or applications consist of software that can be directly downloaded from the internet and used on touch screen tablets.
Moreover, as a great number of alphabet and literacy apps exist for parents to download from the Apple or Play store, a literacy app was selected as the iPad activity. A case study approach was used to allow for a detailed examination of how one mother scaffolded her two children’s interactions with a literacy app. In addition, maternal use of metalinguistic language was analysed to determine the extent to which the app stimulated such language-based exchanges between the mother and her children. The present study aimed to:

1) Develop a coding system to analyse maternal scaffolding and mother-child interactions during iPad use.
2) Describe and qualitatively analyse the types of scaffolding and metalinguistic language a mother used to support her children’s interactions with a literacy app on an iPad.

METHOD

Description of the Family and Children

The family resided in Southeast Queensland, Australia and spoke English at home. Hollinghead’s (1970) 4-factor index (range 8-66) based on parent education and occupation was used to calculate the family’s socioeconomic status (SES). The family SES was 41, which fell in the middle socio-economic range. There were two children in the family. Emma (pseudonym) was 3 years old and her brother Ben (pseudonym) was 2 years old. Based on parental report both children had no developmental problems or learning difficulties (e.g., eyesight, hearing, and speech were developing normally).

Use of Technology at Home

The family owned a range of digital devices at home. The devices were one iPad, one touch screen tablet, one electronic game console, two iPods, two desktop computers, three laptop computers, two touch screen mobile phones, and three televisions. The mother reported that iPads and tablets were easy for young children to use and can help children develop literacy and numeracy skills. Both children occasionally (less often than a fortnight) read an e-book on their iPad at home. Emma wrote letters and words and played literacy apps on her iPad on a weekly basis.

However, Ben never wrote letters or words on an iPad and only occasionally played with literacy apps. The children played with a range of apps at home. Emma played Polo’s world, Ice Land, Puppy Palace, Letter Quiz, Amazing Match, ABC Circus Pizza, Little Pet Salon, Disney Classics, and Puzzles app. Ben played Car Puzzles, Disney Classics, Story time, Little Pet Shop, and Talking Tom app.
Observation Procedure

After obtaining informed consent, the mother completed a questionnaire containing demographic questions about the family, such as age, parental education, occupation, and iPad and technology use at home. The observations were conducted in the children’s child care centre. In a vacant room the mother completed the iPad session with her older child first, then completed a second iPad session with her younger child after the older child had returned to her classroom. The researcher remained in the room for each session. For each session, the mother and child each sat on a small chair at a low table with the iPad placed flat on the table directly in front of the child. The mother sat on the right side of her child. The sessions were recorded with a video camera positioned on a tripod 1 m in front of the mother-child dyad. Prior to beginning the 6 minute iPad activity the mother was asked by the researcher to “Please play with the Endless Reader app with your child.” The first minute of the recorded session allowed time for the app to load and its introductory song to play. Only video data for the next 5 minutes was used for analysis.

App Description

The mother and her children had not played the Endless Reader app (Originator Inc., 2013) before. Endless Reader introduces alphabet letters, basic words (e.g., ball, dog), and sentences with accompanying animations and sounds. The user selects from 26 lower case letters listed across the top of the screen or 26 words presented in the screen’s centre (words are swiped to view each one). However, only the first six letters of the alphabet (a to f) and their corresponding words were made available for the children and mother to select from in the present study. After a letter or word is selected (by tapping the item on the screen) a word (e.g., cake) appears on the screen followed by animated characters that run across the screen and jumble all the letters out across the screen. The outlined shape of each letter on the word remains on the centre of the screen. Each letter must be dragged to its matching letter position in the word. When each letter is touched the app makes the letter’s sound then the letter name is heard when it is placed in the correct position in the word. A brief alert sound (“Wa Wa”) is made by the app if the letter is placed in an incorrect position in the word. When the word is completed, the word is announced by the app (e.g., “cake”) and an animated bird picks up the word. Next, a sentence (e.g., A good cake is the yummiest part of a birthday party!) appears on the screen. Animated characters run across the screen and three words from the sentence (i.e., good, cake, the) are displaced leaving the outline of each word behind. When a displaced word is touched the name of the word is heard. Each word must be dragged to its correct place in the sentence. Once the sentence is correctly completed stars fall from the top of the screen and a new screen with an animation that supports the sentence appears. The sentence appears at the bottom of the screen and is narrated at the end of the animation. The user is presented with the option of moving forward to the next letter (by pressing an arrow) or returning to the app’s home screen. The mother and child were free to select letters and words and play at their own pace.

The Endless Reader app was selected based on the app selection criteria proposed by Hillman and Marshall (2009) of interactivity, digital literacy, appropriateness, results, participation, and global citizenry.
The music, sounds, animation, bright colours, and characters of the *Endless Reader* app engages the child by stimulating visual, auditory, tactile, and kinaesthetic senses. Through dragging, swiping, pressing, and tapping movements, children play the game and solve the problems (i.e., how to match the letters and words). The app increases children’s technology skills (e.g., iPad operation, app navigation) and helps them make sense and increase their knowledge and understanding of the world through its literacy and language-based content. The app is designed primarily for young children and contains some early educational literacy outcomes (i.e., fosters knowledge of letters, words, and vocabulary). The app provides an open-ended activity without emphasising success or failure and its intuitive design allows young children to play the game independently and at their own pace. Child learning has the potential to be enhanced through game participation with a more knowledgeable other, such as a parent, caregiver, or teacher. The *Endless Reader* app does not clearly show a global citizenry perspective or elements of cultural diversity.

**Coding of Observations**

Initially, the video recorded sessions were each transcribed to record all the utterances made by both the mother and the child. For the present study an utterance (Ninio & Bruner, 1978) was defined as a stretch of speech that had a period of silence or change of speaker before and after it (Crystal, 2008). For example, the following was divided into five utterances: /Loading/Let’s go/Push the little red one/Does it make any noise?/I think you got to put the letters on top of the other ones to spell cake/. The transcribed utterances were used to count the frequency of metalinguistic language references by the mother and child and to classify the types of scaffolding the mother used to support her child’s interactions with the literacy app. The coded data also enabled identification of differences between the mother’s scaffolding of her older and younger child. Coding was completed by the first author and a trained research assistant.

*Metalinguistic knowledge* is important for young children because early reading and writing development focuses on concepts such as ‘letter’ and ‘word’ (Goodman, 1986; Otto, 2008). Talking to young children about letters and words increases their awareness and understanding of these concepts and parents play a key role in scaffolding these experiences (Neumann & Neumann, 2012). The use of maternal metalinguistic language during the joint-iPad interaction was counted across each 5 minute transcript. One count was given for each metalinguistic term (e.g., *word, letter, spell, name*) used by the mother (e.g., “b like the first letter of your name”). Similarly, the number of metalinguistic terms the child said in the 5 minute transcript (e.g., “e, n’s, word, letter”) was totalled for each child (one count for each metalinguistic term used). The two coders were in 100% agreement in the coding of the metalinguistic terms. In addition, the total number of verbal utterances and the total number of words spoken by the mother and each child were counted across each of 5 minute transcripts. The average number of utterances and words spoken per minute was calculated by dividing the total number by 5.

Each maternal utterance was also coded as *cognitive scaffolding, affective scaffolding, technical scaffolding, or other*. The criteria used to code maternal scaffolding utterances were based upon Yelland and Masters’ (2007) cognitive, affective, and technical scaffolding concepts.
These three types of scaffolding used by teachers were identified by Yelland and Masters (2007) to play an important role in helping children interact with computers and to complete software-based activities. Yelland and Masters (2007) broadly define **Cognitive scaffolding** as pertaining to conceptual or procedural understandings. **Affective scaffolding** involves providing the child encouragement to maintain the child’s interest and minimise the potential for frustration. Yelland and Masters (2007) define **Technical scaffolding** as the inbuilt ability of the computer software to scaffold children’s learning. However, **Technical scaffolding for the present study** was defined as how a more knowledgeable other (e.g., parent, teacher) technically assists the child in operating the computer device (e.g., turning the device on, pressing the correct icon, knowing how to drag an animated object across the screen) and navigating their way through the software or app in order to play the app. Therefore, the present study extended Yelland and Masters’ (2007) concept of three types of scaffolding by teachers by developing a detailed scaffolding coding system for analysing parent-child interactions with touch screen tablets and apps.

Each maternal utterance was coded according to the following definitions. **Cognitive scaffolding** was coded as any maternal utterance that supports the child’s knowledge and understanding of the world and helps them to solve problems (e.g., ask questions, give directions, repeat focus words, provide expansions, and talk about letters, words, or animation clips; e.g., “Can you figure out which word matches the word eat? Have a look at the letters and see if there’s one over here that looks the same”). Cognitive scaffolding also included utterances such as repeating the focus word on the screen (e.g., “dog”), and positive or negative confirmation (e.g., “yes”; “woops”). **Affective scaffolding** was coded as any maternal utterance that provides the child with positive praise and emotional encouragement (e.g., “Good job darling. Good work. That’s because you did such a good job lots of stars”), **Technical scaffolding** was coded as any maternal utterance that provides the child with help to operate the iPad and navigate smoothly through the software (e.g., “Push the arrow,” “Take your finger off”). **Other** utterance was coded as any maternal utterance that is not related to the child or iPad task (e.g., “I better turn my mobile phone off”).

The coding of the maternal utterances into cognitive scaffolding, affective scaffolding, technical scaffolding, and other was completed independently by two coders. For the maternal utterances with the younger child, the two coders agreed on 69 of the 72 coding decisions (95.83% agreement). The Cohen’s Kappa was .91 (CI95 = .82 to 1.00), which represents excellent agreement. Similarly, the two coders agreed on 67 of the 69 coding decisions for the maternal utterances with the older child (97.10% agreement). The Cohen’s Kappa was .92 (CI95 = .80 to 1.00) and again indicated excellent agreement. Coding discrepancies between the two coders were examined. Due to the overall close similarity of the coding decisions, the first author’s coding decisions were used.

A word frequency analysis was also conducted on the maternal and child utterances. The frequency of each individual word was counted and a word cloud was produced for each participant (mother, Ben, Emma) using the utterances from each mother-child dyad. The word cloud provides a visual representation of the word frequencies, where a larger font size for a word indicates a greater relative frequency. For the maternal utterances, only word frequencies of three or more were represented in the word cloud. For the child utterances, only word frequencies of two or more were shown. The following common English words were excluded from this analysis: the, that, a, of, to, and.
RESULTS

Frequency of Verbal Utterances by the Mother and Children

Overall, the iPad activity was observed to be engaging and positively stimulated a wide range of interactions between the mother and her children. The observation of laughing during the literacy app task provided an indication that the app selected for this study was an enjoyable activity for both the mother and her children. The mother was observed to naturally scaffold her children’s interactions with the literacy app so that both children successfully completed the app tasks (e.g., dragging and matching letters and words to complete sentences).

As shown in Table 1, the mother was observed to utter more words during the 5 minute joint iPad activity with her 2 year old child Ben (413 words) than with her 3 year old child Emma (341 words). However, the mother provided a similar total number of utterances to each of her children (14 utterances per min) during the iPad activity. Emma uttered an average of 12 words per minute whereas her younger brother Ben spoke less frequently than his sister at 6.6 words per minute. Metalinguistic terms were used more frequently by the mother than by her children. The mother provided nearly double the instances of metalinguistic terms (e.g., C, sentence, word(s), letter (s), spell, name) to her older child Emma (18 metalinguistic instances) when compared to her younger child Ben (10 metalinguistic instances). The difference may be related to a child’s age, level of language skills, and metalinguistic awareness. Consistent with this notion, Emma uttered metalinguistic terms a total of 10 times over the 5 minute iPad activity. In contrast, Ben did not utter any metalinguistic terms.

Analysis of Maternal Utterances

Table 2 shows the classification of each maternal utterance into cognitive, affective, or technical scaffolding during the joint-iPad activity with Ben and Emma. No instances of other utterances were observed. Of the three types of scaffolding, cognitive scaffolding was the most frequent type of scaffolding provided by the mother.

<table>
<thead>
<tr>
<th>Table 1. Frequency of words and utterances spoken by the mother and child during the joint iPad activity</th>
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<tr>
<td>Mother-Younger Child</td>
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<tr>
<td>Total words</td>
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<td>Mean words (per min)</td>
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<td>Total metalinguistic terms</td>
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<td>Mean metalinguistic terms (per min)</td>
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Table 2. Frequency of the maternal utterances coded as cognitive scaffolding, affective scaffolding, technical scaffolding, and other during the joint iPad activity (mean per minute shown in parentheses)

<table>
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<th>Mother with Younger Child (Ben)</th>
<th>Mother with Older Child (Emma)</th>
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<tbody>
<tr>
<td>Cognitive scaffolding</td>
<td>48 (9.6 per min)</td>
<td>54 (10.8 per min)</td>
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<tr>
<td>Affective scaffolding</td>
<td>19 (3.8 per min)</td>
<td>10 (2 per min)</td>
</tr>
<tr>
<td>Technical scaffolding</td>
<td>5 (1 per min)</td>
<td>5 (1 per min)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0 per min)</td>
<td>0 (0 per min)</td>
</tr>
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The mother provided slightly more instances of cognitive scaffolding (54 utterances, e.g., “that’s how you spell funny”) to her older child than to her younger child (48 utterances, e.g., “try and figure out which word that looks like”).

The quantity of technical scaffolding provided to each child was similar (Ben: 5 technical utterances, e.g., “now push the arrow”; Emma: 5 technical utterances, e.g., “that’s the end of that one so you go back to the level”) but there was overall less technical scaffolding than cognitive and affective scaffolding. The mother gave more affective scaffolding to her younger child (19 utterances, e.g., “Good job”) than to her older child (10 utterances, e.g., “You are doing a good job”).

The word frequency analysis of utterances made by the mother is shown in Figure 1. During the joint iPad activity with the younger child Ben (Figure 1, top panel), the most frequently used words reflected cognitive scaffolding around the objects on the screen (e.g., “letters,” “stars”) and their manipulation (e.g., “which,” “one,” “looks,” “see,” and “where”). The affective scaffolding is also reflected in the analysis (e.g., “good”). A similar pattern emerged during the interactions with the older child Emma (Figure 1, bottom panel). Words reflecting affective scaffolding (e.g., “good”) and cognitive scaffolding (e.g., “look,” “start,” “push,” “words”) were present.

**Analysis of Child Utterances**

The word frequency analysis of the utterances made by Ben and Emma are represented in Figure 2. The analysis indicated that Ben made several references to objects on the screen (e.g., “stars”) and asked questions regarding the location of words and letters (e.g., “where go?”). In contrast, Emma made several exclamations (e.g., “oh”) and affirmations of actions (e.g., “last one,” “yes”), in addition to descriptions of objects and actions on the screen (e.g., “eat,” “funny”).

**DISCUSSION**

The present study showed how a mother assisted her young children to successfully interact with a touch screen tablet. The literacy app used provided rich opportunities for the children to solve matching tasks and learn about print-based concepts such as letters and words.
The children’s interactions with the iPad were supported by a range of positive scaffolding strategies. These were naturally provided by the mother during the app’s tasks and enabled the children to complete them. Laughing was observed during the mother-child interactions, further indicating the positive nature of this joint digital activity. The findings of this study suggest that touch screen tablets and quality educational apps used in combination with parental scaffolding may be a valuable way to foster early learning.

Figure 1. Mother’s utterances during the joint iPad activity with her younger child Ben (top panel) and older child Emma (bottom panel). Only word frequencies greater of three or more are shown.
Maternal Scaffolding and Mother-Child Use of Metalinguistic Language

Yelland and Masters’ (2007) scaffolding concepts that were developed for describing teachers’ and students’ interactions with computers were extended in the present study by examining maternal scaffolding of young children’s learning during an iPad activity. Each
maternal utterance was coded as cognitive, affective, or technical scaffolding. The mother provided a similar number of verbal utterances to both her 2 year old son Ben and 3 year old daughter Emma. However, the coding system used to examine the types of maternal scaffolding and metalinguistic language allowed for a finer analysis of parent-child joint interactions with an iPad.

The mother provided a similar amount of cognitive scaffolding to both her children regardless of their age revealing on the surface a similar intensity of maternal utterances for each child. However, the complexity of metalinguistic words the mother used for her older child during cognitive scaffolding is an important factor and may reflect deeper differences. Older children generally have more advanced language and metalinguistic skills than younger children (Otto, 2008) so it was not unexpected that Emma uttered more words than Ben during the parent-child interactions. This fits well with the finding that Emma showed the ability to use metalinguistic terms whereas Ben had not yet developed these skills. The mother’s sensitivity to Ben’s level of metalinguistic knowledge is also reflected in the analysis as the mother used half as many metalinguistic terms with Ben compared with her interactions with Emma.

The present findings are consistent with the findings of previous studies that have shown that parents vary the level of their scaffolding based on children’s age, abilities, and task difficulty (Kermani & Brenner, 2000; Otto, 2008). For example, the level of complexity of parental verbal language during shared story book reading changes based on a child’s age and growing linguistic competencies (Sénéchal, Cornell, & Broda, 1995). During a parent-child joint writing activity Aram and Levin (2001) found that children’s emergent literacy skills (e.g., letter and word knowledge) were positively associated with the level of maternal scaffolding. Similarly, the mother in the present study was observed to adapt her use of metalinguistic language during the iPad literacy activity to suit her children’s individual language and literacy needs.

It was also interesting to note that the mother used mathematical metalanguage (words that describe size, quantity, ordinality; e.g., long, first) alongside literacy metalanguage (e.g., letter, word). For example, the mother said “that’s a long word”; “two n’s” and “b like the first letter of your name.” This observation suggests that although an app is classified as a literacy app, when joint parent-child use of such an educational app occurs, this may facilitate richer language exchanges to extend children’s understanding.

Noticeably, a wide range of cognitive scaffolding utterances were provided by the mother to support her children through the task. It would be useful in future research to examine cognitive scaffolding more closely by coding for different subtypes of cognitive scaffolding. Further code subtypes could include the extent that a parent provides cognitive assistance through questions, answers, affirmations, interpretations, expansions, demonstrations, prompts, corrections, evaluations, direction giving, and labelling. The word frequency analysis also suggested that there were different types of cognitive scaffolding. This approach may provide deeper insights into what type of cognitive scaffolding may be most effective for certain types of apps (e.g., gaming apps, creating apps, math apps, e-book apps; Neumann, 2014).

From a theoretical perspective the mother was observed to assist her children within their ZPD (Vygotsky, 1978) to extend them beyond their current capabilities (Kermani & Brenner, 2000). The following example shows how the mother sensitively guided her two year old child to identify the correct word and make the match himself to complete the task.
Ben: /Where it go mum?/
Mother: /Well I think it belongs in one of these ones/ so which one do you think out of the one, two, three/ (Mother points to each word on the screen). (Child and mother laugh again at the Wa Wa sound and mum rubs child’s back). /Wa Wa/, /Wa Wa/. (Child giggles). /Which one?/ Out of the three words here which one do you think it looks the most like?/ (Mother points to the words again). (Child drags the word to the correct place in the sentence then giggles). /Yes Good job/ (Mother rubs child’s back).

Previous research has shown the importance of providing children with positive feedback during the completion of a task that is beyond the child’s independent capabilities (Neumann, Hood, & Ford, 2012; Otto, 2008). This was evidenced by the mother providing her younger child with a greater level of affective scaffolding (e.g., Good job darling) compared to her older child in order to encourage her younger child to remain focussed and complete the tasks. As the older child had mastered the task of matching words to each part of the sentence more quickly, it is possible that she required less affective scaffolding and the mother adjusted her level of support accordingly. It is also possible that Emma was able to gain positive and internal satisfaction through her mastery and independent completion of the tasks.

Both children were provided with the same frequency of technical scaffolding by their mother and the extent of technical scaffolding was considerably less than her provision of cognitive and affective scaffolding. This may indicate that prior to the video-observation session the children were already competent users of iPads having gained substantial technical experiences and iPad operational skills at home (e.g., navigating touch screen interfaces, dragging, tapping, and swiping). The family reported that they owned a wide range of digital devices at home (e.g., iPad, tablet, mobile phone, iPod, laptop, desktop computer) with the children playing a range of educational and game-based apps at home (e.g., Amazing match, Letter quiz, Little pet salon). In addition, few instances of technical scaffolding by the mother may be an indicator that the Endless Reader app is an intuitive and easy to use app for young children to interact with. A measure like technical scaffolding could potentially assist in the design and testing of the level of app intuitiveness.

Practical Implications and Future Research

The CATs coding system used in the present study was a useful tool to classify the types of maternal scaffolding used during joint iPad play with young children. As highlighted by Yelland and Masters (2007), cognitive, affective, and technical scaffolding play a key role in supporting young children’s learning with computers. The results of the present study suggest that the CATs coding criteria could also be used to examine early childhood teacher scaffolding during touch screen tablet interactions with individual and groups of pre-school children. The scaffolding strategies identified could be tested for their effectiveness and used to inform pedagogical approaches to using tablets and apps in pre-school settings. Effective scaffolding strategies may then be used to coach parents and teachers in fostering young children’s learning with touch screen tablets.

However, the present study has examined the CATs system with only one mother and her children and with only one educational app. The present findings cannot be generalised or
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fully validated at this stage. Further research is needed that examines the use of the CATs system with a larger more diverse sample of families from a range of communities and socioeconomic backgrounds. For example, compared to the mother in this study it is possible that some parents may provide a higher or lower level of cognitive, affective, or technical scaffolding to their children during joint iPad interactions. The level of parental scaffolding may be also dependent upon other factors such as parent beliefs and digital technology experience. It is also important for future research to determine what types of scaffolding may be the most effective in fostering different domains of early learning (e.g., literacy, language, science, mathematics).

CONCLUSION

The present study provides qualitative evidence of three important types of scaffolding (cognitive, affective, technical, or CATs) that should be considered when planning to support young children’s interactions and learning with touch screen tablets. A CATs approach has the potential to provide a framework that aims to ensure young children’s learning needs are met. However, further work is needed to validate and implement CATs in the home and preschool setting, utilising a range of quality educational apps. Nevertheless, the present findings have demonstrated through a case study approach that a mother makes use of all three types of scaffolding. Cognitive scaffolding was used most commonly by the mother for both children suggesting that developing knowledge and skills about early literacy was the most prominent factor during the mother-child iPad activity.

REFERENCES


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