Sheffield Hallam University

Young children in an education context : apps, cultural agency and expanding communicative repertoires

DANIELS, Karen

Available from Sheffield Hallam University Research Archive (SHURA) at:

http://shura.shu.ac.uk/14315/

This document is the author deposited version. You are advised to consult the publisher's version if you wish to cite from it.

Published version

DANIELS, Karen (2016). Young children in an education context : apps, cultural agency and expanding communicative repertoires. In: KUCIRKOVA, Natalia and FALLOON, Garry, (eds.) Apps, technology and younger learners : international evidence for teaching. London, Routledge, 280-292. (In Press)

<Chapter heading>Chapter 20: Young children in an education context: Apps, cultural agency and expanding communicative repertoires

<running head> Young children in an education context

<author>Karen Daniels Sheffield Hallam University

Abstract

This chapter examines video recorded interactions of children's engagement with touchscreens in an early education setting. The extracts are taken from an ethnographic research study that explored children's expanding repertoires for meaning-making as these emerged throughout their first year of school. The episodes presented in this chapter draw on observations of children's spontaneous interactions with and around two iPad apps. The findings reveal how children's engagement with iPads has the potential to simultaneously confer children's cultural agency and further expand children's repertoires for meaning-making. The discussion provides nuanced interpretations of how touchscreens might contribute positively to young children's early learning and play experiences.

<A>Young children's use of technologies at home

Studies carried out in the home clearly illustrate that young children's meaning-making practices are shaped by their access to a range of digital resources. Marsh (2004) and Giddings (2014), for example, show how very young children engage with screens and digital texts in the home with playfulness, agency and creativity. When young children enter educational settings, many bring with them extensive understandings and experience of making meaning using digital tools (Yamada-Rice, 2011; Levy, 2009).

Despite compelling research evidence that touchscreens can support early learning and play, Yelland (2011) reminds us how digital technologies are still not seen by all as providing valuable play opportunities for children. Tensions still exist between some principles and practices of early learning and the use of screens with young children (Lynch and Redpath, 2014). In contrast to this view, Wolfe and Flewitt (2010) demonstrate how access to digital technologies in the home, mediated by adult support, can equip children with metacognitive strategies that enable them to engage with more sophistication with digital (and non-digital) tools in the classroom. The implication of these insights is that some children may be less well-equipped

than others to utilise digital tools in meaningful ways. A long-standing concern expressed by educators and researchers is founded on the dissonances that exist between young children's language socialisation in the home and its relationship with success in school (see Heath, 1983). This concern is further complicated when access to meaningful engagement with digital resources is brought to the discussion. Indeed, the ways in which we judge the appropriateness of touchscreens as part of young children's early educational experiences will have a profound impact on the range and type of experiences to which children have access. It is vital, therefore, that early years practitioners recognise and respond to the findings in research into digital technologies (McPake, Ploughman and Stephen, 2012) in order that they can build on children's daily experiences and provide opportunities for children to access digital technologies as part of their early education experiences.

Cultural agency and semiotic resources

In order to provide a theoretical frame for the observations that follow, I will bring together a social semiotic conceptualisation of young children's learning with understandings of young children's cultural agency as described by Corsaro (2005). Elsewhere have examined the ways in which young children's peer cultures emerge in their play and learning experiences in school settings. I argue that in order to understand early learning more fully, we need to view children's activity through an expanded lens that takes into account the range of semiotic resources that children use in order to make meaning, express cultural agency and create peer cultures (Daniels, 2014; forthcoming). In this chapter, I apply this framework to explore children's interactions around iPad apps in order to explore how such activity might confer young children's cultural agency and simultaneously expand their semiotic resources for meaning-making.

I draw on naturalistic observations of young children's interactions with and around touchscreens, in order to examine:

- the features of the communication orchestrated during collaborative engagement around touchscreens;

- the ways in which children's agentic use of apps might confer cultural agency; and

- how both of the above might culminate in the expansion of children's communicative repertoires.

In the examples of data provided and the discussion that follows, children are seen as cultural agents who express their agency through their meaning-making activity. The work of Corsaro (2005) demonstrates how children innovatively and creatively participate in society by appropriating information from the adult world to address their own peer concerns. Here, children can be seen to be doing more than merely internalising the adult world, but instead acting upon it and changing it in some way, and, in turn, creating their own peer cultures. When playing, children express cultural agency as they infuse their activity with their experiences of texts, stories, games, popular culture figures and other experiences gained at home and in school. Key to the ensuing exploration in this chapter is that children are cultural agents, which implies acknowledging children's agency in their interactions with iPad apps. In particular, I look closely at the ways in which this agency is expressed, or comes into being, through children's interactions with the iPad apps, in order to explore how these interactions might facilitate children's peer cultures.

Young children's activity is guided predominantly by synaesthetic activities, which draw upon all the senses and use visual, kinaesthetic and gestural modes (Kress, 1997). Playful engagement with the world enables children to draw on social practices, explore the material qualities of images and objects and construct social spaces multimodally, for example, through talk, gaze, gesture and sound (Wohlwend, 2015). Acknowledging a social semiotic perspective on young children's playful interaction with the world provides a lens through which to view their agency, and view this as a process of learning and development. Kress (2010) reminds us that, 'as the child engages with meaning-making engagement with an aspect of the world, their resources for making meaning and therefore, acting in the world, are changed - they are augmented' (p. 175). The collaborative orchestration of communicative practices that take place during this playful activity manifest as an expression of children's cultural agency, and such activity shapes their peer cultures. This lens of interpretation of young children's meaning-making activity is essential to this study, as learning and development are now intimately connected to the types of meaning-making tools available, and a child's increasing mastery of these tools (Kress, 2010).

<A>Gesture, touch and semiotic repertoires

When we consider the multimodal affordances of touchscreens alongside a social semiotic view of play and learning, it is not surprising that such devices are appealing to very young children and can foster positive play, support child development and offer novel ways of interacting (Geist, 2012). Kucirkova et al. (2013, 2014), for example, demonstrate how interactions around a personalised story-sharing app involve the orchestration of gesture, gaze, posture and facial expression. Furthermore, the authors note how the materiality of touchscreens is significant to the interactions that take place around them. Walsh and Simpson (2014) refer to the significant communicative tools of gesture and touch and how these are brought to the fore during touchscreen interactions. Similarly, Merchant (2014) identified the important role of the hands and the body as a group of toddlers and their facilitating practitioner interacted around an iPad app. Merchant (2014) developed a typology of hand and body movements that typically occur in such contexts. These include stabilising movements, where a child uses hands and/or knees to hold/support the iPad, control movements, for example, precision tapping and swiping and deictic movements, which refer to pointing gestures directing attention to the screen.

<A>The study: context of the episodes and data selection

As is recommended practice in the Early Years Foundation Stage (DFE, 2012), the statutory curriculum for children from birth to five in England, the children in this study had access to a range of carefully selected and organised resources that they could use freely for extended periods of time during the school day. There were twenty-eight children aged four and five in the class. The class teacher had selected from a range of available apps and downloaded these onto the three iPads provided by the setting for this classroom. From these apps, the children could select freely. The apps examined in this chapter include Toca Robot Lab by Toca Boca© (see Figure 1) and Story Maker by Lego Friends©. Toca Robot Lab enables the children to build a robot and guide the robot through a maze, collecting stars as he or she is propelled along by the game player, towards the shipping unit. Lego Story Maker© allows children to design a multimodal narrative, selecting from a range of character

images, accessories and story settings. It has editing and read aloud functions, with the possibility of adding speech and music.

<Figure 1: Building a Robot: Toca Robot Lab by Toca Boca© > about here

<A>Methodology: Data collection, selection and analysis

I collected data by using a small hand-held camera, with the intention to capture both children's facial expressions and actions, and also the screen of the iPad. I followed the children's movements and choices around the classroom, filming their activity. Data selection involved repeated observation of the film clips, followed by the multimodal transcription of short selected episodes of activity. This facilitated close examination of children's communicative practices in individual episodes and across episodes.

Coding of activity in a table format (See Tables 1–3 below) enabled the filmed episodes to be transcribed and analysed. Speech was recorded first to give sequence to the episode; haptics and gaze transcribed afterwards. Key activity on the screen of the iPad that followed and prompted children's responses is also transcribed. In order to draw particular attention to the role of haptics in the communicative repertoires, I drew on Merchant's (2014) typology of hand movements, focusing on deictic and control movements. Transcribing in this way facilitated analysis of the orchestration of communicative resources taking place during the interactions. Each table then, is a representation of how activity developed moment-by-moment, in time sequence.

To interpret the tables, one needs to look at the activity, which is recorded chronologically from the top of the table downwards. By looking horizontally, children's simultaneous orchestration of communicative resources can be seen. Looking vertically outlines the sequence of events. In this way, insights into the orchestration of communicative resources prompted by the iPad app and the children's actions can be explored. Each table is preceded by a narrative observation to provide context to the information in the table. This is taken from my observational notes during the fieldwork. Permission from the parents and school was gained to

film the children, and negotiated ongoing assent (Flewitt, 2006) was secured from children during the filming episodes.

<Tables 1 to 3 about here>

<A>Findings: Observing play and apps

***<B>Episode 1**: Louise, Sally, Mazie and Kehinde building a robot*

Louise, Sally, Mazie and Kehinde, who regularly play together, are sitting in the carpet area of the classroom during a morning session. Louise is holding the iPad, to her right are Mazie and Sally and to her left is Kehinde. All eyes are on the iPad and Louise holds it with both hands and is resting it on her knees (stabilising movement). The robot is on the screen and currently it has a body and legs. The task now is to complete the robot by sliding the selection panel at the bottom of the screen and to select from an array of possible heads and arms. These require the user to drag and drop (control movement) the chosen limb/body part into position. At this point, the app makes a short and sudden electronic sound 'czzzt' as parts of the robot fix into position.

Table 1: Building a robot

Speech/gaze	App	Movement: precision tapping/ swiping (control)	Movement: deictic/gestural	Commentary
Mazie: Oh! Have that one then!	Czzzt!	Touches sliding bar at bottom of page	Mazie points to app Louise: Finger hovers over bar, poised to make a selection	
Mazie: Why don't you have that one… that funny one…?		Louise selects head indicated by Mazie, and drags and drops into position		Louise takes-up Mazie's suggestion of the 'funny' head
	Czzzt! Head is 'fixed' into position on screen. Eyes blink intermittently			
Children watch silently				Blinking of robot draws their silent attention to the app/ mirrored gesture and gaze across group
Kehinde sings: *Know that, know that… I've got the look…*		Louise: Touches screen and moves selection bar from side-to-side	Louise: Hand hovers over the robot arm selection bar at the bottom of the screen	Kehinde's song here seems to be celebrating the robot's appearance – acknowledging Louise's choice
Mazie: That one! That one! Sally: That one!		Louise: Selects a rainbow patterned arm and drags and drops it into position	Sally: Points to robot arm	Louise responds to Sally and Mazie's suggestion. Sally's pointing prompts Louise's action
Girls watch robot	Arm clicks into position: Czzzt!	Louise: Selects second arm, matching rainbow pattern, and places it on the other side of the robot's body		
	Arm clicks into position: Czzzt!			Again – girls watching the fixing of the robot arm – watching carefully as it moves into position.
Mazie: Same! Sally: Yea! Girls watch robot, look to each other and smile	Robot on screen blinks twice: Czzzt!			Mazie acknowledging Louise's choice. Sally agreeing The robot blink is anticipated, and the girls enjoy the event and acknowledge this to each other

In this episode it is clear that the children are confident in their use of control movements for the app's operation – in this case the drag-and-drop function. The theme of building a robot is certainly appealing to the children and it is apparent that they have enjoyed this activity many times before as they anticipate the robot's

responses. The children point and gesture while the building of the robot is taking place, offering suggestions and ideas. What stands out in this episode is how Mazie, Kehinde and Sally not only make suggestions, but also acknowledge the actions of Louise as she makes her own decisions. It is clear that although Louise is operating the app, it is by no means a solitary activity. As they enjoy the shared experience of building the robot, the camaraderie between the girls, seemingly prompted by the opportunity to make collaborative choices that incur visual and auditory responses for the iPad, emerges and is sustained. What we also see here then is an example of how the deictic movement of hovering over the app appears to communicate Mazie's choice before she has made it. This appears to fuel anticipation amongst the group, which in turn further prompts engagement with the app. Once the robot is given arms, it blinks twice and comes to life. The anticipated and lived emotional satisfaction of this culminating event begins with a moment of silence and stillness as the children look at the screen, which is reciprocated across the group as the girls look to each other and smile.

Episode 2: Blaise and Harry steer the robot: Toca Robot Lab by Toca Boca©

<Figure 2: Steering the robot > about here

Blaise and Harry are at a later stage in the Toca Robot Lab game sequence. The aim of the game now is to guide the robot through the maze, taking him to the shipping unit, following the white arrows, and gathering stars along the way. The pair have been playing this game for some time now, sitting in the carpet area side-by-side. Blaise is stabilising the iPad using his knees and at times his left and/or right hands are placed either side of the iPad. In order to keep the robot moving, and to prevent it from falling down deeper into the maze, he is continually swiping it across and up the iPad 'page'.

Table 2: Steering a robot

Speech/gaze	App	Movement: precision tapping/swiping (control)	Movement: deictic/ gestural	Commentary

Blaise: Watch it! Watch … this!		Blaise: Guides the robot from left to right across the screen, swiping with forefinger	Harry: Leans in closer to screen. Clasping hands together	Harry's body language and gesture signalling his involvement
		Blaise drags the robot to the right of the screen, disregarding the white arrows		Blaise is subverting the game here
	Robot moving rapidly vertically up the screen	Blaise: Begins to swipe upwards using left and right forefingers alternately		Blaise speeding up the movement of the robot Harry: Predicting what might happen
Harry (looking at screen): And then he'll be trapped!!		Blaise: Positions the robot over a long vertical drop in the maze		Blaise's drama and quick glances to Harry, show how he is checking he has his attention
Blaise: AARRGH! Harry: Oh! Harry: Ah!	Robot begins to tumble down, deep into the maze		Blaise: Quickly pulls both hands away from screen, dramatically raising them up above his head.	Blaise screams as if he is the falling robot…. The quick succession of their exclamations take place as the robot is falling
			Harry: Leans closer to the screen Looks to Blaise	Harry signalling his interest
Blaise: I like that bit! Harry: Can I have a go now?		Blaise: Guides robot back up the maze using left and right hand swiping movements		Blaise decides to repeat this sequence. He is speeding up the movement – using both hands.
Blaise: Watch it! Watch it! After I have completed this mission				Blaise maintaining Harry's attention… Uses word from gaming experience

We can see in this episode how Blaise, confident in the haptic skills needed to operate the app, is exploring the app in a playful way, enjoying 'failing' the mission to watch the robot fall back down into the maze, almost subverting the object of the app. He confidently uses both hands to speed up this part of the game, moving quickly towards the part of the game he is enjoying – the robot's tumble down the maze. He repeatedly draws Harry in to watch this sequence, and appears to link it to his experience of computer games as he is on a 'mission'. Again, although Blaise is carrying out most of the control movements, we can see how he draws Harry into the activity. He links the exaggerated haptic movements to sweep the robot up the screen, to the gesture of throwing his hands up towards his head. Harry watches this merging of control movement and gesture intently. Blaise is keeping Harry involved and Harry is duly entertained.

Episode 3: Josie and Jane: Let's make a pop group! Story Maker by Lego Friends©

Josie and Jane are sitting in the book area of the classroom on a small bench – an informal place where children frequently share books or just chat. Josie is balancing the iPad on her knee with a classmate sitting either side of her. I recognise Lego Friends Story Maker©. Josie turns the screen to me and uses the arrow icon in the corner of the screen, revealing a page called 'My Book Title'. Jane reaches across, extends her finger and presses the 'person' icon on the screen. A menu array of possible story characters appears at the bottom of the screen. Josie turns the iPad back towards her and settles it onto her knees (stabilising movement). Jane and Josie are negotiating which characters to choose from the slide bar menu. Jane accidently selects the story setting selection menu.

Table 3. Josie makes a pop group

Speech/gaze	App	Movement: precision tapping/swiping (control)	Movement: deictic/ gestural	Commentary

Josie: No!... Persons!			Josie pulls her hands away from screen	Josie signalling her exasperation at Jane's intervention – she wants the character choices menu back
	Characters re-appear at bottom of page	Josie: Reselects row of people		
Jane: Boy... boy... boy	Another character is aligned on screen	Josie: Selects and aligns another character	Josie: Re-adjusts iPad on knees (stabilising movement)*	Josie resisting Jane's attempt to make a choice Jane repeats 'boy' three times to assert her choice
			Josie: Moves hands away from screen – outstretches arms*	
Jane: My big sister has got that other person. There!		Josie: Slides row of possible characters from side-to-side with right index finger	Josie: Moves hands back to iPad and re-stabilises	Jane drawing on home experiences
Josie: Err...	Five characters now aligned on screen		Jane: Points to character on array	
Jane: Get her a doggie!		Josie: Selects and draws a person to array	Josie: Moves Jane's hand away and points back to screen	Josie persuading Jane which characters they need for the pop group
Josie: Need her! She's nice look!		Uses thumb and forefinger to realign and resize characters		
Jane: She can be a kid!			Jane: Points to array at bottom of screen	
Josie: Yes – she's the singer…		Josie: Selects, drags and drops a guitar onto middle person in array.		Jane has taken up Josie's intentions here…
Jane: Get a microphone for her…	Centre character is now holding a guitar			
Josie: What about a handbag? No!			Jane: Points to accessory icon	Jane persists with her suggestion
Jane: Get her a doggie!				

<Figure 3. Making a pop group > about here

In this third episode, children were developing haptic skills necessary to access the app. They used the drag-and-drop function to select images, and Josie made some attempts to resize and re-align images. The complexity of this app did appear to be beyond the reach of the children, and the activity around it focused on selecting characters and accessories and did not progress beyond this. What appeared significant were the ways in which the children drew upon the haptic skills they had already mastered, and attributed their own understandings and experiences in order to generate a meaningful shared experience with the app. Josie, for example, drew on her cultural and media experiences of Lego characters and of pop groups and the

objects and accessories they may have. By contrast, Jane appears to want to create a family scene, with a 'boy' and a 'doggie'. We can see how Josie draws from her knowledge of pop groups, and selects characters to join the on-screen array. She knows about what pop bands might need and the accessories a girl band might want to have. She resists Jane's suggestion to add a 'doggie' to the line-up, or to select a 'boy' member of the band. Josie makes direct reference to particular characters in the app. The comment 'My sister has got that one', seems to refer to familiar characters in other *Lego Friends* apps. Josie was clearly the most demonstrative member of the group, and she used her repertoire of communicative resources in order to steer the direction of the play. She appeared to exaggerate the stabilising movements needed to hold the iPad as a way of expressing this. Her stabilising movement moved into the gesture of throwing her hands into the air. Jane intervened and persisted in providing suggestions to shape the direction of the play, and although Josie resisted these, she continued to follow Josie's choices, taking these into account.

Discussion: Apps in the classroom – possible sites for collaborative cultural engagement and expanding communicative repertoires

In this chapter, I explored episodes where children spontaneously and playfully took up touchscreens in order to examine the communicative repertoires that are orchestrated through such activity. What was clear across all three episodes was the way in which children collaboratively brought peer interests and concerns to the app, and the ways in which this shaped the ways the app was used and what the app *became* in the classroom. We have seen how children collaboratively interact around apps and as they do so, the app offers an opportunity for creative engagement as the children learn to control it, explore its possibilities and imbue it with meanings significant to them. In this way, the apps become a site for engagement amongst peers where friendships, relationships and shared interests emerge. These shared interests culminate in the emergence of children's peer cultures for this group, as they bring their experiences, their concerns and their interests to the activity. In turn, they transform such activity into an activity that is relevant and significant to their own lives. Children's desire to build friendships and bring their shared and individual experiences to the episodes drove much of the interaction. Blaise drew on his knowledge and language of gaming to predict what might happen to the robot as he

frantically tried to keep it moving. His deliberate 'mistakes', causing the robot crash to the bottom of the maze, and his exaggerated haptic control movements as he rapidly swiped the robot upwards, were with the intention of entertaining his friend, Harry. In Episode 3, Josie, stabilising the iPad, appears to be the dominant decision-maker in this episode. She claims territory, expressing her knowledge and experience from outside school, gained from spending time with her older sister. Apparent in all the episodes is the good humour and the 'togetherness' with which the children created activity meaningful to them as they played with the apps.

The ways in which children collectively transformed the apps through their activity is only part of the story. The iPads and apps prompted the children's interests and a range of semiotic resources, including touch, facial expression, gesture, talk and movement as they played together with and around the iPad. The potential for meaning-making brought to the fore via the use of deictic, control and stabilising movements (Merchant, 2014) and its orchestration with other semiotic resources, such as speech and facial expression, was significant in that it provided children with opportunities to explore and extend their communicative repertoires. When applying Merchant's typology of hand movements to these examples, we can see how the deictic movements that spontaneously arise, often prior to a control movement, are interpreted by the children, and how they become shared anticipated events. In Episode 1, Maizie, Kehinde and Sally quickly anticipated and interpreted the ideas and intentions of others through the gestures that took place, and how these were often prompted or lead into the haptic 'actions' needed to operate the app. Episode 3 illustrates how the very demonstrative Josie used deictic movements and stabilising movements, not only to control the iPad, but also to communicate her dominant role in the group. It is evident how swiftly and seamlessly these young children integrated such movements into their repertoires, blending what they know and what they can already do, with more novel ways of expression brought about by touchscreen interactions.

What was noticeable in this study, was that even when children were presented with apps that were linear or closed, the children often transformed them into experiences with a multiplicity of meanings and choices. This was achieved through children's playfulness and through their fluid management of meaning as it emerged moment-

by-moment. At times, this appeared to occur because of the children's lack of knowledge of the 'right way' to operate the app, as in Episode 3. This playfulness and shared management of meaning conferred and secured their peer cultures and provided them with opportunities to collaboratively share and extend their communicative repertoires. Furthermore, this activity reflected and provided children with the opportunity to try out a broader set of meaning-making practices that linked to their shared cultural experiences.

I argue that the possibilities of touchscreen technologies may, as yet, not be altogether realised in many early years classrooms. Apps used in classrooms often have very specific pedagogical goals in mind: for example, to support skills in early literacy and numeracy. If we are to further our understanding of the learning potential of such devices, we may need to look beyond such goals when we observe children's interactions with and around touchscreens.

References

Corsaro, W. (2005) *The sociology of childhood.* Thousand Oaks: Pine Forge Press.

DFE. (2012) Statutory Framework for the Early Years Foundation Stage. Available at: http://webarchive.nationalarchives.gov.uk/20130401151715/https://www.education.gov.uk/publications/standard/allpublications/page1/dfe-00023-2012 (accessed 19 July 2016).

Daniels, K. (2014) Cultural agents creating texts: a collaborative space adventure. *Literacy* 48(2) .103-111

Daniels, K. (forthcoming) Exploring enabling literacy environments: young children's spatial and material encounters in early years classrooms. *English in Education* Available at: http://onlinelibrary.wiley.com/doi/10.1111/eie.12074/abstract (accessed 19 July 2016).

Flewitt, R. (2005) 'Conducting research with young children: some ethical considerations'. *Early Child Development and Care* 175(6):553–65.

Geist, E. (2012) 'A qualitative examination of two year-olds interactions with tablet based interactive technology'. *Journal of Instructional Psychology* 29(1).26-35

Giddings, S. (2014). *Gameworlds: Virtual Media & Children's Everyday Play*. New York: Bloomsbury.

Heath, S. B. (1983) *Ways With Words: Language, Life and Work in Communities and Classrooms*. Cambridge: Cambridge University Press.

Kress, G (1997) *Before Writing: Rethinking the Paths to Literacy*. New York: Routledge.

Kress, G (2010) Multimodality. A Social Semiotic Approach to Contemporary Communication. London: Routledge.

Kucirikova, N., Messer, D., Sheehy, K. and Flewitt, R. (2013) Parent–child narrative accompanying a personalized iPad story. *Literacy* 47(3)115–22.

Kucirkova, N., Sheehy, K. and Messer, D. (2014) 'A Vygotskian perspective on parent-child talk during iPad story sharing'. *Journal of Research in Reading*. Available at: http://onlinelibrary.wiley.com/doi/10.1111/1467-9817.12030/abstract (accessed 18 July 2016).

Levy, R. (2009) '*You have to understand words… but not read them'*, young children becoming readers in a digital age'. *Journal of Research in Reading* 32(1):75–91.

Lynch, J. and Redpath, T. (2014) ''Smart' technologies in early years education: A meta-narrative of paradigmatic tensions in iPad use in an Australian preparatory classroom'. *Journal of Early Childhood Literacy* 14(2):147–74.

McPake, J., Plowman, L. and Stephen, C. (2012) 'Pre-school children creating and communicating with digital technologies in the home'. *British Journal of Educational Technology* 44(3):421–31.

Marsh, J. (2004) 'The techno-literacy practices of young children'. *Journal of Early Childhood Research* 2(1):51–66.

Merchant, G. (2014) 'Keep taking the tablets, iPads, story apps and early literacy' *Australian Journal of Language and Literacy* 38(1):3–11.

Walsh, M. and Simpson, A. (2014) 'Exploring literacies through touch pad technologies: The dynamic materiality of modal interactions'. *Australian Journal of Language and Literacy* 37:2:96–105.

Wohlwend, K. (2015) 'Making, remaking and reimagining the everyday: Play, creativity and popular media'. In: J. Rowsell and K. Pahl (Eds) *Routledge Handbook of Literacy Studies.* London: Routledge.

Wolfe, S. and Flewitt, R. (2010) 'New technologies, new multimodal literacy practices and young children's metacognitive development'. *Cambridge Journal of Education* 40:4:387–99.

Yamada-Rice, D. (2011) 'New media, evolving multimodal literacy practices and the potential impact of increased use of the visual model in the urban environment on young children's learning'. *Literacy* 45(1):32–43.

Yelland, N. (2011) 'Reconceptualising play and learning in the lives of young children'. *Australian Journal of Early Childhood* 36(2):4–12