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iPads, Digital Play and Pre-schoolers

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Mobile technologies such as the iPad, mark a turning point in leisure activities for many young children. Their proliferation is now an emergent theme in educational research yet the impact on 'play' is less understood. This paper reports on data collected from three interrelated studies designed to examine issues of (i) children's access to these technologies from the perspectives of parents/guardian, (ii) the opportunities for spontaneous play these devices present through their applications targeted for young children, and (iii) the affordances and limitations that emerge from the experiences of children. In this paper we share an expanded criteria designed for the analysis and observation of computer play with young children. Our findings, contribute to the theoretical basis for digital play by applying theories (established in conventional play settings) to children's use of iPads in their home settings. Our findings captured some positive experiences showcasing the potential for digitally mediated imaginative play with the iPad. The critical role that parents and care-givers play in framing the activity through time and selected opportunities was emphasized. We provide some examples of the affordances for children and their significant others that emerge from digital play that might be not be possible in natural play.

Introduction

There has been an ongoing debate on how (and whether) digital technologies can fit in the lives of young children, although the use of computers and other digital devices such as iPhones, iPads and game consoles are rapidly becoming a reality in early childhood settings and many children's homes. The arguments for and against the use of digital technologies in education and entertainment of young children appear to be concerned with the quality of children's experiences with digital technologies and the value of such experiences for their physical, cognitive and socio-emotional development (Alliance for Childhood, 2010).

Recently the debate has been extended to the use of digital technologies by children under three (NAEYC, 2011). While technologies are used for a variety of activities in these early childhood years, the use of computers for playing games is the most common activity. According to the Australian Bureau of Statistics, 88% of 5-8 year olds use the computer to play games (ABS, 2006).

This asks questions about the value of these devices and what affordances they offer to those children in the formative early years.

Over the past decade, there has been an increasing body of research into digital games and play in a range of age groups, however, very little research "focuses specifically on digital games and young children" (Lieberman, Fisk & Biely, 2009, p.300). This is particularly surprising as "theorists, regardless of their orientation, concur that play occupies a central role in children's lives" (Isenberg & Quisenberry, 2002, p.33).

Play and children's learning and development

The role of spontaneous play in young children's development has been widely described in early childhood literature (Fleer, 2010; Bodrova & Leong, 2007; Van Hoorn, Noujrot, Scales & Alward, 2003; Singer & Singer, 1990). Modern and classical theories of play have identified many ways in which children's traditional play in a Western society may advance their cognitive and socio-emotional development (summarised in Verenikina, Lysaght, Harris, & Herrington, 2004). In pretend play, children acquire the foundations of self-reflection and abstract thinking, develop complex communication and meta-communication skills, learn to manage their emotions and explore the roles and rules of functioning in adult society. From a cultural-historical point of view (Fleer, 2010), make believe play constitutes the basis for the child's awareness of the world and raises their cognition of reality to a more complex and generalized level (Vygotsky, 1967). It has been argued in recent literature that "children's play, especially in its make-believe or pretending game forms, is a critical precursor to a major feature of our adult narrative consciousness" (Singer & Singer, 2006, pp. 97-98).

Even though the early childhood curriculum is traditionally based in play (Van Hoorn, et al, 2003), the majority of studies are focused on the use of computers to enhance learning in a particular curriculum area. A recent study of 4-5 year old preschoolers demonstrated that educational games are used more frequently (79.54%) than recreational (59.90%) (Zevenbergen & Logan, 2008, p.41). Thus, the developmental value of computer games is still undervalued and not fully understood.

Digital games and spontaneous play

Current researchers argue "digital media are here to stay and are going to be widely used by young children. The important issue is how to maximize the positive consequences of these new media so that they enrich rather than hinder children's play experiences." (Johnson & Christie, 2009, p.285). Salonius-Pasternak and Gelfond (2005) suggest that computer play is, perhaps, "the first qualitatively different form of play that has been introduced in at least several hundred years," and "it merits an especially careful examination of its role in the lives of children" (p. 6).

Recent studies have identified a variety of newly emerging digital devices that are suitable for children's education and entertainment. Researchers notice the

advantages of the use of handheld technologies such as tablets as compared to mouse-driven programs (Couse & Chen, 2010). Leoni (2010) sees a great potential in iPads as they are not only "useful and portable, but also more affordable" than laptops. Additionally, the cost of the applications are very competitive and include the opportunity to download a “light”, often free trial of the application though Banister (2010) points to a lack of research into iPads for education, as they are "still very new to the market" (p. 122). Marsh (2010) argues against the "dichotomy often posited between play and technology" (p. 25), since the emerging phenomenon of 'digital play' differs from that of child's spontaneous play as the former largely depends on (and is often restricted by) the actual design of the software and hardware. Nevertheless, if digital play in its different forms is to become a significant part of young children’s lives, it is important to examine its developmental value from the same perspective that is taken when considering the significance of traditional forms of play in child development.

The research presented in this paper contributes to the theoretical basis for digital play by applying the theories of play (established in conventional play settings) to children’s use of iPads in their home settings, and by investigating whether such digital play provides unique affordances* for children’s development, that might not be possible in natural play.

Approach and Methodology

This project stems from the premise that play is “an essential and integral part of all children’s healthy growth, development and learning” (Isenberg & Quisenberry, 2002, p. 33), which has the potential to advance children’s cognitive and socio-emotional development (Verenikina, Herrington, Peterson & Mantei, 2010). Working from a number of characteristics that have been identified to distinguish child’s play from other forms of their activity (Piaget, 1952; Vygotsky, 1967; Singer & Singer, 1990), we have categorized play as a spontaneous, self-initiated and self-regulated activity of young children, which is not necessarily goal-oriented. In particular, we emphasize the main characteristics of child’s spontaneous (traditional) play as including:

- Dimension/s of pretend; an action and interaction in an imagined situation;
- The use of object substitutes;
- Spontaneous, self-initiated and self-regulated activity;
- Not goal-oriented;
- Relatively risk free;
- Intrinsically motivated;
- Child in control.

The widespread proliferation of digital play for very young children merits a re-examination of its impact on children’s psychological development using these criteria for play. To this end, we have employed three interrelated studies to help us begin to respond to the following questions:

* 'Actionable properties' of an artefact (a game application for the iPad in this study) which are not necessarily visible or yet known (Norman, 1999, p. 39)

- What access do young children have to digital technologies, including computer games? And how do parents view the role and place of digital technologies in the lives of their children? (Study 1: Parents' perspective)
- How do game applications for iPads provide opportunities for spontaneous play? (Study 2: Software selection and analysis using expanded criteria designed for the analysis and observation of computer play with young children)
- How do pre-school aged children respond to these applications offering varying opportunities for play? What are the affordances and limitations of these opportunities for digital play? (Study 3: Child observation in their home)

Participants and method

This research was framed as a case study of a convenient sample of three families who have one or more children at pre-school age who were invited, and consented, to participate in the study. Children and families selected were readily available and convenient, in that: a member of the family was known to a member of the research team; the family contained at least one preschooler (ie a child aged 3-5); they were geographically close to the researchers' institution to enable distribution of necessary resources; and they were willing to participate in the research project. All parents were in their mid to late thirties, and the age of children ranged from 3 to 4 years old. All the children had one or more siblings. The demographics of the participants are summarised below (Table 1). Table1 Participant demographics*

Parents	**Children**	**Siblings**
Jarrod	Adrian, 3	Oliver, 6 months
Carla	Iris, 3	Elvira, 10; Anita, 8; Gary, newborn
Ben and Alison	Kent, 4	Jay, 2

*Pseudonyms are used

We acknowledge these participants may not be representative of the entire population of young people who are using iPads. It is our intention to see our participants and this research design as a pilot as we look to take both our research design and research questions in a broader context with a greater emphasis on what 'digitally mediated imaginative play' is, and how teachers and parents can effectively and appropriately support this phenomenon.

The methods of data collection included observation of the children using selected software (captured by videotaping) and semi-structured interviews with the parents which were audio taped. The interviews were analysed for emerging theses using thematic analysis (Braun & Clarke, 2006). The analysis of video recordings was based on the traditional techniques of child's play observation: the children's speech samples and behavioural episodes were noted, in particular those that indicated their engagement in imaginary play (e.g.,

undertaking the roles of others, variations in labeling situations and objects, interactions with peers and adult about situations of pretend). The research comprised of three interrelated studies.

Study 1: Parents' perspective

To understand the access that young children have to computer games the parents were invited to participate in the interviews conducted by the researchers. Questions that were asked concerned their children's access to computer or other digital games (eg iPhone, Videogames, Internet Games etc.); the rules in the household that regulate children's digital play, and also the parents' thoughts on whether digital play is good for their child/ren's development.

The interviews included open-ended questions, which allowed for a "search for meanings" (Smith, 1995, p.9). The interviews were informal and if the parents touched upon an interesting point outside of the guiding questions, they were prompted to discuss it further. An interview with each family was conducted prior to children playing the chosen software. In two families only one parent was available for interview, and in one family both the parents participated in the interview together. Two interviews were conducted in parents' homes—a preferred option which was most convenient for them, and one—in an early childhood centre.

Study 2: Software review and selection

In this second study we expanded on the criteria developed in our previous work (Verenikina et al., 2010) by incorporating Gee's (2003) gaming principles, to analyse a range of game applications for the iPad. Applications that feature in the 'top 50 education aps' (Apple iTunes website) and which were identified for pre-schoolers, were selected. These applications were used for further exploration in Stage 3. They included *Monkey Lunchbox, Toy Story, Puppet Pals* and *Pocket Pond,* the analysis of which is presented in a later section of the paper.

Study 3: Child observation

In this third study we used the sample of applications identified in Study 2 that represent a diversity of available games according to our criteria. We then provided an iPad loaded with these applications to the three pre-schooler participants. As identified in our previous research the observations of children using computer software are better conducted in an authentic environment of children's homes where children can naturally engage in play in communication with their siblings and parents (Verenikina et al., 2010). Each child's parent/s observed their child in their home environments as they 'played' the selected game applications designed for the iPad. Parents were encouraged to video record interactions and capture observations as their child interacted with the iPad.

Findings and Discussion

This paper reports on data collected in the three interrelated studies of this research. It presents the parent interview results, the analysis of two selected iPad applications and discusses the results of observation of one child, Iris, while engaging in the use of the selected iPad applications (documented by video recording).

Study 1. The role and the place of digital technologies in the lives of young children: parents' perspective

The interviews allowed us to explore the parents' views on the place of digital technologies in their children's lives. In particular, what choices the parents made to regulate the time and space while their children engage with the technologies, and how they saw their role in children's development and learning.

The opportunities for the use

All the children in the study had a variety of digital technologies and applications in the household: desktop and laptop computers, iPad and smartphone (Iris); iPhone and iPad, laptop and desktop computer with on-line connection (Adrian) and a laptop with access to some games from the Internet and CD games (Ben). The software and games choices for Ben and Adrian included both educational games and entertainment applications. However, Carla did not seem to try to engage Iris in any activities with digital technologies. She stated that she wouldn't want to "force anything or create a dependency that took away from their [children's] creativity".

Digital technologies and the screen time

All the interviewed parents referred to making healthy choices for a screen time for their children, which were within the regulations for the use of technologies with young children (Alliance for Childhood, 2010; Evans, Jordan & Horner, 2011). The parents of Adrian, 3 and Kent, 4 were really definite about the time use of the digital computerized technologies by their children: 20-30 min a day, or not more than 20 minutes at a time. Interestingly, children were accepting of this ruling. Ben and Alison pointed out that Kent, 4, would not engage himself in playing games for more than 20 minutes ("If he is more than 20 minutes we stop him, or he is usually off himself, finding something around the house"). Adrian, 3, at the beginning "was very demanding and wanted them [games]", but once he realised he would get access to them every day, he "accepted it and doesn't ask for it, as he knows when he is going to get it next time. Boundaries are in place now and it works well".

Digital play and spontaneous make-believe: beyond the screen

The applications made available to Kent and Adrian display strong connections to popular culture. The children enjoyed games from ABC Disney such as *Mickey Mouse* and *Toy Story*. Kent's parents made an explicit connection to the TV shows: "Some Disney games relate to the TV shows which he knows. Eg Mickey Mouse—so he knows the story line. Sometimes he sees games advertised on ABC kids—their websites—and he asked—can we go and do 'Dirt Girls' game—we haven't done it yet!"

A connection can be made here to children's spontaneous play as children tend to make sense of what they observe in real life by acting it out (Vygtosky, 1967), and the TV shows are a part of their life. Parents also noticed that children extended their digital play beyond the screen to other activities, thus making digital play as part of their wider interaction with their environment. For example, Kent's father commented that sometimes he plays out the characters from the show and the games: "Kent and Jay run around the house pretending sometimes to be Buzz during their rumble time, they jump on me pretending they are Buzz (I am Buzz!!!)". Jarrod added how Adrian had taken ideas from a digital game and created physical representations of this in the garden during periods of play.

Digital play and learning

While all the parents appear to value children's spontaneous play, most of them seem to emphasize the educational, rather than developmental, value of children's activities with digital technologies. For example, even though Carla didn't allow for much use of digital applications by Iris, she stated, "I guess it would be ok if it was for a purpose". Interestingly, she admitted that it didn't occur to her that digital play might be a useful thing to encourage in her children. She reflected, “To be honest we haven’t encouraged play, or lots of access to these. I’m wondering if we’ve sent the message that those are things for work? Both Morgan and I work from home and the girls see this.” Kent's parents were particularly concerned with the educational value of his engagement with the digital technologies. They repeatedly returned to this topic during the interview. Kent's Mum seemed to be quite supportive of him playing educational games, even the child appeared to be not all that enthusiastic about them himself:

> With educational games he is OK—those with words, or numbers, he was happy to play. They are Pre-school ones to count, do letters. Very basic games. The words, the stories. He was playing quite often for a while, but then [he] stopped. He is probably doing maybe twice a week now, [we] took a 3-week trial reading games package. So I was trying to get him playing those games.

When Kent's parents were asked how they felt about their son playing computer games, the topic of education, and particularly learning some tangible skills, were brought back to the conversation:

> We like him playing; we think the games we picked are fairly educational. Mum: I love what he learnt from it—he learnt some fairly good reading skills. Dad: Big gains are at work, fairly educational, too. And I like [the way] he learns how to use the computer, navigating a computer; we just seem such a computer world at the moment.

Interestingly, just playing with digital technologies was not considered by parents as valuable, which perhaps reflects current promotional trends in advertising digital technologies for learning (Verenikina et al., 2010). When the parents were asked whether the games that they chose for Kent were educational, their responses were indicative of that:

> Mum: Yes…He has these other ones up there, but he seems to choose the ones that are more educational anyway. Aren't they all these days, whatever they try to encourage them to do, introduce a character, they do something educational with that character. Dad: That sort of age games anyway—they are all some sort of education whether it is counting, or matching, or colours or something like that.

Such a view of digital games by Kent's parents perhaps is also indicative of the types of games the child was playing—in the words of his parent—'very basic games', which might not have any developmental value but rather focused on some elementary reading and counting skills. Kent's Mum also commented that most of the other parents, whom she knew, have similar views: they might not want to let children just play, but they do so with educational games ("I think most people I know let their children play educational kind of games").

Adrian's experience with digital play was of a different kind. He played a variety of games on his iPad, which he was able to choose himself. They included some open-ended games such as *Puppet Pals* and the *Pocket Pond* (analysed for this research in Study 2). He also played some simpler educational games but quickly lost interest in them as described by his Dad, Jarrod:

> Current favorites are puppets ones where he can create his own story… He liked also those which you can match the colours, shapes, objects and animals. He tried few interactive games and now he knows outcomes and he moved beyond those to another realm of creating concepts… he moved to those where you can create your own concepts... He creates a story, plays it out, listens to it and deletes it and starts all over again. It is interesting that he moved away from the games where you follow the game or a story from the beginning to the end, to something more spread out… he creates his own puppet shows.

The above quote from Adrian's dad reinforces the argument that children's level of engagement in digital play depends on the characteristics of the digital game at hand. It also demonstrates that children as young as 3 years of age are interested in, and are capable of, engaging in such a sophisticated digital play as creating their own puppet show, with their own characters and their own story. However, this is not all that surprising, if we think of the level of sophistication of children's traditional, spontaneous make believe play, which is largely created by the children themselves. Adrian's dad further supports this idea: “He [Adrian] can control where it finishes and how it starts; what characters are introduced and what they are doing and saying—he can control all of that.” Being in control is one of the main features of young children's spontaneous play and it is suggested that the children's digital technology use should reflect this characteristic (NAEYC, 2011). Ironically, in contrast with the above argument, in Adrian's preschool, as it came out from the interview, the children are not allowed to even touch the computers—the technologies are predominantly operated by the caregiver.

Digital play and the social context

Even though there was no specific interview question related to the social context of the use of digital technologies, this theme emerged in all the interviews. All the parents referred to the necessity to assist the child with the technologies at least at the beginning of their use. In some cases it was direct assistance, as explained by Kent's dad, Ben, "We have sat down and have seen him playing and helped him at the start. We monitor the play". In other cases it was a demonstration of the possibilities and modeling. Jarrod recalled:

> It started as Blog to publish on a Website when travelling overseas for people back in Australia. First Adrian was contributing content with my prompts but did not manipulate the technologies; but then Adrian was showing interest in doing what I was doing and he was keen to do it himself and be in control—so we let him.

The parents actively assisted their children to progress with the use of the digital technologies. Jarrod reported on his conversations with Adrian, in relation to his progress:

> He generally shows us what he has done. He often does the same thing over and over. I will watch him and then show him what else can be done. He is happy to allow me to control the device and demonstrate how it is done. Then he would look at what I have done. So it is not just verbal but showing each other and doing. If he asks questions—they are about how to use the device, but not about how to do the story.

Interestingly, as pointed out by Jarrod, Adrian needed his dad's help in relation to the use of the technology, but not his imaginative play, as he perhaps perceived his dad as a technology expert. Adrian's use of his dad's expertise allowed him to work in the Zone of Proximal Development (Vygotsky, 1978) and thus further advance his own skills.

Carla, Iris' mum, admitted that she did not introduce her children to using digital technologies available at home, but she described an episode when a family friend introduced her daughters (Iris, 3; Anita, 8; Elvira, 10) to a digital version of *Scrabble* play on his iPad. The girls were very excited and could not stop talking about it for a while. Carla commented: "I guess that was the first gaming experience our children had had. It did get me thinking though!" None of Carla's oldest daughters played digital games before which apparently also contributed to Iris' lack of experience with the technologies. The role of communication with siblings came out of the discussion with parents in two families. In their opinion, using the digital devices helped the siblings to play together rather than separate them into individual players. Ben explained that when his oldest son Kent, aged 4, played his computer games, it did not draw him away from communication with his younger brother Jay, 2. He commented: “Jay would pull out a chair and watch Kent playing the game. We watched them the other day and Kent would say, "Hey, Jay, you do it this way, and da-da-da" and then would let Jay try it. It was encouraging see that he was sharing and teaching Jay. He does not always share.” It is evident that the use of the digital technologies by children provides an additional dimension for communication and collaborative activities with parents and siblings in the family.

Study 2. iPad software selection and analysis

The choices of the iPad games for Study 2 were guided by the expanded criteria designed for the analysis and observation of computer play in our previous study (Verenikina et al. 2010). These criteria are summarised in the table below (Table 2).

Table 2. Characteristics of digital games that promote young children's development (expanded on Verenikina et al., 2010).

Factor	The computer game:	Play effects:
Motivation	Is intrinsically fun and is not limited in scope to "teaching" particular skills	Fun, state of flow, intrinsic motivation, action at a distance (manipulating and making decisions for a character)
	Allows play for the sake of play—reaching goals is less important	No visible goal, possibly unintentional play
	Operates at the outer and growing edge of a player's competence—it is challenging but do-able	Eagerness to challenge oneself, players can customise the game to their level of ability and preferred style of learning
Context	Relates to daily life—the things from daily life that the child can recognise	Uses familiar objects consistently throughout the program
	Can be incorporated into children's imaginative play	Engaging in pretend, make believe play
	Presents opportunities for problem solving	Users need to be supported with problems getting more complex as the game unfolds
Path	Is discovery-oriented	Children explore situations in an open-ended, non-linear manner; free exploration skills are integrated into the game, aren't separate entities, players get a feel for any "rules" as they spend time interacting with the game
	Allows children choices in selection and timing of activities	Children in control of selection, timing and pace
	Allows the manipulation of symbols and images on the computer screen	Symbolisation by children, engage in make-believe and situations of pretend
	Provides the facility to engage collaboratively with the program rather than exclusively a single player	Discuss, talk, children seek collaboration
	Provides visible transformations; children produce rather than consume	Children's actions impact the program; their decisions and choices have consequences, they see that their decisions in the game contribute to the game world

	Enables increasing complexity, gradually gets more difficult as the game progresses	Children move to more complex levels of the program, initial levels present problems that are designed to form generalisations that will work later in the game when more complex problems are presented
Access	Provides spoken directions (as children may not be old enough to read), or provides advice when children need assistance from more experienced players; information "on demand" and "just in time" support when needed by the child	Children listen and follow directions, words and concepts become evident through experiencing the game, children access available support when needed or children seem to be "stuck" and cannot move forward without further assistance
	Employs an uncluttered screen design with simple background, colouring and graphics	Children seem to respond well to the interface and are not distracted by meaningless features.

The analysis of the games presented below utilized the above criteria (Table 2, column 2) to describe the characteristics of two individual games, which were observed in study 3. Features of different kinds of play software that are associated with the developmental value of computer play were identified.

Puppet Pals:

This application enables users to create a puppet show as they select backgrounds and characters and manipulate these on the stage as they record oral annotations. Themed categories of characters are presented, from which the user can make individual selections. Once the user has made selections regarding backgrounds and characters these are transported to a stage where the backgrounds can be changed and characters dragged onto the stage and resized by moving two fingers in and out. Characters can also be flipped with a double tap or rotated using two fingers. Once the record button is pushed every movement and annotation are recorded. These are then saved to a library that can be viewed later.

Play factor	*Interpretive comment*
Motivation and goal orientation	The application is designed to engage the user in the art of puppetry—selecting characters, backdrops and creating scenarios to be acted out. This can be conceptualised differently by different users—there is no expectation as to how long the play should be, nor is there any specific motivational feedback built into the application. The ability to record, playback and archive puppet shows could be seen as a motivator.
Context	The characters are available in themes (for example fairytale, wild west, monsters); the user makes decision about which characters to use (up to 8), which they can choose from the

	one theme, or between and among. The application provides opportunity for the user to engage in imaginative play as they move between backdrops (up to 3) with the characters, as they develop their stories. The application lends itself to the creation of narratives, through which the characters can experience complication/s that the narrator may work to create and resolve.
Path	While the elements of the puppet show (selecting backgrounds and characters) are quite controlled, the user is able to explore these through their manipulation and oral annotations. The user has control over the selection, timing and pace as they manipulate the characters and backgrounds to fit with the story they develop. While one user best controls this manipulation, there is scope for collaborative decision making around the characters, backdrops and skill development.
Access	There are written instructions available, however these are difficult for a young user to access. Assistance from another user might be more valuable that the on-screen supports. The screen design is conducive to a puppet play. Once the user has made their choices with characters and backgrounds, they move to a screen that has a stage (with curtain) and their characters around this.

Pocket Pond:

This application simulates a pond for koi fish (for visual overview see iFish Pond HD, 2010). As soon as the application is launched the user hears soothing sounds akin to a natural water environment. As the user touches the iPad screen (by touching and swiping the screen) the water reacts. The fish can be fed by tapping the screen twice and the user can add and size lily pads, dragonflies and additional fish to the ecosystem. Thunderstorms can be simulated and the user is able to engage with some fishing activity. The game has no strict aim, rules or objectives apart from building and changing a pond for koi fish to live in.

Play factor	*Interpretive comment*
Motivation and goal orientation	There are no defined goals in this application. Users engage with the pond at their own pace within their own levels of interest. There is no insistence that additional features be added, and users are able to explore these as they choose.
Context	The pond and its sounds are realistic and representative of reality. There is potential for the pond to engage users in imaginative play as they create their own ecosystem.
Path	Decisions made by the user have implications for the koi fish, and through discovery the user is able to explore these. Users have complete control over how long they engage with the application and the complexity of the ecosystem they create. The transformations made to the pond environment are visible as the user's decisions take effect.
Access	There are few directions about how to interact with the application. There is an image menu that can be selected to add features to the pond, but even this is quite hidden. Trial

	and error reveals the intricacies of the potentials within the environment.

Study 3. Child observation and analysis

In Study 3, observation and analysis of children's engagement with software identified and analysed in Study 2 were conducted. The sessions were videotaped by the parents in their homes. The analysis of children's play was based on the criteria listed in Table 2, column 3.

This paper presents the analysis of the case of Iris. She has been selected to report on in this paper as she had the least exposure to, and experience with, digital games (from this cohort) prior to the research. Carla captured seven video clips of Iris using the iPad for analysis in the project. In all the clips Iris was seated on the couch in their family room, nursing the iPad on her outstretched legs.

In all video clips, Iris appeared confident in manipulating the iPad. She demonstrated that she was able to swipe the screen, make touch selections and navigate between screens using the home button (the only button on the iPad). She was captured turning the iPad to ensure the screen was correctly positioned and within her favourite orientation (landscape rather than portrait). Within the applications, Iris demonstrated awareness of what she was required to do as she moved between the options and made selections. When unsure what to do, Iris sought help from her mother (who was recording the videos) or her older sister Anita.

Iris and Puppet Pals

Carla identified that Puppet Pals became a family favourite. Iris's older sisters (Elvira and Anita) and their father had worked with the application to create a number of puppet shows. These had been saved into the library within the application. Iris was captured on video to retrieve and view these performances several times. Watching the plays and hearing the voices of her family members appeared to be an enjoyable experience for Iris. In another clip, Iris began to create her own puppet show. She demonstrated her ability to record her show and move between the backdrops as she orally composed a story. In a later clip, she added the movement of characters to her skill set as she moved characters in and out of the stage area in response to her script.

Iris and Pocket Pond

Iris played with Pocket Pond by herself for around 20 seconds. During this interaction, all that Iris did was move her finger up and down the screen to make the water ripple. Her older sibling, Anna, must have been observing her sister. After watching this repeated action, Anna entered the space to show Iris how to add other features to the ecosystem. Interestingly, Anna stayed for about 15 seconds as she demonstrated the features, but left the scene once Iris seemed to gain control of the environment and ways to manipulate it.

Conclusions and future research

While the findings of the study cannot be generalized, they represent some positive experiences of the preschoolers' digitally mediated imaginative play with the iPad. The study highlighted the pivotal role of the collaborative effort of parents and other family members in supporting such play. It demonstrated the importance of informed choices that need to be made in selecting the digital applications, which provide the pre-schoolers with the opportunity of active and sustained engagement in imaginative play.

All the pre-schooler participants in the study had a variety of digital technologies and applications in the households. However, the children's access to the technologies was shaped by parental decisions and beliefs. The parents expressed a clear view that the technologies are best used for educational purposes so the preschoolers could gain some knowledge and skills. The simple applications advertised as educational games, however, did not capture the young children's attention—they quickly worked out the process and the solutions and lost the interest in them. The children preferred the games which allowed them to engage their imagination and develop their own play that extended beyond the screen as digital play blended in the variety of children's other play contexts. Most of the parents, observed that they saw value in their children simply playing with the devices without any particular purpose. All the children easily accepted the healthy choices that their parents made for them for appropriate screen time.

The iPad applications such as *Puppet Pals* allowed the participant pre-schoolers to engage in a complex make-believe play which was supported by the technical features such as voice recording facilities, choice of the characters and recording an individually created story. The ability to be able to retrieve previous creations (eg in *Puppet Pals*) appeared to be a strong affordance of the device. The data demonstrated that to progress with creating a complex digitally mediated make-believe play the pre-schoolers needed technical support from other members of the family, more experienced in using the iPad. Thus, to take advantage of the technologies the young participants needed support in the use of technological features in which parents or older sibling had the expertise.

The theme of social interactions within the family while using the iPad came strongly out of our data. The need for technical support from parents or older siblings extended the space for collaborative activities in relation to children's imaginative play. By tapping into the child's play as a 'technical expert' (sometimes just for few seconds), parents and older siblings received a unique opportunity to share, and scaffold, the child's imaginative play which otherwise might have not happened. The ways that young children's imaginative play can be afforded by the use of digital devices such as iPad and scaffolded by more experienced family members merits a further study.

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