

Structured practitioner notes

What is already known about the topic?

- The use of tablet technologies is widespread in schools.
- Teachers are unsure how to use iPads in play-based programs, and mandated curriculum contexts.
- There is a recognition that iPads need to be incorporated into contemporary education settings in transformative ways.

What this paper adds?

- Encourages refocus away from literacy to multiliteracies, and from technology to a consideration of multimodal learning
- It is based on empirical data collected *in situ* over 4 years with children from aged 2 – 8 years
- It considers ways in which iPads might be incorporated into programs in order to enhance teaching and learning.

Implications for Practice and pedagogy?

- Recognize that foundational skills are required by children and need to be built on in context. iPads are one potential resource to support this.
- Careful and well planned questioning, observing and listening are vital pedagogical skills that can help children to clarify what they understand, and support their investigations.
- Being a contemporary educator is not just about using tablets but incorporating them into a dynamic learning program.

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A pedagogy of multiliteracies: Young children and multimodal learning with tablets.

Nicola Yelland,

Professor of Early Childhood Studies,

College of Education, Psychology & Social Work.

Flinders University,

Sturt Road,

Adelaide, 5042

South Australia

Nicola.yelland@flinders.edu.au

Tel: +6182015637

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Biography

Nicola Yelland is the Professor of Early Childhood Studies in the College of Education, Psychology and Social Work at Flinders University in Adelaide, South Australia. Her teaching and research interests have been related to the use of new technologies in school and community contexts. She has also worked in East Asia and examined the culture and curriculum of early childhood settings. Nicola's work engages with educational issues with regard to varying social, economic and political conditions and thus requires multidisciplinary perspectives. She is the editor of a new collection to be published in 2018 with Dana Franz-Bentley; *Found in translation: Connecting reconceptualist thinking with contemporary early childhood practices*. (New York: Routledge).

Abstract

The data reported in this paper is part of a larger case study with children from 2-12 years of age, that took place over four years. The data reported here pertains to children in the age range 4 to 8 years of age in Australia. The children were from low socio-economic schools in one Australian state. The study was concerned with providing empirical evidence about learning ecologies in which teachers designed multimodal experiences to support young children to become literate in the 21st century. Using a participant observation methodology, both the pedagogical strategies, and learning experiences of young children were documented in the form of narratives of early childhood practices. The aim was to consider the potential for *new learning* (Kalantzis & Cope, 2012) with new technologies, and to support teachers to use tablets to transform their pedagogies and practices in the early years. The approach taken was to use the theoretical constructs of *new learning* and a *pedagogy of multiliteracies* (New London Group, 1996) as the focus for designing the new learning ecologies. In this way we moved away from an emphasis on digital childhoods to create contexts for multimodal learning in 21st century childhoods. In doing this, the documented learning stories have multimodality as a uniting element, and digital technologies are viewed as being complimentary to other resources, rather than alternatives, or in competition with, traditional modalities. The paper illustrates the ways in which these multimodal learning ecologies can work to support emergent literacy which is viewed as a foundational skill needed by all children in order to thrive in their learning.

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Keywords: young children, multiliteracies, new learning, iPads, tablet technologies, early childhood pedagogy

Introduction

It has become increasingly apparent that being literate is a fundamental skill for citizens of the 21st century just as it was in previous times, but that new conceptualisations of what it means to be literate are needed for these new times. Globally, a broad definition of literacy promoted by UNESCO (2004) is regularly used to describe the skills, culture and contexts for literacy:

Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society.

(p.13)

The recognition of culture, context, and a continuum of learning, is a significant advance on previous definitions which simply regarded people who could *read and write* as being literate. It acknowledges that becoming literate enables people to manage the demands of literacy in their everyday lives in order to participate in active social futures (New London Group, 1996). In the 21st century such participation requires using digital technologies, and thus any definition that relies solely on traditional print literacies is inadequate in our consideration of contemporary contexts for becoming literate.

Accordingly, the teaching of early literacy is highly contested (Lynch & Redpath, 2014). Globally, government agencies have sponsored reviews of the teaching of reading (e.g. in the United Kingdom,

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Layton and Miller, 2004, ~~Australia~~The United States, NICHD (National Reading Panel), 2000) and they have frequently advocated stringent standards-based approaches whereby, what is regarded as being 'essential' knowledge and 'basic' skills, are outlined and taught explicitly. The mandated curricula are usually accompanied by sequenced assessments that provide a limited and traditional view of literacy that relies on phonics and the simple encoding and decoding of print based texts (Lankshear & Knobel, 2003). This has had the effect of reducing the concept of literacy to a simple skills based experience. Some policy statements seem to recognise the use of digital texts as being essential for literacy learning (e.g. DEECD, 2006). However, the focus of early years literacy programs and pedagogies, seems to remain dependent on 'print' based resources. They are a stark contrast to the social futures approach inherent to a pedagogy of multiliteracies (Kalantzis & Cope, 2012; Kress & Jewitt, 2003; Lankshear & Knobel, 2003; New London Group, 1996) which emphasise the multiple linguistic and cultural ways of knowing and communicating that are essential for negotiating the fundamentals of everyday lives, and research which indicates that young children can use new technologies in creative and productive ways (Marsh, 2004; Plowman, 2010; Yelland, 2007, Yelland & Gilbert, 2017).

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This has lead to a situation in which teachers, while recognising that digital experiences are inherent to becoming literate in the 21st century, are receiving contradictory messages regarding their validity (Yelland & Gilbert, in press). They see governments and the public, obsessed with national tests results which focus on print literacy contexts, and the application of 'basic' skills in order to demonstrate that their students meet national benchmarks. Meanwhile, in different learning ecologies, in their homes and community contexts, young children are fluent in creating, and using multimodal texts (e.g. Marsh, 2004; Rowan & Honan, 2005). They interact with digital and printed texts as they need to. Thus, while definitions of literacy are evolving, and digital technologies are becoming more ubiquitous, the focus has remained on traditional literacy skills in our schools. It has been contended

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(e.g. Lynch & Redpath, 2014) that this situation has resulted in learning contexts that 'constrain and devalue student enactment and position literacy learning as a 'struggle' to encode and decode rather than a means of pleasurable self-expression' (p.150). This is problematic as we strive to educate children to be active citizens in the 21st century for a world of 'work' that is yet to be defined.

For children from low socio-economic areas this conceptualisation of literacy is particularly problematic. These are the students who tend to perform at lower levels in standardised tests and thus deemed to be 'at risk'. Accordingly, their teachers tend to spend more time on the 'basics' in order to have them 'test ready,' and as such they often do not have opportunities to experience broader, more exploratory approaches to inquiry (Yelland et al., 2008). Further, these children are often characterised in terms of being in deficit for not meeting benchmarks and characterised in terms of what they are *unable* to do. This deficit model is not helpful (Yelland et. al., 2008) in terms of building their literacy capabilities, and does not respect the rich funds of knowledge that they come to school with (Moll, Amati & Jones, 2012) that are often not incorporated into, or valued, in school based learning tasks.

Multimodal literacies and learning

Becoming literate in a variety of multimodal contexts (oral, aural, linguistic, visual, kinaesthetic) with both printed and digital resources are essential to being able to function effectively in contemporary societies. Such learning ecologies are rich grounds for facilitating what are now called '21st century skills' (Trilling & Fadell, 2009). These skills are creativity, critical thinking, collaboration and communication. They are regarded as being more critical for learners than knowing a large number of facts.

Within these learning ecologies, educators recognize that there are foundational skills and concepts that learners need to be able to draw on in order to begin the process of becoming literate (and

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numerate). It is virtually impossible to engage with the more complex skills required to become literate, if a learner does not have these prerequisite skills. Included in these foundational literacy skills are being able to recognize letters, sounds, some everyday (sight) words, as well as being able to use language to tell and retell events and everyday practices. If learners don't have these skills, they will not be able to interact with either print or digital texts. As educators, our focus should be on how these skills can be used in context and not in isolated and mechanical applications. Creating opportunities for authentic uses of literacies will benefit all learners. Further, in order for children to communicate their ideas – they need to have purpose and audience. Teachers can incorporate a range of pedagogies (teaching strategies) so students are able acquire the foundational skills and apply them appropriately and creatively in contexts that are authentic and relevant to their lifeworlds (e.g. Yelland & Gilbert 2014; 2016).

New learning and tablets in the early years

This project was based on the premise that the essential difference about learning in the 21st century is that it is *multimodal* (Jewitt 2003; Kress & Jewitt, 2003; Yelland, 2007; 2016). And, that it is the multimodality, not the digital, that should be the focus for early learning ecologies. *New learning* (Kalantzis & Cope, 2012) involves using teaching strategies, and designing learning ecologies that meet the needs of learners who are experiencing changing social futures in dynamic communities. *New learners* are responsive to change, and creative thinkers who can readily adapt to their changing circumstances. New learners are also stimulated and become curious when they are faced with new ideas. They exist in communities of learners who are knowledgeable and have a powerful sense of social justice. Becoming a valuable member of a community, or a good citizen, is important and an essential element in their education.

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For educators designing learning experiences that match with such priorities are a major focus. They recognize that many children now have access to mobile technologies, as well as many other resources and experiences that are not digital, which all contribute to how they make meaning and communicate their understandings about the world. Most recently, the iPad has become the most popular form of portable device for use in education, and thus a consideration of what they might do for learning has become a source of interest for researchers (e.g. Burnett, 2010; Flewitt, et al., 2015; Lynch & Redpath, 2014; Rowe & Miller, 2014). Studies that have incorporated empirical observation data (e.g. Agostino et al., 2016; Lynch & Redpath, 2014; Rowe & Miller, 2016; Yelland & Gilbert, 2014, 2016) of young children learning with iPads, have shown what is possible for new learning. When research has had literacy as a focus (e.g. Flewitt et al., 2015) it has often revealed that teachers are eager use tablet technologies (iPads) as part of their early literacy programs. Further, when children use iPads, there is evidence that quality learning experiences that incorporate collaborations with others, communicating ideas and findings, as well as opportunities for independent learning (e.g. McKee and Heydon, 2015; Rowe and Miller, 2016).

This has also included studies of the ways in which bilingual children become literate. For example, Rowe and Miller (2016) revealed the ways in which multimodal books enhanced literacy opportunities for bilingual children, over a period of 2 years. Similarly, Agostino et al. (2016) worked with children who were struggling as readers. But, they used very different and more structured Apps (e.g. *LetterWorks*). By incorporating structured activities and including them as part of a multimodal and rich literacy program the study showed the ways in which iPads, were used to support emergent literacy. Further, the study showed that this would not have been possible if the teacher could not see the value incorporating the new technologies into their teaching repertoire. In this way it becomes apparent that the use of iPads and other tablets have the potential to make a

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contribution to multimodal learning that would benefit from a detailed consideration of the ways in which this might be achieved.

As such this paper seeks to elucidate the pedagogies that enable new learning and encourage emergent multiliteracies in young children in preschool and the first years of compulsory schooling in Australia.

Methods

This study was designed to explore and document pedagogical contexts for using tablet technologies (iPads, Surface Pro, Asus) in early learning scenarios. The aim was to consider the potential for *new learning* (Kalantzis & Cope, 2012) with *new technologies* and to support teachers to use tablets to reconceptualise their pedagogies and practices in the early years.

In the first year of the project, we started with three groups of children located in the western suburbs of a large metropolitan city in Australia. The first group was a 'mothers' group, organized by the community, that used a room in their local primary school. The ten children in this group were 2 and 3 years of age and attended for 1.5 hours / week, with their mothers. The second group (20 children, one teacher, one assistant) was a kindergarten group (4 and 5 years of age) who attended a community kindergarten. This is the year before compulsory school attendance in the state. The final group were (78) children who were in their first year of compulsory schooling (5-6 years of age). They were in organized into three different groups, taught by three teachers, in an open plan classroom.

In the second year, we focused in more detail on a new group of children attending the same kindergarten (20 children) and a new cohort of Preparatory children in the same primary school (80). In the third year, the project changed slightly. We used Asus and Surface Pro tablets with two classes of (40) kindergarten children (age 4-5 years) located in an outer metropolitan primary school in the

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same city, and two Preparatory classes (50 children) in the same school. The second school was in a regional town, where we explored the potential of the **S**urface **P**ro tablets with 3, Year 2 classes (84, 7-8 year olds). In the fourth year we worked with Indigenous children in four separate child care centres. The centres were called Multifunction Aboriginal Child Care Centres (MACS) and were specifically created to support Indigenous families. One was located in the capital city of the State and three were in regional centres. In each case we introduced new Apps to the educators and asked if they thought they would be relevant to the children in their group. We worked with the teachers to discuss what pedagogies might be most effective in using them, and incorporating them with other play- based pedagogies.

As researchers, we sought to observe and interact with the children, caregivers and teachers, so we adopted a participant observation methodology. Participant observation can be defined as a method in which ‘the researcher is taking part, to some degree, in the activities of the people being observed’ (Deacon et al., 1999, p. 251). The aim of participant observation is to gain access to everyday practices, which are difficult to describe or reproduce in group discussion or interview (Mikos cited in Struppert, 2010). Through participation in the context, the researcher can achieve a better understanding of the practice, roles and cultural patterns of the participants (Mikos cited in Struppert, 2010).

Each year, we visited the city sites one day a week for 6 weeks in Terms 2 (starting in April) and 3 (starting in July). We visited the rural centres on two occasions, for two continuous days, during the same terms.

There were three sources of data. First, daily reflective notes in which we recorded the events as we recalled them as a narrative. These included descriptions of the children using the Apps as well as our details of our conversations with them. Second, the teachers/ educators in the schools and centres

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shared their planning documents and observations by making them available to us and in conversations with them when we made the visits. We also interviewed all the teachers/ educators in their schools/ centres, prior to the start of the participant observations. Here, we focus on the daily reflective notes which we (the research assistant and the author) typed up at the end of each day and shared in conversations with annotated remarks, and some photographs of screen shots and group scenes. We immersed ourselves in this data in order to derive themes to synthesise the various forms of pedagogies and learning scenarios we planned and observed. This theoretical sampling of the data using the Grounded Theory Approach (Strauss & Corbin, 1990) enabled us to review our ideas and theories as they emerged. The process continued until theoretical saturation of all the categories is reached. This was achieved when no new or relevant data emerges and the relationships between categories are well established and validated. Here, we were concerned with the pedagogies and learning aspects of the learning ecologies that we had designed. We wondered what types of activities would create learning ecologies to support emergent literacies and what pedagogies facilitated learning?

Thus over the four years of data collection, the study included; 459 children (including 63 Indigenous preschoolers) from age 2 to 12 years of age, 17 teachers and 10 educators (pre school teachers). Ethical clearance for the research project was granted by the University, and the State Education Department. In each location consent for the children and teachers to participate was negotiated with all participants and parents.

Findings

The empirical data collected for this project indicated that there were potentially three essential ways in which the use of iPads can make a contribution to new learning. These were:

1. **The acquisition of foundational literacy (and numeracy) skills:** Together with manipulatives, natural materials and other experiences, Apps could be used to introduce and practice the

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foundational skills that are inherent to literacy, and which children need to acquire in order to enable later, more complex investigations.

2. **Creating multimodal texts** that were both creative and a documentation of learning processes.
3. **Rethinking pedagogies** to incorporate using iPads to document learning, to provide explicit scaffolding, incorporating authentic activities and communicating ideas with real audiences.

The acquisition of foundational literacy skills.

The data revealed that there were what we called ‘entry-level’ Apps that afforded opportunities for the children to acquire the foundational skills of literacy, such as letter recognition and sounds (phonics), basic vocabulary, and they could also be stimuli for conversations and the use of language. The ‘entry level’ label meant that their content was based in acquiring and using these skills, and that the structure of the Apps were such that the children were responding to fixed, and usually sequential, tasks which needed to be completed before they could move on to ‘higher’ levels. In some of the research literature (e.g. Goodwin and Highfield, 2015) these Apps might be called ‘closed’ or ‘drill and practice’. Yet, with the evolution of new technologies, these Apps have become much more elaborate in their design and incorporate opportunities to follow an interest, both off and on a device. The experiences with the entry-level Apps represented a focused time on particular skills and concepts that the educators could build on in their conversations with the children while they were playing with them, and in other learning activities, with different resources. They could also help the children to make connections between concepts when different activities were incorporated as part of the planned program in the kindergarten. These learning contexts included other resources that were three dimensional and pedagogies designed to encourage meaning making (see final section here).

For example, with the App, *Alpha Tots* (Figure 1), we observed the children making connections between the various letters of the alphabet and the letters that make up their own names as well as

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familiar items that were evident (table, chair and carpet) around them in their rooms. We made cards from digital photographs with them to label these items around the rooms, and as an additional activity. The audio features of *Alpha Tots* also helped those children who experienced problems with the pronunciation of words. The App encouraged children to recognize letters and words and to say them out aloud. For example, when the letter ‘c’ was introduced, it was accompanied with the name of the letter and the hard ‘c’ sound. The action of ‘cutting’ was paired with the sound and the ‘cutting’ of the strings on some balloons was displayed in an animation. Each experience could be linked with further planned activities and conversations to enable the children to reflect on how the letters and their sounds relate to their everyday activities. In the Year 2 class they were exploring ‘living things’ in Science. The children were creating categories of living things, and in the process labelling photographs with names. As they were doing this we emphasized the letters and sounds, and the words that they made, as we discussed various items. The children wrote them down, as well as verbally commenting on them (i.e a flower is a living thing) and using them in sentences (A rock is not a living thing because it does not breathe).



Figure 1: Alpha Tots

Thus, in our interactions with the children, we noted that once the letters are recognized they can be combined to make words. Then, in another App called *Monkey Lunch Box*, various words are read

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aloud, and can be followed up with further activities, like making similar sounding words and using them in sentences. We encouraged the educators to talk with the children both individually and in small groups and ask them questions such as:

- What letter is this? What sound(s) does it make? (Strawberry – starts with ‘S’).
- Can we think of another word that starts with this letter? (Sally starts with an ‘S’ and Sand starts with ‘S’).
- Can we think of a word that has this letter at the end? (Cars ends with an ‘s’).
- This fruit is red. What other things can you see that are red?
- What other fruits can you name? Do any start with ‘s’? What sound do they start with?

Using Apps such as *Alpha Tots* and *Monkey Lunch Box* with their visual, audio and linguistic learning experiences and extending experiences with conversations about letters, sounds and words, proved to be very worthwhile. Additionally, with Apps such as *iWrite Words* the children could trace over letters and numerals and the experiences became tactile. This enabled them to become familiar with the structure of letters and numerals and how they ‘felt’. In one particular activity, the children were guided by the App in a structured way, in terms of the direction of each stroke that made a particular letter. They were then able to transfer this experience over to using paper and pencil representations of the letters and numerals, as well as tracing them in sand and with paints. At the same time the children were extending their personal vocabulary of words and numbers, which they could then apply to other learning activities.

Playing with Apps like these, extending them with other traditional resources (books, cards, making the letters with pencils, crayons and in the sand) and talking with their educators, enabled the children to experience early literacy concepts in dynamic interactive and multimodal contexts that built on and

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extended their 'real world' play experiences. Taken together, these multimodal learning opportunities prepared the children to experience reading with both electronic and traditional reading books.

Creating multimodal texts

We also used the iPads to make eBooks with *Book Creator* to document some of the activities that the children were participating in. The books represented examples of using literacy in meaningful ways in original multimodal texts. For example, in one pre-school centre we travelled to a local (Indigenous) cultural centre. The eBook that we created became a dynamic and permanent record of the day's events that could be revisited at any point in time when individual or groups of children wished to recall them. It contained photographs, video, text, oral recordings, electronic and paint/crayon illustrations and information (maps) derived from the internet.

Some schools and centres also decided to print the books as well as have them in the electronic format. This provided the context for another dimension of multimodal representations of the books and led to conversations about why the video could not work in the printed version – a feature that was important for many of the children in the various groups. A benefit of printing the eBooks was that we were then also able to use QR (Quick Response) codes. We created QR codes using an App called *QR code Generator*. For example, we made an eBook about a scooter race held at a kindergarten one morning. The eBook contained videos of each child racing around a track in the playground on the scooter. These videos showed how long each child took to complete a circuit. Our aim was to find out who was the fastest on the scooter in the group. Each of the videos was then uploaded to a private *YouTube* account, using the *YouTube* app on the iPad, and assigned a URL. The URLs were uploaded individually into the *QR Code Generator* App and a unique QR code was automatically created for each video. The unique QR codes were printed and pasted onto each respective page of the hard copy. The children could then use their iPads to scan each code to view their video.

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With different Apps (e.g. *MadPad*, *Sock Puppets* and *Play School Art Maker*) different types of multimodal representations of the children's interests, or a topic under investigation, could be created. For example, with *Sock Puppets*, the children could create 'plays'. The App encourages the child to select a context for the play (e.g. garden, haunted house), as well as the characters and then to develop a storyline. In *Play School Art Maker*, the young children can create 'scenes' using their favourite characters which can then be animated into a (1 minute) video.

These three Apps are examples of 'open ended' Apps that can be used any way that the educator of child determines. They, like the entry level Apps can also be broadened to go beyond the App into real world scenarios.

Rethinking pedagogies

These learning scenarios, incorporating the iPad Apps with other experiences in different modalities were made possible, in the first instance, by redesigning learning ecologies to incorporate new technologies. This did not mean simply purchasing and adding the use of iPads into the learning program. It required a careful consideration of the ways in which they could be incorporated with valuable learning activities that would compliment and extend the existing learning program. In the Kindergarten setting it required understanding ways of encouraging playful explorations (Yelland, 2011) and in the school contexts it was made possible with particular consideration about how to best scaffold the learning with relevant questions, not only about content, but also about how the learning was connected in the various modalities of expression of ideas. For example, in thinking about what a portrait is, one kindergarten teacher had asked the children to bring in a family or individual photo. She began the discussion by asking the children to talk about who was in the photo and when it was taken. She discussed the modality – in that it was a photograph – and asked the children if they knew the

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special name for this particular type of photograph (the portrait). She used the tablet to take a photo of the group and also talked with the children about the ways in which they had been using the camera feature of the tablet over the past few weeks to document their learning activities in the kindergarten. She had a mirror and called on a few of the children to look in the mirror and say whether they thought it was a good photo that showed how they really looked. She then asked the children to draw a new portrait of themselves, or their family, on paper. To do this they could choose to use, colored pencils, crayons, paint or charcoal. She framed this activity by saying that in this new portrait they needed to try to be as close to the original as possible. The following day, the teacher, who had also brought a portrait photo of herself, used the drawing program to create a new ePortrait of herself and asked the children over the course of the next two days to create their own. Finally, the group came together on another day to focus on the three portrait representations to talk about how they were similar or different and to decide which was their preference, or if they liked them all. This got the children to think and talk about how they saw themselves as well as discussing the techniques that they had deployed in the three examples. The type of questions that the teacher used with the children were critical to their emerging understandings as well as extending their vocabulary. The incorporation of the tablet into this learning scenario required rethinking pedagogies to focus on the multimodal aspects of learning as well as creating a new repertoire of questioning about content, ideas and representations – which they had not traditionally done in play-based kindergarten programs. The introduction and inclusion of the tablet (in this example Asus) in this learning scenario changed the activity from the one she had done with the previous class because now she not only focused on the creation of portraits as she had previously done, but also had interesting conversations about how the various representations compared as well as reflections on what they had learnt about how they were able to represent themselves in each of the modalities and how they were different (Figure 2).

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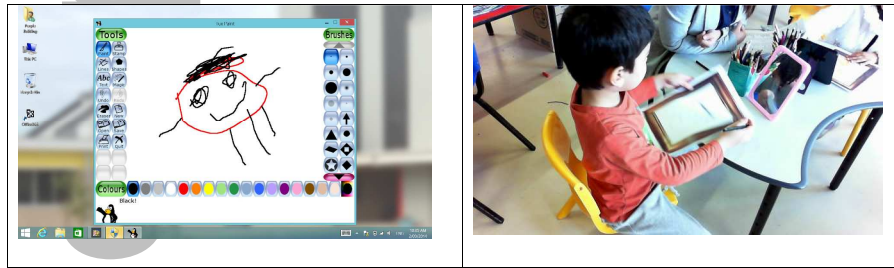


Figure 2: Multimodal portraits

Another important aspect of using the iPads was in the documentation of pedagogy and learning. Traditionally, this has been done by the teacher, but we found during this project that the children wanted to have a permanent record of some of their learning activities and this was made increasingly easy with the iPad camera. It was more difficult with the Surface *Pro*, which was much larger and heavier for the preschoolers to lift in order to take a good photo. The documentation of pedagogy and learning is a significant part of the learning ecologies of early childhood and has become very popular since the notion was transformed in the Reggio Emilia approach to early childhood education (e.g. Rinaldi, 2006). Including the children as part of this process has *shifted* the locus of control of learning to give children more autonomy and confidence in their learning and enabled teachers to be more explicit about their pedagogical repertoire. It has made learning visible and this has transformed contemporary early childhood learning ecologies.

Conclusions

This paper has considered learning ecologies in which tablet technologies were used to promote new learning and create contexts for young children to become multiliterate in the 21st century. In doing so it has utilised a pedagogy of multiliteracies (New London Group, 1996) and the concept of new learning, (Kalantzis & Cope, 2012) and provided snapshots of learning narratives that illustrate the emergent themes from the data collected over a period of four years. The learning narratives presented here

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illustrate the ways in which including iPads in learning programs supports multimodal learning. It highlights the importance of the acquisition of foundational skills which are used in context, and then can be applied in investigations carried out by the children. The children were able to use the modalities that they think are the best for sharing their emerging understandings, about themselves and the world that they live in. The data presented here are included to show that the main difference about learning in the 21st century is not that it is digital, but rather that it is multimodal. Being able to select the most effective modalities to represent your idea or communicate your findings is an essential component of being multiliterate in contemporary times. This view of literacy will ensure that young children are able to participate in collaborative and creative investigations that will benefit them and the learning communities of which they are a member. Using new technologies as a resource that compliments and builds on other resources and real world experiences can only benefit new learning and enable educators to provide the most responsive learning ecologies for all children to have productive lives.

Statement on open data, ethics and conflict of interest

The research project was approved by the ethics committee of Victoria University (HRE12-052 & HRE15-038) and followed all the protocols inherent to the conduct of research in an ethical manner. The data is not available due to the protocols, and the fact that it is not de-identified, and thus it is kept in a secure location on campus. There is no conflict of interest arising from this study and I am solely responsible for the content and writing of this article. I would like to acknowledge the contribution of the Research Officer for the project (Caja Gilbert) and all the teachers, children and administrators who participated and made it possible. I would also like to thank Louise Davis (IBM) for her continued support and funding of the project in 2012, 2013 and 2015. And to DEECD (Victoria) and Microsoft for funding in 2014.

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