

Using iPads to promote mark-making in children on the autism spectrum

Claire Hamshire, Julie Lachkovic and Oliver Robinson, UK

Editorial comment

This paper explores the use of iPads in a nursery setting, particularly to promote mark-making. Mark-making is important to help children develop pen control and writing skills. With the increase in the use of technology to support learning in both mainstream and specialist schools, this paper is an important glimpse into the challenges and benefits of introducing iPads into early years settings. Although this is a case study, it provides useful information on some of the reservations and difficulties staff came across over the course of the study. The results of this case study are overall very positive and the authors suggest further research that would add to this area. This paper will be of interest to staff working in school settings and parents of children with autism.

Address for correspondence

E-mail:

c.hamshire@mmu.ac.uk

Acknowledgements

This research was conducted at Manchester Metropolitan University and was part-funded by both Manchester Metropolitan University and Health Education North West. The authors declare no conflicts of interest.

Background

The development of pen control and early writing skills through different forms of mark-making is an important focus of the early years curriculum (Department for Education, 2014). Mark-making in the early years develops the foundation for later literacy and handwriting (Graham, 2010), and confidence with mark-making can improve a child's self-esteem and willingness to engage in written work (Feder and Majnemer, 2007).

Mark-making involves the integration of a number of different skills including fine-motor skills, visual-perceptual and visual-motor integration, and central coherence. These are often areas of difficulty for children on the autism spectrum (Kushki et al, 2011). At a socio-emotional level, mark-making links to the development of both self-expression and communication which are also vulnerable to significant delays and differences in children on the autism spectrum (Prelock and McCauley, 2012). This means children on the autism spectrum can have great difficulty in understanding the purposes of mark-making, leading to their poor engagement and

consequent reduced experiences with such activities (Fay, 2013) and a negative effect on later handwriting (Church et al, 2000; Fuentes et al, 2009; Johnson et al, 2013). Furthermore, Early Years Foundation Stage Profile (EYFSP) results have revealed that progress across the scales of learning and development are notably lower in the scales for writing with a marked negative differential for boys (Department for Children, Schools and Families, 2008), giving further incentive for exploring innovative ways of engaging young children on the autism spectrum in positive mark-making experiences.

Technological interventions have often been used to assist in the learning of children on the autism spectrum with some evidence of success in the use of iPads to teach literacy (Spooner et al, 2014; Oakley et al, 2013; Johnson, 2013). Interactive whiteboards and keyboards have been used to increase motivation when writing for children on the autism spectrum (Fay, 2013; Ashburner et al, 2012) and iPads have begun to be used for teaching mark-making with mainstream children (Price

et al, 2015; Clarke and Abbott, 2015). However, there is a lack of research looking specifically at the use of iPads to promote early mark-making in children on the autism spectrum in an early years setting. This project explored the introduction of iPads into two early years settings, their use in the promotion of mark-making in children on the autism spectrum and the benefits and difficulties associated with this.

The study

This case study was part of a wider project that introduced iPads into two early years settings and supported the settings to use the iPads to enrich aspects of the curriculum to supporting learning and communication. The aims of this strand of the project were to evaluate the usefulness of iPads in both aiding communication and fine-motor skill development. Nursery A was based within an autism specialist school for children aged 3 – 18 and Nursery B was an inclusive nursery for children aged 3 – 5 years. Both settings were initially provided with a start-up kit consisting of a set of iPads, a charging case, a MacBook and credit for purchasing appropriate apps. To support the project, staff teams were also offered bespoke training on how to use the iPads, particularly the accessibility settings which allowed the iPad to be set-up to meet the specific needs of each child.

Nursery A shared 14 iPads across the whole school and had access to them at planned times several times during the week. Following a review of the curriculum and the developmental goals of the individual children they chose to focus on integrating mark-making apps and systematically introduced these in small group work. The use of iPads expanded during the project and they subsequently also used them to support the achievement of other learning goals and in free play. Nursery B shared 17 iPads throughout the nursery. They used the iPads to support a range of activities and developmental goals that included mark-making. Nursery B also arranged for children with additional learning needs to have a loan iPad that was used partially for home school liaison and for supporting learning.

Data collection

As part of the project evaluation schedule we conducted in-depth narrative interviews with the Early Years Lead in Nursery A and the Special Educational Needs Coordinator in Nursery B. These interviews explored the expert practitioners' views and experiences of introducing iPads in the Early Years Foundation Stage as an additional learning tool and strategy for developing mark-making. Each interview began with a narrative prompt in which the practitioners were invited to discuss the success and challenges of the project and reflect on the lessons learnt during the study.

The interviews were transcribed verbatim and analysed using thematic analysis to identify themes across the two nursery settings; similar to that of the framework analysis of Spencer et al (2013) and Ritchie and Spencer (1994), including a phase of familiarisation and subsequent indexing, mapping and interpretation of the data leading to the development of a thematic framework. The themes were then discussed and agreed between the authors of the research before the extracted data segments were mapped and interpreted and then condensed and synthesised.

Findings

The thematic analysis of the interviews produced three main themes in relation to the introduction of the iPads:

- motivation and support for staff
- engagement
- integrating iPad use into the curriculum

Motivating and supporting staff

As the practitioners reflected on the project during their interviews they noted that there were both challenges and opportunities to using multiple iPads within a Nursery setting. Motivating and supporting staff across the setting was essential for success; as well as understanding the individual needs of staff. Both interviewees acknowledged that initially there was considerable variation in the digital literacy skills of staff and that it was important to use the skills of those who were most knowledgeable and interested in the iPads to act as 'champions' for other staff:

"We had half of the staff team who were very familiar with iPhones, iPads and half for whom even just switching it on and off was a bit of a daunting prospect." Nursery A

Both settings also noted that it was important to ensure that parents of the children using iPads were included and supported:

"We put a lot of emphasis on making sure that we'd met with the parents and created that point of liaison." Nursery A

Fundamental to successful integration was an underpinning technical support structure for staff. Both settings experienced the challenges of unexpected technical difficulties with managing and synching multiple iPads; and were concerned that technical difficulties could distract staff from the purpose of integrating iPad use into sessions:

"It's fine if you've only got one or two iPads but when you go to multiples, that's a bigger management issue and any nursery doing that needs to know they've got access to the technical support and access to guidance." Nursery B

"The purpose of the project was lost at times in just trying to resolve some of those technical issues." Nursery A

Engagement

Each of the practitioners noted that the initial purpose of using the iPads was to offer an alternative to children who did not engage with traditional mark-making activities:

"Boys traditionally don't want to mark-make. Boys with autism certainly don't want to mark-make, we needed to find creative, innovative ways of trying to deliver it to them." Nursery A

"Boys don't like mark-making a lot of the time. But give them the stylus and the screen and you've motivated them." Nursery B

The introduction of the iPads also appeared to increase the children's engagement as they were more likely to engage with mark-making using iPads than using traditional mark-making activities. Further, one practitioner described how children would spend longer using a mark-making app than other traditional materials.

"One of our teachers today observed one of the boys complete some really nice mark-making for 20 minutes. He was just enjoying making the marks and creating and changing the page." Nursery A

It was also noted that the use of iPads and mark-making apps offered novel features that were effective at gaining the interest of some of the young children on the autism spectrum:

"We had one app that plays back the mark-making, so children could watch their own marks being made again. It added something different that they could re-see the marks they'd made." Nursery A

"He has been fascinated by the drawing programmes; as soon as you squiggle your finger across, you get an immediate feedback. It helps him to stay sitting for longer periods of time where he would've got a bit agitated before." Nursery B

Both settings also believed that the use of iPads and mark-making apps encouraged interpersonal interaction between the children, particularly when used in a group setting.

"You can sit side by side and see what the other person's doing so that's a shared focus particularly for children who find that hard. If they develop an interest in something, it allows somebody else to draw alongside them, you take it in turns and it facilitates group activities." Nursery B

Integrating iPad use into the curriculum

While acknowledging that the iPads increased children's engagement, both settings also strongly emphasised the importance of integrating the iPad use into the curriculum and setting goals for iPad use related to current learning. The practitioner in Nursery B noted:

"In the early years, the curriculum is all about the underlying skill that's going to assist you in learning for life."

Nursery B

Therefore, for some children it was necessary to transfer use of the iPad from a reward or something used for entertainment, to a tool for skill learning:

"The use of the iPad as an entertainer is very different from it as a tool as an educator."

Nursery A

"We've looked at our additional support plans and seen how they (the iPads) empower what we know is a good objective for the child rather than it being just for its own sake."

Nursery B

The practitioners believed that this approach offered a clear framework for development and children had opportunities to generalise skills learnt on the iPad to more traditional methods:

"Every child has got involved, we've made this fantastic collage of work which we couldn't have done 12 months ago, the children wouldn't have known what to do, that they had that power to make marks and be creative so, for us, it's had big implications to start on the iPads."

Nursery A

"In the past we had interactive whiteboards but you can't bring it down to become a table-top activity and the iPad lets you do that. It lets you take that skill and bring it into a position ready for the next step of bringing in a pen and a piece of paper."

Nursery B

Furthermore, in Nursery B, where iPads have been used to support home-school communication, sharing information with parents on children's development that has been context specific to the nursery has been an added bonus:

"One of the successes was seeing that the iPad has allowed us to share skills with parents where the children are contextually bound, so the child has been able to show skills they have at home and vice versa." Nursery B

Discussion

In common with other forms of technology, the use of iPads within the nursery settings was found to be very motivating for children on the autism spectrum and increased the children's engagement in mark-making tasks (see also Ashburner et al, 2012; Fay, 2013; Neely et al, 2013). More surprisingly, and contrary to the expectations of the practitioners interviewed, use of the iPads also increased the children's personal interactions with other children. Before starting the project, the practitioners were worried that the opposite would be true, that children would get so involved with the iPad that they ignored other people. Clarke and Abbott (2015) found that iPad use with mainstream 4 and 5 year olds increased peer collaboration so it is interesting that most children on the autism spectrum in this study found it easier to share attention and work with other children when using the iPads than with other tasks. The National Literature Trust (Formby, 2014) found that children preferred using iPads for literacy when working with an adult and both the settings interviewed for this study found that children were more likely to interact with each other when using an iPad if it was adult led.

Other studies have found that staff often have anxiety about using iPads in a classroom setting (Clark et al, 2014; Price, 2011; Cumming et al, 2014) and this was confirmed by the practitioners in the current study. However, it was felt that motivating and supporting staff and ensuring that they had sufficient training was effective in overcoming these challenges. The practitioners in this study suggested that useful training might focus on the technical difficulties of managing multiple iPads

to ensure that they were all charged and synched and available for use.

They also suggested a need for a database of useful apps which teachers can use to choose suitable apps. As with other studies (Johnson, 2013; Cumming et al, 2014; Price, 2014), difficulties in using the iPads were mostly technological and organisational and having multiple iPads seems to increase these difficulties. Technological support was seen as important for this reason and Nursery A in particular found support in networking with other schools who were using iPads. This kind of support may become more available as iPad use in schools increases but these technological difficulties could be a barrier to using iPads for some schools. This would be a shame, as both settings found definite benefits in using the iPads at this early stage of education, particularly with children who had a diagnosis on the autism spectrum.

Limitations of the study

This case study focused on just two settings and relied on reflective retrospective reports of the practitioners in those settings. As such this information is not directly generalisable to other settings but does provide an insight into the experiences of iPad use in the early years.

Suggestions for future research

It would be beneficial for future research to look at quantitative evidence for an increase in mark-making engagement in children on the autism spectrum across a wider range of settings and how this engagement impacts on their handwriting progression and use of writing as a communicative act later on in school.

Concluding comments

This study found that the use of iPads can be beneficial for early years children on the autism spectrum as they increase their engagement in mark-making activities and their interpersonal interaction with other children. However, training and support for staff is essential for the successful use of iPads in schools; as is carefully planned integration into the curriculum and ensuring that technical support is available so that technological difficulties do not detract from the usefulness of iPads.

References

- Ashburner, J, Ziviani, J, and Pennington, A (2012) The introduction of keyboarding to children with autism spectrum disorders with handwriting difficulties: a help or a hindrance? *Australasian Journal of Special Education* 36 (1) 32–61.
- Church, C, Alisanski, S and Amanullah, S (2000) The social, behavioral, and academic experiences of children with Asperger syndrome *Focus on Autism and Other Developmental Disabilities* 15 (1) 12–20.
- Clark, M, Austin, D and Craike, M (2014) Professional and parental attitudes toward iPad application use in Autism Spectrum Disorder *Focus on Autism and Other Developmental Disabilities* 29 (2) 1–8.
- Clarke, L and Abbott, L (2015) Young pupils', their teacher's and classroom assistants' experiences of iPads in a Northern Ireland school: "Four and five years old, who would have thought they could do that?" *British Journal of Educational Technology* available from <http://onlinelibrary.wiley.com/doi/10.1111/bjet.12266/abstract> (accessed on 6 January 2016).
- Cumming, T, Strnadová, I and Singh, S (2014) iPads as instructional tools to enhance learning opportunities for students with developmental disabilities: an action research project *Action Research* 12 (2) 151–176.
- Department for Children, Schools and Families (2008) *The national strategies: early years. Mark making matters* available from <http://webarchive.nationalarchives.gov.uk/20110202093118/http://nationalstrategies.standards.dcsf.gov.uk/node/132558> (accessed on 6 January 2016).
- Department for Education (2014) *Statutory Framework for the Early Years Foundation Stage: Setting the Standards for Learning, Development and Care for Children from Birth to Five* London: Department for Education.
- Fay, R (2013) *To what extent does smart board technology increase motivation and participation during writing lessons for a student with autism?* unpublished doctoral dissertation, Caldwell College.
- Feder, K and Majnemer, A (2007) Handwriting development, competency, and intervention *Developmental Medicine and Child Neurology* 49 (4) 312–317.
- Formby, S (2014) *Practitioner Perspectives: Children's use of Technology in the Early Years* London: National Literacy Trust.

Fuentes, C Mostofsky, S and Bastian, A (2009) Children with autism show specific handwriting impairments *Neurology* 73 (19) 1532–1537.

Graham, S (2010) Want to improve children's writing? Don't neglect their handwriting *Education Digest: Essential Readings Condensed for Quick Review* 76 (1) 49–55.

Johnson, B, Papadopoulos, N, Fielding, J, Tonge, B, Phillips, J and Rinehart, N (2013) A quantitative comparison of handwriting in children with high-functioning autism and attention deficit hyperactivity disorder *Research in Autism Spectrum Disorders* 7 (12) 1638–1646.

Johnson, G (2013) Using tablet computers with elementary school students with special needs: the practices and perceptions of special education teachers and teacher assistants *Canadian Journal of Learning and Technology* 39 (4) n4.

Kushki, A, Chau, T and Anagnostou, E (2011) Handwriting difficulties in children with autism spectrum disorders: a scoping review *Journal of Autism and Developmental Disorders* 41 (12) 1706–1716.

Neely, L, Rispoli, M, Camargo, S, Davis, H and Boles, M (2013) The effect of instructional use of an iPad® on challenging behavior and academic engagement for two students with autism *Research in Autism Spectrum Disorders* 7(4) 509–516.

Oakley, G, Howitt, C, Garwood, R and Durack, A (2013) Becoming multimodal authors: Pre-service teachers' interventions to support young children with autism *Australasian Journal of Early Childhood* 38 (3) 86–96.

Prelock, P and McCauley, R (2012) *Treatment of autism spectrum disorders: evidence-based intervention strategies for communication and social interactions* London: Paul H. Brookes Publishing Co.

Price, A (2011) Making a difference with smart tablets *Teacher Librarian* 39 (1) 31–34.

Price, A (2014) Autism and iPads: what we are learning *Teacher Librarian* 41 (3) 40.

Price, S, Jewitt, C and Crescenzi, L (2015) The role of iPads in pre-school children's mark making development *Computers and Education* 87 131–141.

Ritchie, J and Spencer, L (1994) Qualitative data analysis for applied policy research In A Bryman (ed) *Analyzing qualitative data* London: Routledge; 173–194.

Spencer, L, Ritchie, J, Ormson, R, O'Connor, W and Barnard, M (2013) Analysis: principles and processes in J Ritchie, J Lewis, C Mcnaughton-Nicholls and R Ormston R (eds) *Qualitative research practice, a guide for social science students & researchers* 2nd ed London: Sage; 269–93.

Spooner, F, Ahlgrim-Dezell, L, Kemp-Inman, A and Wood, L A (2014) Using an iPad2® with systematic instruction to teach shared stories for elementary-aged students with autism *Research and Practice for Persons with Severe Disabilities* 39 (1) 30–46.