STRANMILLIS UNIVERSITY COLLEGE
A College of Queen's University Belfast

RESEARCH REPORT

MOBILE DEVICES IN EARLY LEARNING

EVALUATING THE USE OF PORTABLE DEVICES TO SUPPORT YOUNG CHILDREN'S LEARNING

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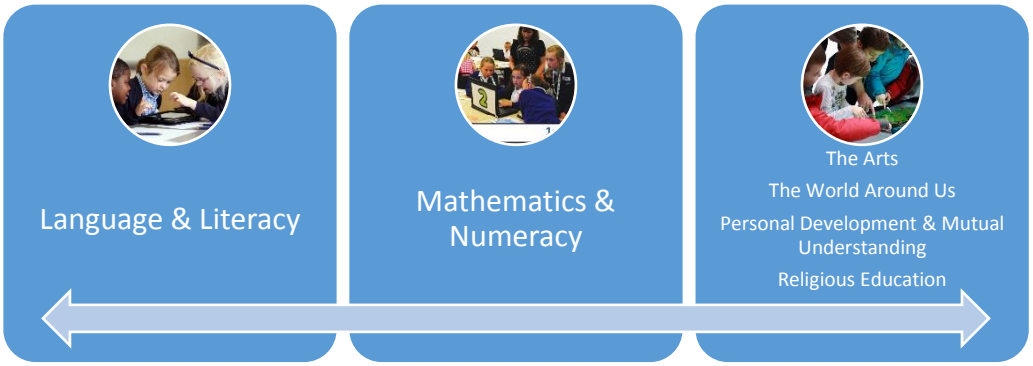
Executive Summary

Digital technology has become an everyday part of young people's lives both at home and in the classroom. Portable tablet devices in particular have become increasingly popular with more and more children having access to or ownership of iPads and other digital devices. Recognising the educational potential of this technology, many schools have prioritised the integration of tablet devices into their classrooms. Indeed, these machines offer a number of potential advantages compared to desktop computers, including portability, intuitive design, and a touchscreen interface. However, the increasing presence of digital technology in homes and schools raises important questions about its role in children's learning and development.

The pilot project *'Developing the use of portable devices in early years learning'* investigated the long-term implementation of iPads in five Northern Ireland primary schools located within the Belfast Education and Library Board[1] (BELB) area, and associated feeder nursery/pre-schools. This study aimed to evaluate the outcomes of the pilot project. The primary objective of the study was to assess the impact of the use of iPads on children's learning in the Early Years and Foundation Stage of education. It focused on the impact upon literacy and numeracy, as well as examining the extent to which [2] iPads can support other areas of the curriculum.



[1] On 01 April 2015, the Education Authority became operational and took over all of the roles and responsibilities of the former Education and Library Boards (ELBs) and the Staff Commission.

[2] Whilst this report examines the implementation and use of iPads, generic terms such as 'tablet devices' and 'handheld, digital' or 'portable devices' are variously employed to reflect the properties of a device or the range and variety of devices available to children at home.

The investigation also focused on secondary objectives including the impact on teaching and pedagogy, leadership and management, and parental involvement.

The research was undertaken in four phases using a mixed-methods approach and it involved school principals, classroom teachers, ICT coordinators, pupils and parents. A detailed account of the methods utilized to interrogate the data is included in Chapter 3. Key findings are summarised below with more detailed findings reported in the final section of each chapter.

Key Findings

Impact on literacy and numeracy

- For the most part, principals and teachers in the participating schools believe that the introduction of digital technology has had a positive impact on the development of children's literacy and numeracy skills.
- Contrary to initial expectations, principals and teachers report that the use of iPads in the classroom has enhanced children's communication skills. In many lessons, particularly where pupils were sharing iPads, there was a high level of discussion.
- The use of iPads has had a positive impact on reading and writing, particularly with the creation of children's own digital books.
- The iPad has the potential to enhance children's numeracy skills in a more engaging and exciting way than traditional approaches.

- Digital technology complements existing teaching approaches in numeracy rather than replaces them.
- Open-ended apps encourage pupil choice within a range of literacy and numeracy based activities.
- Children's fine motor skills are reinforced when they use a stylus to practise letter formation on screen.
- Principals and teachers agree that digital devices have the potential to complement all areas of the curriculum and that schools are yet to realise the full potential of these devices.
- The iPad supports the development of other skills such as recording, taking photographs, web searches, cropping and drag and drop.
- It is believed that digital devices have increased children's confidence and ownership of the learning process.
- Children view learning using handheld devices as play and are more highly motivated, enthused and engaged when tasks are presented on tablet devices.
- There is potential for iPads to support the learning needs of children who require additional support.
- There is evidence of a range of levels of competency and creativity in the use of digital technology by teachers and pupils both across schools and within schools.
- Boys appear to be more enthused when using digital technology, particularly when producing pieces of written work.

Impact on teachers' professional development and learning

- Principals and teachers believe that the introduction of iPads has had a positive impact on teachers' motivation and enthusiasm.
- Although teachers were initially nervous about using digital technology, there was evidence to suggest that teachers had developed their confidence and competence throughout the project.
- Teachers are continuing to review their practice in order to identify how, and where, they can include the use of digital technology to support their teaching.

- Recording and monitoring children's progress directly onto a tablet device had proved beneficial, particularly with regard to teacher workload.
- The iPad also has the potential to offer rich resource material for the Irish Medium sector.

Impact on leadership and management

- In all of the schools, iPads are used at the discretion of the class teacher and this often involves collaborative use.
- The majority of children expressed a preference for collaborative use, claiming that it was "more fun" or that it was "kind" to share.
- Children showed great awareness of the care required when using portable devices.
- Most principals hope to extend and develop the use of digital technology throughout the school.
- Principals had included, or were planning to include, the use of iPads in their School Development Plans.
- The initiative has served to redefine the role of the ICT Co-ordinator.

Impact on parental involvement

- Relationships between home and school are good. The majority (72%, n=87) of parents believe that they were sufficiently informed about the iPad initiative with a higher percentage (86%, n=95) satisfied with the amount of information they received from their child's school. Girls' parents appeared more knowledgeable and satisfied with the information they received than boys.
- A large majority of parents (92%, n=101) said their child has access to a range of digital devices at home with approximately half using them on a daily basis.
- The most common educational benefits of using portable devices identified by parents/carers included making learning easier, exposure to a wider range of learning resources and greater experience with technology.

- Concerns about the use of portable devices included the potentially negative impact they might have on a child's attitude to work, concentration and awareness of the world around them. Several also mentioned the need for vigilance to ensure children's safety.

Recommendations

Whilst the evaluation suggests that the project has a positive impact on teaching and learning, several recommendations are included below.

- Findings from the observations suggest that some pupils may lose interest and become frustrated, particularly with regard to skills-based apps in numeracy and literacy. It is important that teachers closely monitor the choice of app and the level of difficulty where applicable.
- There is a need for school leaders to plan for specific, on-going, high-quality training for all teachers in effective pedagogical use of digital technology in the classroom.
- A redefinition of the ICT coordinator's role is required to ensure that portable devices deliver maximum benefits and that their full potential is realised by teachers in early years classrooms and settings.
- Parental training in child protection and safeguarding is required to ensure the wellbeing of young children who have free access to a tablet device.
- Further research is warranted to determine the impact tablet devices have on the learning experience of children with specific learning needs, including children in special needs schools.

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Acknowledgements

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The principal goal of education is to create men and women who are capable of doing few things, not simply of repeating what other generations have done—men and women who are creative, inventive, and discoverers, who have minds which can be critical, can verify, and not accept everything they are offered (Piaget,1973).

Chapter 1

Introduction

The *'Digital Technology in the Early Years Classroom'* report was commissioned by the Belfast Education and Library Board[3] (BELB) to assess the impact of the pilot project *'Evaluating the use of portable devices in early years learning'.*

1.1 Background

The Belfast Education and Library Board was awarded a grant of £299,400 from the Belfast Regeneration Office, Department for Social Development (DSD), to develop an ICT pilot programme in the Greater Belfast area. The pilot focused specifically on the impact of personal tablet devices (iPads) in the Early Years and Foundation Stage of education. The programme ran from February 2013 to March 2015.

1.1.1 Selection of Schools

Schools were selected from areas of multiple deprivation. Schools within the 10% most deprived areas as defined by the Northern Ireland Multiple Deprivation Measure (NIMDM) and Super Output Areas (SOAs) were eligible to apply. Schools falling outside the measure but with free school meals of 70% and above were also considered eligible.

The eligible schools were invited to submit applications which were subsequently assessed by a selection panel according to:

- Quality of response to the school's commitment to the pilot (15%)
- Evidence of current use of ICT at the Foundation Phase (20%)
- The benefits of developing literacy and numeracy skills to be gained from the use of iPads (35%)

[3] On 01 April 2015, the Education Authority became operational and took over all of the roles and responsibilities of the former Education and Library Boards (ELBs) and the Staff Commission.

- Creative use of iPads in other areas of the curriculum (20%)
- Future development of iPads in the school (10%)

Five primary schools were selected, with one from each geographical area (North, South, East and West) within the BELB area, and one Irish medium primary school.

The feeder nursery school/pre-school for each of the primary schools was also included in the project.

1.2 Project Details

The pilot project consisted of three main phases, as detailed below.

1.2.1 Phase 1 (2013-2014)

Two models of implementation were considered.

- Class sets: Two schools were allocated class sets of iPads (one for primary 1 and another for primary 2). The tablet devices were maintained as a set and allocated to pupils for specific lessons or purposes. The tablet devices could be shared between pupils or they could be used by pupils on a one-to-one basis.
- Personalised use: Three schools were allocated tablet devices across primary 1 and 2 to facilitate 'personal ownership' by pupils to use across lessons.

In addition, five feeder nursery/pre-schools were allocated five tablet devices.

An iPad was issued to each one of the teachers participating in the project which they could use for their professional needs and for monitoring and recording pupil progress. The devices were distributed in advance of the pilot start date to enable familiarity and to improve successful adoption.

1.2.2 Phase 2 (2013-14)

An additional class set of iPads was issued to each of the five participating schools which provided access for children from primary 1 to primary 3.

1.2.3 Phase 3 (2014-15)

A further class set of iPads was issued to each of the five participating schools which provided access for children from primary 1 to primary 4[4].

The BELB provided support to the participating schools throughout the duration of the project. This included initial training for teachers by Nerve Belfast and training for the set-up of the mobile technology along with support with any technical issues as they arose. Additionally, the BELB facilitated face-to-face and on-line interactions between the participating schools.

1.3 The Research Study

The research study involved conducting a rigorous assessment of the impact of the use of portable tablet devices on learning in the early years, focusing initially on primary 1 and 2 and progressing on to primary 3 and 4 when further complements of iPads were introduced in 2013-14 and 2014-15.

A BELB steering group was appointed to liaise with the research team.

1.3.1 Primary Objectives

The primary objective of the investigation was to assess the impact of the use of iPads on learning with regard to children in the Foundation Stage in the five participating primary schools.

The investigation focused on the impact upon literacy and numeracy with particular emphasis on:

- Assessing the impact of the use of iPads on the development of the pupils' literacy and numeracy skills in the Foundation Phase and in contributing to raising achievement;
- Determining which aspects of literacy and numeracy benefit most from the use of tablet devices;

[4] A number of schools opted to budget for the purchase of additional iPads for use in primaries 5-7.

- Examining the extent to which tablet devices can support the requirements of other areas of the Northern Ireland Curriculum.

1.3.2 Secondary Objectives

Throughout the course of the investigation, the research focused on the following additional points.

- In relation to teachers' professional development and learning, the research focused on how the personal tablet devices can impact on teaching and pedagogy. Consideration was given to the extent to which the introduction of a iPads would:
- Change the nature of the interaction between the teacher and the pupil;
- Affect the teachers' pedagogical choices;
- Facilitate/enhance a teacher's professional learning;
- Develop the teachers' professional practice with respect to planning, monitoring, recording and evaluating.

Consideration was given to the impact on leadership and management when iPads are introduced into school and included the following areas:

- The influence of iPads on the future deployment of ICT;
- The interface between iPads and the C2K system;
- The management and control of apps for the devices;
- Health and safety issues related to the devices (risk management).

The investigation examined the impact upon parents and considered whether tablet devices are able to promote parental involvement.

This report outlines preliminary findings from the research. These findings should inform the future rollout of similar initiatives and will be of interest to practitioners, policy-makers and parents.

Chapter 2

Literature Review

We live in an age where we are surrounded by digital technology. Ernest et al. (2014) claim that the technology industry is targeting the youngest members of society more and more. In many parts of the world early childhood is now infused with digital technology (Merchant, 2014) and touch screen devices have become part of the shared activity between adults and children in many home settings (Kirkorian and Pempek, 2013). Indeed, Carrington (2007, in Flewitt et al., 2015) suggests that for children growing up in today's world, digital technologies are as unremarkable and ubiquitous as electricity, becoming visible only in their absence.

In a recent study including six European countries (Chaudron, 2015), it is reported that children grow up in media-rich homes and are in daily contact with a wide range of digital tools. To the children in this European study, technology had a 'magical' value as an object of high desire. In a survey of 100 parents in the UK, 73% of under-fives were using a portable tablet or computer, compared to just 23% in 2012. Tablets are especially popular, with more than three in five using one (ChildWise, 2015). These devices have a growing popularity and importance in children's digital lives, particularly for leisure (Livingstone et al., 2014) and Ofcom (2014) report that there has been a significant increase in access to, ownership of and use of tablet computers by children of all ages with seven in ten children aged 5-15 years old now having access to a tablet computer at home. In a survey by the National Literacy Trust (Formby, 2014), 91.4% of parents reported that their children had access to a touch screen at home. The use of portable tablet devices in schools is also seen as one of the 'hot trends' for technology adoption in schools (Clark and Luckin, 2013). A recent report suggests that 68% of primary schools and 69% of secondary schools in the UK are using tablet devices. Schools are using tablets in a variety of ways but in 9% of schools children have their own individual tablet device. The report also states that there is an underlying trend that schools want to use tablets more, with 45% of schools reporting that they would soon be introducing them (Family Kids and Youth, 2014).

It is suggested that the increasing popularity of digital technology such as tablet devices is due to the affordances of these devices which include their portability,

affordability and efficiency (Flewitt et al., 2015). As Merchant (2012) suggests, technology is on the move; it moves with us and is as mobile as we are. Tablet devices have three novel features: they are portable and light-weight; they eliminate the need for separate input devices such as a mouse or keyboard; and they are designed to accommodate apps which have child-friendly, intuitive designs (Kucirkova, 2014). Indeed, it is suggested that, in contrast to traditional computers, touch screen tablets provide an easier to use and more intuitive interface for a child (McManis and Gunnewig, 2012).

This increased acquisition of touch-screen technologies, such as tablet devices, in homes and schools raises important questions about their role in young children's education (Price et al., 2015). Clarke and Abbott (2016) ask: is it a kind of 'flamboyancy' aid where schools can display an eye-catching innovation in a scenario where they are competing for pupils or is there a learning purpose even with the youngest pupils? In short, does investment in such devices improve educational outcomes?

In a study on the use of portable tablet computers in school with children aged from six to seven years, two main advantages of tablets as tools in the education process were identified: increased pupil motivation and the individualisation of the task-solving process (Fekonja-Peklaj and Marjanovič-Umek, 2015). The teachers in this study also reported that tablet computers encouraged pupils to persist more in their schoolwork compared to the use of workbooks. They further highlighted the immediate feedback on answers as being a positive feature of tablet devices. Increased motivation among children using tablet devices is reported in many studies and this increased engagement keeps children interested in their learning for longer (Burden et al., 2012; Clark and Luckin, 2013; Clarke and Abbott, 2016). Flewitt et al. (2015) refer to this as the 'magical awe and wonder' engendered by the use of the tablet. The impact of tablet devices on young children's literacy skills has been demonstrated to be a positive force in a number of recent studies. Pre-school children's (aged three to five) access to tablets at home has been shown to be positively associated with letter sound knowledge and name writing skills which are important predictors of future reading ability (Neumann, 2014). Another study with children aged four to five demonstrated that the use of tablet devices improved pupils' readiness in acquiring initial key concepts in literacy and this included struggling learners who made unexpectedly good

progress (Clarke and Abbott, 2016). Research has shown how children were engaged deeply and creatively in story making apps and how tablets empowered children to form new identities as good spellers and good readers (Flewitt et al., 2015). Whilst research evidence worryingly suggests that a fifth of young people say they rarely or never read outside class, it also reports that the number of children reading e-books continues to rise (Clark, 2014). It has been shown that the reading ability of four year old Japanese boys increased after intensive exposure to e-books but not after the same exposure to printed books (Masataka, 2014). A study focusing on children aged two to three years claimed that the touch based-interaction of tablet devices offers new opportunities for mark making practices with young children. Mark making contributes to the process of developing symbolic understanding (Vygotsky, 1978) and is important as children move into emergent writing. The affordances of the tablet supported speed and continuity which led to more mark making in general and extended the range of mark making practices. There have also been a number of studies which have addressed the positive impact of tablet use on mathematical skills (Burden et al., 2012) with some teachers reporting girls' mathematic skills to be noticeably better since using the mathematics apps (Clarke and Abbott, 2016).

Against a backdrop of concerns about children's uptake of digital media as an affront to childhood and claims of addiction to technology (Teichart and Anderson, 2014), children's lack of social skills and emotional development (Plowman and McPake, 2013), recent research has explored how the use of apps impacts on pre-school children's play and creativity (Marsh et al., 2015). It indicated that these essential areas in the early years can be fostered by apps. There was a range of types of play that apps can foster and there were many potentially creative uses of tablet devices to enhance children's learning through play. However, this was dependent on the design of the apps and some of the most popular apps were not age-appropriate and provided limited opportunities for play and creativity.

Many researchers call for a balanced approach regarding technology in education (Ernest et al., 2014) and suggest that the debate between technophiles and technophobes is driving us down the wrong road (Jenkins, 2015). Kucirkova (2014) refers to the 'troubled relationship' between digital and non-digital resources and how it positions technology and traditional resources in opposition rather than in a complementary relationship to each other. It is suggested that the use of technology

should be a supplement rather than a replacement for certain kinds of activities (Price et al., 2015).

However, the introduction of tablet devices into schools is not without its controversies (Clark and Luckin, 2013), and Merchant (2012) suggests that such technology can disturb the 'fragile ecology' of classroom life by opening up the possibilities for different kinds of learning, communication and interactions. Similarly, Lynch and Redpath (2014) warn that there are tensions when potentially transformative technologies meet institutionalised educational practices. Indeed, some suggest such 'moral panics' can be based on uneasiness about the 'rise of a vulnerable and unruly generation of "techno-subjects" who engage in practices that are unfamiliar to many adults' (Davies and Merchant, 2009, cited in Teichart and Anderson, 2014, p. 1679). These potential disruptions and tensions in the classroom are a key challenge and the teacher can be central in reducing their impact, and their perceptions of the use of tablet computers are critical. Many early childhood educators recognise the potential benefits of using technology with young children but lack pedagogical and technological knowledge. They report confusion around when and how to integrate technology into their teaching and demonstrate differences of opinion about the role of technology in early childhood settings (Fenty and McKendry Anderson, 2014). Teachers have to spend many out-of-school hours searching for appropriate apps to support their learning objectives and often encounter technical difficulties which disrupt the flow of learning (Flewitt et al., 2015). Burnett (2015) suggests that while many teachers may be active participants in digital technologies in their own lives they may see such practices as inappropriate in the classroom setting.

Yet, other educators are using technology in innovative ways to support children's creativity and critical engagement with digital texts (Waller, 2012). The OECD recently reported that over the last ten years, there has been no appreciable improvement in student achievement in reading, mathematics or science in countries that have invested heavily in ICT for education. However, the report acknowledges that factors such as teachers' readiness to integrate technology into teaching and whether teachers have learned how to use these devices to enhance student learning are key issues impacting on improvement.

Recent research highlights the challenge in using portable tablet devices to both enhance and transform educational experiences (Merchant, 2012). Lynch and Redpath (2014) believe that this transformative work is possible but warn that there is a risk that tablets will emerge as tools to be put to the service of already-established dominant classroom practices, manifesting as content-delivery systems with some added interactive multimedia appeal. Similarly, Flewitt et al. (2015, p. 17) caution that, “if innovative uses of new technologies are absent from the classroom, then we risk failing to turn on a powerful switch that can light up this generation’s learning”.

Chapter 3

Research Methods

3.1 Overview

The study adopted a mixed-methods approach, comprising a multitude of qualitative (e.g. semi-structured interviews, focus groups) and quantitative (e.g. questionnaires) methodologies in order to assess the impact of the use of iPads in early years classrooms. It also utilised a triangulated multi-source approach, drawing its findings from parents, pupils, teachers and principals, with evidence gathered at different time points over a period of two years. This breadth of methods and sources highlights the expansiveness of this research.

Data collection was carried out in four discrete phases. These phases aimed to correspond to the three phases of the pilot, with phase one relating to the introduction of sets of iPads, and phase four consisting of follow-up data. Each phase is outlined below in more detail.

3.2 Participants

This research was undertaken as part of a Belfast Education and Library Board (BELB) initiative (with funding from the Belfast Regeneration Programme) designed to pilot the use of portable tablet devices in socially deprived regions within the Greater Belfast area, with the overall aim of assessing the impact of the use of iPads on the development of the pupils' literacy and numeracy skills in the Foundation Stage. Schools were invited to apply for participation and, out of the 100 who submitted an application, five primary schools and five nursery schools were selected on the basis of area, socio-economic status and school management (i.e. maintained and controlled). Data was provided by school principals, primary 1 to 3 teachers, ICT coordinators and two cohorts of primary school children from each primary school, one primary 1 to 2 (i.e. was primary 1 at the beginning of testing and primary 2 by the end of testing) and the other primary 2 to 3. Parental perceptions of children's engagement with tablet devices were also sought during several phases of the study.

3.3 Ethics

In the course of the research, every effort was made to comply with the ethical guidelines mandated by the British Educational Research Association (2011) and the European Early Childhood Research Association Ethics Guidelines (Bertram, Formosinho, Gray, Pascal & Whalley, 2015). All identifiable information was removed prior to analysis and procedures at every phase of testing were made accountable to the Stranmillis University College Research and Ethics Committee and discussed with the BELB steering committee. Parental and teacher consent was acquired prior to involving each of the participating children in the focus group discussions and virtual tours of the iPads. Consent was also sought from each child. Researchers informed the children that their participation was voluntary and that they were free to return to their classroom at any point during the discussion.

3.4 Phase One

The main purpose of Phase 1 was to collate baseline information for comparative purposes. This was gathered either before iPads were introduced to the classrooms or just after, at a time when the full effects of the tablet devices had yet to become apparent. It was hoped that findings from this phase would provide background information on teachers' perceptions on iPad use in the classroom. As the BELB strategy was to introduce the iPads into schools at the beginning of the 2013/14 academic year, in the late autumn of 2013 semi-structured interviews were conducted in each of the five primary schools with primary 1 and 2 teachers, school principals and ICT coordinators[5]. Two sets of interview questions were devised: one for principals and ICT coordinators, focusing mainly on whole-school benefits, and the other for teachers, focusing mainly on in-class benefits (Appendix A). Interviews were also conducted with the five nursery school principals. The following areas were broached in the interviews:

- Background and willingness to be involved in the project.
- Perceived benefits and challenges.

[5] In several schools the ICT coordinator also taught a P1 or 2 class.

- Practical implementation and technical support.
- Prior teacher experience of tablet devices.
- Use of iPads in the classroom and the apps that are being used.
- Relationships between iPad use and learning.
- Effectiveness of training received.

Exactly one year later, in 2014/15, iPads were introduced into primary 3 classes in each participating school. At that point interviews were conducted with those classroom teachers using the same set of questions described above. All interviews at every phase of the study were recorded, transcribed and subjected to thematic content analysis.

3.5 Phase Two

Whereas the purpose of Phase 1 was to gain background information from the teachers, Phase 2 focused primarily on the pupils. In order to assess pupil knowledge and familiarity with the tablet devices, a select number (approximately 3-4 from each school) of primary 1 and 2 pupils were invited to demonstrate to the researcher how to navigate an iPad and to open and explain several apps including a literacy and numeracy app. During this 'Virtual Tour' they were also asked about the apps that they liked most or least. These conversations were recorded and each child's responses and actions during the virtual tour were noted.

Pupil perceptions on iPad use were also recorded during focus group discussions (Appendix D). A total of ten focus groups were conducted across the five schools. In each school approximately eight children (four boys and four girls) participated in the discussions. Given the researcher was a stranger to the children, each participating child was selected by their class teacher on the basis that they would be more likely to engage in discussion. The primary 1 and 2 groups were interviewed separately. Primary 3 pupils were not involved at this phase of the evaluation as iPads had yet to be introduced into this year group. The following areas were addressed in the focus group discussions:

- Frequency and manner of iPad use in the classroom.
- Pupil preferences towards individual iPad use versus shared use.

- The manner in which iPads are used in the classroom and in particular which apps are used during literacy and numeracy.
- Awareness of connections between iPads and learning.
- What pupils like and dislike about tablet devices and whether they prefer iPads to computers.

The interviews were scheduled at the end of the 2013/14 school year at a time when the children had been using the devices for a full year. All the focus groups were recorded, transcribed and subjected to thematic content analysis.

3.6 Phase Three

Phase 3 of the study included qualitative classroom-based structured observations carried out across all three year groups. The principal aim of this phase was to assess how portable tablet devices were used to support teaching and learning during literacy and numeracy lessons. Each observation was carried out by an experienced researcher, over the period of one morning per setting. The observation schedule (Appendix E) sought to examine the following areas:

- How the iPads were used by teachers and pupils in the classroom.
- Amount of use and the level of access pupils have to the iPads.
- Classroom management of the iPads.
- Pupil to pupil interaction and teacher to pupil interaction when using iPads.
- Specific apps used during both literacy and numeracy.
- Pupil engagement with and enjoyment in the use of iPads.

The classroom observations for primary 1 and 2 pupils took place at the end of the 2013/14 school year. Observations were also carried out in primary 3 classrooms a year later. The observation form was altered slightly between the 2014 and 2015 testing points, to allow the inclusion of more open (as opposed to closed) responses by the researchers, but the focus was unchanged.

3.7 Phase 4

The fourth and final phase of the study involved the use of a number of different measures to assess the value and implications of the pilot project. Parental questionnaires designed to measure experiences of tablet devices were distributed to the parents of primary 1 to 3 children at each of the five schools. These questionnaires, a covering letter and return envelope were circulated to parents via each child's homework diary. The questionnaires (Appendix F) explored the following points, using both open-ended and forced-choice questions:

- Children's access to and ownership of tablets and other portable IT devices.
- Awareness of the BELB pilot project and the guidance provided by each school.
- Perceived advantages and disadvantages of tablet devices in the classroom.
- Use of apps at home, specifically literacy and numeracy apps.
- Perceptions on how the use of tablet devices and other portable devices has affected their child's education.

Initial distribution: Each of the five schools was contacted to determine the number of children in each class. Based on that information, 400 packages were hand delivered to the participating schools in January 2015. A researcher called with each of the schools three weeks later to collect any completed forms. The response to the survey was extremely poor; yielding 32 (8%) completed and returned questionnaires. Two schools had no returns and others a low return rate which school principals described as *"normal for our school"*.

Follow-up distribution: To increase the response rate, the survey was redistributed to schools with the lowest response rates. Again, the response rate was disappointing. In total, 110 (27%) questionnaires were returned. Whilst low, an ESRC (2008) briefing paper on survey data collection rates argues that after two distributions, *"27% is a reasonable response rate."* It also notes that although there can be no claim that "*the survey data is completely unbiased, the level of bias introduced can be considered to be within acceptable levels for this kind of research"* (p. 1-3).

The data from each questionnaire was coded and entered into SPSS software for statistical analysis. Findings from the parental survey are included in chapter 7 of this report.

3.7.1 Follow-up Interviews

Follow-up interviews and focus groups were also held at the end of the 2014/15 school year with principals and teachers. According to Brenner (2006), rather than a single snapshot in time, repeated interviews involving the same participants offers them an opportunity to engage in a reflective process that revisits, reviews and clarifies the topic under investigation. Similarly, Cohen, Manion and Morrison (2011) claim that time triangulation across an extended period serves to bridge issues of reliability and validity and to increase the fidelity of the data. The interviews with primary and nursery school principals were semi-structured and focused on the impact of the iPad programme at a whole school level since the commencement of the BELB project (Appendix A (i) and A (ii)). The following areas were addressed in the interviews:

- Management issues to do with the introduction of the iPads.
- Technical support and training.
- Benefits of using iPads in the school.
- Use of literacy and numeracy apps and how these influenced teaching and learning.
- Teacher perceptions on the effectiveness of iPads in the classroom.
- Changes to the school development plan since the iPads were introduced.

Focus group discussions (Appendix B) were carried out with teachers from primaries 1, 2 and 3 from each of the five primary schools, to allow them to reflect on the effectiveness of the iPad initiative over the past two years. Each focus group was comprised of five or six teachers from the same school. A number of areas were broached in these discussions, including:

- How iPads are used to support teaching.
- The benefits and challenges of using iPads.
- Training and support provided.
- The overall impact of iPad use on pupil learning and classroom practice.

The interviews and focus groups were recorded, transcribed and then analysed using thematic content analysis. Findings are presented in chapters 4 and 5 of this report.

Chapter 4

School Principals' Perceptions

4.1 Introduction

School principals were interviewed in the first and last phases of the project to gain insight into their experiences and perceptions of the iPad pilot project. This section explores principals' reasons for applying to join the project; their perceptions of the impact of iPads on the development of children's literacy and numeracy skills, the school development plan and ICT policy; and their views on the advantages and disadvantages of introducing iPads into early years classrooms. The findings are presented using exemplars from the interview transcripts to reflect the authentic voice of the five school principals who participated in the project. For the purposes of anonymity and confidentiality, each school was allocated a numeric code from S1 through to S5.

4.2 Application to the Pilot Project

All five school principals recall the initial letter from the Belfast Education and Library Board (BELB) advertising the project. Given each of the schools in the pilot is in an area of social deprivation, the principals felt that participation in the project might help to motivate pupils to engage in the learning process and ultimately improve their educational outcomes. Although the pilot was initially focused on introducing the devices into primary 1 and 2 classes, several principals were, from the outset, considering how best to introduce iPads throughout the whole school. The following exemplars capture experiences of the majority.

> *Most of our children don't have access to iPads or tablets, or even computers at home. Probably a lot of their parents have smartphones, because they tend to have those anyway, regardless of their level of deprivation, but they don't have iPads at home. In terms of our school budget, it has been restricted in the last couple of years; it will take a couple of years until we'll be able to afford iPads in the budget. I just thought that the project*

Principals recognise the potential of digital technology (S4, S1).

looked so valuable. iPads have such a great educational benefit that they can access. Children really find out a lot through technology these days, much more than adults can, so it was too great an opportunity to miss (S4).

Supposedly, it was only meant to be for P1 and P2, but we hope to expand that, and use it up the school. That is one of the reasons why I really wanted to get it, to expand it, not only for literacy and numeracy either, but to use it as a planning tool, really, and to make things a bit quicker and easier, to organise and manage the curriculum. I know that the options are huge (S1).

In terms of forward planning, another explained that each member of staff had been provided an individual iPad and a small budget to buy apps.

Our staff are young and keen and are very technically minded. Each teacher was given an iPad and £10 to become familiar with the technology and different apps. This was a necessary step. It also meant that they could trial an app before we went out and bought 30 more iPads and apps. From the outset we were looking ahead to roll it out across the school rather than just use it in P1 and P2. We have interactive whiteboards in the classrooms, we have Apple TV and all of those. We believed the iPads would complement and extend existing practice (S2).

Younger members of staff appear particularly enthused by the introduction of mobile technology into early years classrooms (S2).

Asked why they had chosen to apply to join the iPad pilot project, the majority of principals said that they had had plans to develop ICT within their school and this offered them an opportunity to realise that aim. By way of example:

I think it really gave us a kick-start to start bringing in iPads into the school. We had brought in an interactive whiteboard, we went through a transformation and this project made us really focus on iPads (S5).

For another principal, the successful application enabled staff to focus on the development of children's literacy and numeracy.

That is one of the reasons why I applied. I really wanted to expand our plans for ICT, especially in terms of literacy and numeracy. To support our planning and make it happen, it happens at a faster rate (S1).

4.3 Implementation of iPads into Schools

There was considerable variation in the way schools chose to introduce the iPads. One principal thought it important that teachers each had access to an iPad ahead of implementation.

We bought one [iPad] for each member of staff ahead of receiving them from the board. So that was our starting point. I set aside time for training sessions. I also organised the introduction of headphones into each classroom in order to facilitate iPad use (S5).

Other principals were considering how best to introduce the iPads into early years classrooms.

At the minute, we have not decided on an allocation, whether it is going to be so many per class, or if it is going to be used by both classes, as a whole class pack…. At this stage, we are not too sure about how we are going to use them properly (S2).

Technical difficulties delayed the introduction of the iPads in some schools.

The iPads are all in the cabinet, they are fully charged, they have the system, but I think there are a couple of bits and pieces to get done before we are able to use them on a whole class basis. The children have access to them; the teacher has already used the iPads with small groups. So that's where we are with the project (S4).

The number of iPads allocated to schools varied in accordance with pupil numbers within the primary one to four year groups. For the smaller schools, one iPad was provided per child. For the larger schools, the iPad allocation corresponded with the number of children within the largest class in the year. Providing schools with sufficient numbers for personalised use allowed schools to be flexible in how they used the iPads. In addition, several schools already had a stock of iPads prior to the

commencement of the project and this also influenced how they were being used within the school.

> *We received forty, so they will be enough for whole-class sessions, but we are thinking that maybe each class will have ten at all times, to be used in Foundation Stage, whenever they are needed, but this still has to be finalised (S2).*

> *There were already thirty eight iPads in school, so we will probably end up with 94 tablet devices. That means there will be more than enough to allocate one per child in primary 1 and 2. Our pupil numbers are declining so we would have liked to use them [iPads] further up the school and said so in our application. But we were told they were for Foundation Stage pupils only. We believe this is a missed opportunity (S4).*

Another principal was equally keen to ensure that children had access to their own tablet device.

> *When distributing iPads within the school, it was decided that one full class of P1s and one full class of P2s would have an iPad each. On the advice of the BELB we thought it'd probably run smoother on a one-to-one, so what we did was…we just picked one P1 class and one P2 class (S1).*

4.4 Leadership, Management and Planning

Several schools adapted areas of the school development plan to accommodate iPads; others included it as a target with a view to fully integrating it into their next planning cycle. Meantime, class teachers were encouraged to include iPads in their planning.

> *Yes in literacy, numeracy and ICT, but you would see it in a teacher's planning… in their 6 weeks planning, if they were using, for example, resources. Before you would have had the books they were using, the*

practical materials, now you also find the apps they are using as well (S3).

We were at that stage of reviewing our school development plan anyway, so we were already reviewing our targets for the school year. We are in our third year of the school development plan at the minute, and the timing of the initiative worked quite well. It's now part of the school's new development plan for 2015-2017. We will be able to put in targets with a view to full roll out throughout the school (S4).

Another principal explained that, whilst their previous focus had been on literacy, they now intended to concentrate on numeracy and were looking for appropriate apps to challenge and extend pupil learning.

We've done some work with literacy. For numeracy I think we are unsure of what is the best plan, so this year in our Action Plan we have identified numeracy and aim to investigate apps which would be useful to help children problem solve, so it isn't just about times-tables (S1).

Regular reviews of classroom plans ensures progression across and between primary year groups (S1, S5).

Convinced about the benefits of employing digital technology in the classroom, a school had already identified ICT as its priority area in the school development plan. The timing of the initiative complemented their existing plans and helped them to successfully achieve their targets.

The use of iPads would have been part of the PRSD programme (Performance Review and Staff Development) which then would have been part of our school development plan. It is actually a priority focus. It was last year and it is going to be next year… So it is very much a priority focus within the school because we have seen the benefits of using it (S5).

Discussion of the school development plan was an issue at both phases 1 and 3 of the study. Whereas initial concerns were focused on mapping the iPad initiative onto an existing school development plan, by the final phase this had shifted to the need to develop plans that showed progression and development. Moreover,

notions of how digital technology might be better employed had also changed. For example:

> *The 2011 plan, if you look at it there is very little in terms of ICT at all. The ICT accreditation scheme would have been in 2011, and we were kind of going "Right, get interactive whiteboards into every class", and we need to get the computers. Because we had so few computers they were all up the school more so. There was literally one computer in the P1 and P2 classes. For year 1 and year 2, you do a skeleton plan for year 2 and year 3. There was statutory assessment of ICT. That was all done at the beginning in 2011, so our new one for this, which started last year, 2014, we are now into year 2. It included ICT, the tasks, developing the tasks, more training in ICT, so we plan more for the use of ICT. It is much more on a par with literacy and numeracy in our SDP now. In fact, probably more so because it permeates every subject and the focus is now on development and progression (S4).*

Principals are keen to infuse digital technology into all areas of teaching and learning (S4, S1, S2, S3, S5).

> *ICT is very prominent in the school development plan and is becoming more prominent. But not just ICT on its own, its technology and new technology we hope to expand to include as much innovation as possible. Our aim is to engage the pupils' interest and year on year introduce them to another level of ICT and I mean digital technology in its widest term (S1).*

Support for the last point comes from a principal who talked about the expansion of ICT in the school as a direct consequence of the iPad initiative. This has had an impact on other areas of the curriculum; it has changed how ICT is used in the school and this has had a significant effect on the ICT co-ordinator's role.

> *Yes, certainly it has had an impact. However, we are still using laptops for ICT accreditation and actual skills in ICT but this is more about enhancing all areas of the curriculum, it isn't just about ICT. Now that we're using them extensively in literacy, numeracy … we have in place*

a number of action plans and we're looking at the potential for other areas. For example, I can see how they would be useful for World Around Us projects and how they have more potential. The role of the ICT co-ordinator has changed dramatically and developed (S3).

Reflecting on the influence of the iPad initiative, a principal noted how worthwhile they have found iPads for engaging children who are 'turned off'.

The children have certainly benefited. Some who never shone when they were asked to complete worksheets or were asked to produce something on paper have really taken to the iPads. It's been a transformative experience …it's been unbelievable and we intend to roll it out to the whole school (S5).

Moreover the same principal believes that, having captured the interest of children who might otherwise be lost using traditional teaching methods, the iPads will be able to retain their interest.

It is so worthwhile. We want to engage the children in their learning and especially children who have been turned off; we need to harness this enthusiasm. Schools have only so many PCs. This mobile device is great. They can take it around the school. It is just a fantastic resource to get the children interested in education and once you have that interest there is so much to offer and so much more available that it would be madness not to harness that (S5).

None of the schools in the pilot appeared to have a policy directly addressing how iPads should be used, stored and managed. One school is currently working on putting a policy document in place, whereas the others have yet to draft a policy.

4.5 Impact on Teaching and Learning

Overall, principals were enthusiastic about the benefits they have experienced as a result of introducing iPads into the school. The point of engaging children, who

were previously disaffected, was mentioned several times. There was a sense that in an area of deprivation children do not value the learning process.

> *They can easily get lost. There are few successful role models in the area and many of our children grow up in households where unemployment is generational. Education doesn't have the same value when you have no aspirations and we have always been aware that we have to work that bit harder than other schools to bring our children on board. It's not lack of ability it is lack of motivation. The introduction of iPads is changing that (S1).*

Increased motivation and enthusiasm for learning was mentioned at least once in each of the interviews with principals in both the first and last phase of the evaluation. By way of example, one principal observed an increase in motivation in the children and in the teaching staff. She also noted greater innovation in teaching methods and a reduction in the time spent on recording pupils' progress.

> *I think the motivation, and I am not just talking about the children, I think it has motivated staff to look for other resources. For example, when we took on the iPads, our numeracy co-ordinator looked at our scheme for Maths. We took on Heinemann Maths which uses the interactive whiteboard and allows us to use the iPads for children to show off their work. So it's been a good fit with our own technology. The teachers have been really motivated to look at different ways of reporting and recording children's progress and looking at how they carry out their assessments. Having this with them, can raise standards and that is what we aim to do with the children's work…. Our teachers are experiencing a reduction in time spent on recording observations. Before they made notes and typed them up later whereas now they can directly make notes in a spreadsheet all done and dusted (S2).*

Teachers have been really motivated to look at different ways of reporting and recording children's progress and looking at how they carry out their

According to one principal, the real impact has been on children's confidence.

I see classes, particularly classes with lower ability children, really engaging with the activities on the iPads. They can manipulate the level of the app themselves which puts them in charge of their own learning. This increases their confidence. Some of our children would be shy. Now you hear them calling the teacher and saying Miss XX, "look at this" or "see what I can do". That's a massive step forward for our children (S1).

Lower ability children are more engaged with learning presented on iPads. It also boosts their confidence (S1).

Another major benefit concerned the mobility and versatility of handheld devices. Apart from proving useful in documenting performance, they can also help identify children who are underperforming.

You can use it anywhere … drama or even to showcase artwork. Obviously, it's focused in literacy and numeracy but it's also used to do research, Google images etc. We can use it for any area of the curriculum. It facilitates what we are doing anyway and cuts down on time, and storage of pupil information. We can now take photographs of children's work and retain it throughout their school experience. So we can see progression. Now, we are able to identify children who maybe we thought were doing quite well but actually were getting lost in the system (S1).

iPads have proven a useful tool in reinforcing children's learning through activities that are not typically associated with formal learning.

I see staff using it after or before a taught session to aid consolidation of the learning process. It's embedding skills through educational apps that are colourful and interesting to children and they are getting more and more practice (S4).

The potential for schools to produce their own tailored resources is particularly beneficial for teachers and children who do not have English as their first language.

In Irish Medium, there were always fewer resources. There was always a massive gap, which digital technology has begun to fill. So there's a lot of opportunity to produce books and we can also scan them. Previously our teachers sat down and wrote their own resources. They can now see opportunities to use them with the whole class or on a one-to-one with children who are struggling, and also in early identification of any learning difficulties. We use the phonic apps which are in English and there is a need to support language acquisition in both languages. Even our youngest children can record themselves so it offers a self-correction tool.

4.6 Impact on Children's Learning and Development

4.6.1 Impact on Numeracy Development

Some stated that they had seen a definite improvement in the numeracy skills of the pupils since the introduction of the project.

I think the children…. We can definitely see an improvement in their mental arithmetic, in their recalling skills. It has helped… to reinforce and consolidate the work that they are doing within the class (S5).

Nonetheless, it appeared that the use of the iPad within numeracy was initially more limited than in literacy. In particular, some noted that they had difficulty finding appropriate numeracy apps.

I suppose at the minute it is limited. It is the reinforcement of facts and consolidation of learning with numeracy. We haven't quite moved on to the problem solving though we are focused on that this year…. I would say it is not having the time …. We know it would be a super tool to use but just having the time to find the appropriate apps to do it. Whereas obviously I think the focus has been on literacy. We feel we need to move with numeracy… but we find there are not as many new apps for learning in numeracy (S1).

Finding appropriate numeracy apps to engage young learners is time consuming (S1).

However, the principal of S1 added that it was part of the School Development Plan to invest in apps for numeracy.

> *It is in the Action Plan to invest in numeracy apps, the Numeracy Action Plan. We are actually using it for planning with our Heinemann resources … I think it will, and I suppose also what we have done this year in our Action Plan/School Development Plan is that we want to look at problem solving in numeracy, so we find…that is further on down … (S1).*

4.6.2 Impact on Literacy Development

At the final stage of interviews, one principal noted the positive impact of the iPads on children's talking and listening skills along with their communication skills, pointing out that literacy and social skills are related in terms of communication.

> *I think it makes the children aware of their audience and aware of how they talk to each other. It has improved their talking and listening by having to talk to someone else, improving everything (S1)*

Although handwriting had been highlighted as an initial issue of concern, the iPads appeared to have had a positive impact on children's writing.

> *Sure that is the whole reason for the Revised Curriculum. It was felt that boys were not ready for writing. It has been a massive issue recognised in education so it is having a really big, positive impact there. So yes, in terms of levels of motivation … (S4).*

Another principal noted that children were able to add text because of the way the use of apps was managed.

> *Well when we are doing the ICT tasks you go through the success criteria at the beginning. You are telling them they have to have text, they can have animation, and they can change the colours. They can use whatever script or fonts etc. But the writing is still there. In fact they are able to change their mistakes, they are able to correct without it looking like you are scoring out like it is on paper (S1).*

The personal views of another principal had changed with regard to children's writing skills.

> *I think it is my attitudes that have changed. I am the eldest in the school. I would have thought, pencil and paper. It is going to take away from their writing skills, but if you are learning how to form letters correctly and you have an app that is showing and insisting that all children do that then surely that will lend itself up the school and maybe it is not so much how much is written but if the children are using the iPads there is more than what they would put down on paper because again they don't think it is work! (S2)*

By contrast with the previous section, one principal felt that the use of the iPad was more restricted within literacy. However, apps such as Book Creator and My Story had proved to be very useful.

> *For literacy we have been more restricted … the likes of Book Creator and MyStory have been very useful because we can create our own and you can use pictures, animation…Lego Movie and that and adding animation and sounds to it (S4).*

Later, the same principal noted that the iPads had been particularly useful within literacy.

> *We have found that it is particularly useful for literacy because we are very under resourced. You will hear the arguments and the different things in the media which we hear all the time. We do not have enough resources. There aren't enough reading books, there aren't enough textbooks. There aren't enough of anything. So it has filled a huge gap for us (S4).*

When asked about the impact on early literacy skills, another principal talked about children's enthusiasm.

> *…our ICT co-coordinator, she is a P2 teacher …. her children have presented at assembly the books they have…even as part of our ICT assessment we did desktop publishing, so they did their posters and added animation all on the iPad, and presented at Assembly. They were just so enthusiastic. When they are done in groups, from the weakest children, you get different levels but it has had a very positive impact (S4).*

One principal commented on the impact of digital technology on children's interest and achievement within literacy.

> *There is an increase in their love of reading, their interest, their phonics skills…So we have noticed a great improvement. We notice that our literacy scores have been increased. Using the standardised scores, so I would say definitely it is literacy and just enthusiasm for reading is there (S5).*

4.6.3 Impact on Children's Communication Skills

Some principals were initially concerned that integrating iPads would have a negative impact on children's communication skills, both in terms of the interaction between children and between children and teachers, as summed up in the following exemplars.

> *Our big worry was that communication was going to fall. Technical expertise would increase but that they were going to stop talking to each other and the class teacher. Instead we have the opposite feedback. Teachers continue to ask questions and children work in pairs or groups. We have also continued with whole class teaching. So contrary to our initial fears it has had no adverse effects. If anything, children talk very enthusiastically about the work they are doing using iPads (S2).*

In contrast, this was never an issue for another school.

> *We weren't really concerned because our ethos is about language and language development. But we do see children talk more about their work with their teacher and when they take pictures using the iPad they can feed back to the whole class the work they've done (S4).*

4.6.4 Gender

Gender was not a prominent topic, but when discussed it was typically to express the opinion that the use of iPads particularly affected male pupils. Highlighted as an ongoing issue, the effect on male pupils' literacy development was positive, as it was believed that boys were more likely to produce pieces of written work when using digital technology.

> …..boys definitely find the benefit, writing for longer, producing and finishing tasks (S4).

> *They definitely enhance learning, embed learning, and help motivate the children. The boys definitely find the benefit, writing for longer, producing and finishing tasks…but what we have noticed massively is that not only are they very much encouraged but boys are definitely producing more writing (S4).*

4.7 Key Findings

- All five schools are in areas of deprivation with some struggling to afford teaching resources. They were very enthusiastic about being part of the pilot initiative and believe that it has had a very positive impact on teaching and learning.
- Some were in a position to include iPads into their school development plan whereas others intend to include the technology into their next planning cycle. Most hope to build and extend the initiative by rolling it out across the school. At the time that the last interviews were conducted, none of the five schools had a policy document in place that addressed the management and storage of iPads. All, however, are aware of the need for such a document and intend to draft a policy as soon as possible.
- The versatility and mobility of the devices means that they complement and extend other forms of technology already in schools. For example, they link with interactive whiteboards enabling children to present their work to the teacher and class.
- Initially introduced to support the development of children's literacy and numeracy skills, they are being introduced into other areas of the curriculum including the World Around Us, Art and Drama. There is a sense that they have the potential to complement all areas of the

curriculum and that schools are yet to realise the full potential of the devices.

- In all schools, there was considerable discussion on the benefits of using iPads to monitor, record and assess children's performance. Whilst recording observations directly onto iPads has reduced teachers' work, it also provides an accessible record that enables teachers to identify children who are falling behind their peers. Supported learning can quickly be put in place to target areas of weakness and raise achievement levels.
- Overall, principals were positive about the impact on literacy skills with one principal claiming that children's standardised scores had increased.
- Enthusiasm for literacy, particularly for boys, seems to have increased.
- Handwriting had initially been a concern. However, the use of iPads for letter formation and letter direction was noted. It was highlighted that iPad usage had encouraged boys in particular to produce pieces of written work.
- Apps such as Book Creator and My Story were being used creatively for literacy.
- Use of the iPads within numeracy seems to have been more limited, with the impression that there were less suitable apps available. Schools however recognised the need to develop and plan in this area.
- The iPads were being used to reinforce and consolidate mental arithmetic facts.
- Motivation and enthusiasm amongst staff and pupils has increased significantly as a result of the initiative. Children who were previously disengaged when taught using traditional approaches appear more highly motivated when activities are presented on a digital device.
- Teachers have also reviewed their teaching to identify where they can include digital technology and are including it as a matter of routine in their lesson planning.
- The initiative has proven so successful in the five schools that ICT is now being used extensively and it has served to increase and change the role of the ICT Co-ordinators.

- iPads are potentially a good resource for the development of classroom materials for the Irish Medium sector. There is currently a shortage of texts for these schools and one principal believed they will offer a rich resource for the development, storage and presentation of a range of materials.
- Children's language and communication skills are not thought to have been adversely affected by the introduction of iPads. On the contrary, iPads offer teachers another device to discuss work with children.
- It is also believed that the devices have increased children's confidence in and ownership of the learning process.
- Reflecting on their inclusion of the initiative, all of the principals believe it has benefited their schools.

Chapter 5

Teachers' Perceptions

5.1 Introduction

This chapter explores digital technology in the early years classroom from the perspective of teachers. One-to-one and small group interviews were conducted at three phases of the evaluation. The first interviews were held shortly after the iPad initiative commenced in 2013. At that point, teachers' experiences of the training available to equip them with the skills necessary to integrate iPads into all aspects of the curriculum were explored. The second round of interviews took place at the end of the first year of the initiative between May and June of 2014. At this point teachers were able to reflect on the impact digital technology has had on children's literacy and numeracy skills and the effect it has had on teaching and learning. The final series of interviews were undertaken in mid to late 2015.

Exemplars from interviews are used throughout this chapter to ensure that the voice of teachers is given prominence. Whilst the code for the participating school is included, primary year group is not included to protect the anonymity of the participating teachers.

5.1.1 Exploring the primary objectives

Given that the focus of the evaluation was on classroom practice, a considerable body of data was collected from class teachers. To synthesise and interrogate the data, and to faithfully represent the voice of the teachers involved in the project, this chapter is presented in two sections. Section 1 reports findings that directly address the primary objectives of the project. There is a particular focus on the impact that digital technology has had on the development of children's literacy and numeracy skills, their confidence and motivation to learn and how it might contribute to raising the achievement levels of children living in areas of endemic deprivation.

5.1.2 Exploring the secondary objectives

The second half of the chapter reflects on teachers' perceptions of the initiative as it progressed from the implementation stage to a 'bedding down' stage. The secondary objectives of the project are explored here with the focus on teaching and learning, leadership and management and parental involvement issues.

5.2 The Primary Objectives

5.2.1 Impact on the learning experience

As noted in the Nutbrown Review (2012), the quality of a young child's learning experience will affect their wellbeing, development and longer term achievements. Professor Cathy Nutbrown places particular emphasis on the learning environment which should offer a nurturing experience through playful interactions. For that reason, this section begins by looking at the impact the introduction of iPads has had on the affective nature of learning including enjoyment, engagement, motivation and enthusiasm.

Teachers talked positively about the impact that iPads have had on children's enjoyment of learning. The following exemplar captures the views of the majority.

> *I think it has had a very positive impact. It has enhanced things certainly and it has given another dynamic, another dimension to the structure of lessons. Having them at a table for children to come to, it has enhanced things and it is a different resource to have. It is something that we need to be doing now. The world is moving on, the children can all use them fine (S3).*

Digital technology offers another dynamic, another dimension to the structure of lessons (S3).

Others talked about the impact that the iPad has had on children's talking and listening skills. This is an important point given that many were concerned that iPads would negatively impact children's communication with their peers and teachers.

> *I would definitely say that talking and listening have significantly improved. They have more chance to talk to a peer or to work in*

..talking and listening have significantly improved. [Children] have more chance to talk to a peer or to work in mixed ability groups (S5).

mixed ability groups and that has really helped them. They are talking and communicating their ideas and learning from others (S5).

They are also talking to us, "Miss how do I find?" or "Come and see this." They want you to appreciate their efforts and I think we have more talk not less (S3).

We use it for The World Around Us. The children took pictures of flowers and trees. They then made a little book which was about how plants grow and what they need and they were able to add pictures of rain and the sun and soil (S4).

They enjoy using iPads so after a reading activity I might set them a task on the iPad which is fun but works to reinforce earlier learning.

The recording element is helpful for shy children. I had a little girl who was so quiet but loved recording her voice as she described her picture drawing. She loved it and brought it for me to listen to, so I think there is potential to improve young children's confidence (S1).

Despite reservations that the use of a tablet device might negatively affect children's written skills, several said it has had the reverse effect.

The taking of photos, videos, manipulating pictures and writing over them has to be good for all emergent writing skills.

I think their fine motor skills are improved by using the stylus pen. The first ones were hard for them to grasp but we have chunkier pens now and the children use them very well. I know I initially thought that simply swiping a screen would be detrimental to their writing skills but I've been pleasantly surprised (S2).

The iPads have also proven to be a useful tool for gathering additional information on children's progress and performance.

It is useful for gathering evidence, and documenting what the children have worked on. I get the children to record their thoughts

and it helps me to identify areas of strength and weakness. You simply wouldn't have that detail using pen and paper (S1).

It's really helpful to take photographs of the children while they are involved in various activities, and then I can look back at that later and see how well they understood things from another perspective. It has been really useful for me. Also, whenever I am going to be teaching something, I can quickly research something on Google, or if the children ask me a question about something, I can look it up and show them photos straight away. It just helps make my teaching more relevant to the children (S2).

5.2.2 Impact on literacy development

All of teachers talked positively about the impact iPads have had on the development of children's literacy skills. There was also a sense that children are more positively disposed to reading and writing when it is taught through the medium of digital technology. This appeared to be particularly relevant for children who experience difficulty with traditional teaching approaches.

[Through iPad use] talking and listening have significantly improved (S2).

The iPad can help children who struggle with their fine motor skills to learn how to form letters, follow lines, and build up the talking and listening have significantly improved. They have more chance to talk to a peer or to work in mixed ability groups without feeling pressurised to complete something amazing on paper. So, I think that it is really good, and it also gives them really positive attitudes to writing and letters when they get to see a really colourful app, with lots of nice sounds and everything. It helps them to be more excited about literacy lessons (S2).

In P1 and P2 the children are using Hairy Letters and BlobbleWrite. It helps their literacy development by using some interesting apps. They can do their letter formation. I believe it has a positive impact on children's writing because they can quite easily follow the imprint of the letter. Their reading skills

are being developed with the High Frequency app, and eventually when we get on to creating little books, they can take pictures of books and record themselves reading. This will develop their confidence. There is an opportunity to develop a progressive approach to reading and writing and to tailor learning to meet the needs of the child (S3).

I use it to extend learning as a follow up to guided reading where children get to record themselves retelling the story. But most often, instead of having a worksheet, they would do it on the iPad, or during play, each week, each day, there's a different child who is the reporter and they use the iPad and walk around and take pictures, and then they are the ones who discuss with the class what has been going on (S4).

I would say Book Creator has made it easier to teach some aspects of literacy. It is easier because they are initially engaged but they are excited to be using it. It's a bit of art, bit of literacy, everything thrown in. Recording their voice. Like that [6]SAMR model, maybe if you were doing the same lesson on paper you would have them colour the picture one day, cutting and sticking the next. But with this it happens at speed (S2).

Other areas of literacy identified by teachers as benefiting from the use of iPads include:

Good for emergent writing skills (S1).

We've used BlobbleWrite and Jolly Phonics apps to support sounds and letter formation (S5).

[6] The **S**ubstitution **A**ugmentation **M**odification **R**edefinition Model offers a method of seeing how computer technology might impact teaching and learning.

Useful in guided reading with P1 and P2 children. We use the Big Talking Book app (S3).

Taking of photos, videos, manipulating pictures and writing over them has to be good for all emergent writing skills (S2).

Children easily learn how to crop pictures, drag and drop, add captions and titles, even including little speech bubbles gives them an added interest in their work. I honestly believe that it has increased their motivation and enthusiasm (S1).

5.2.3 Impact on numeracy development

Teachers were equally positive about the impact of iPads on children's emergent numeracy skills. They focused on the fun that children have in completing a numeracy task on an iPad, an element frequently missing when the same task is presented on a work sheet.

In the Foundation Stage, a really important thing is that learning needs to be fun and enjoyable for the children, and iPads guarantee that the children are going to enjoy whatever it is that you are doing. You can build in a lot of numeracy concepts in a really fun and exciting way for them (S4).

I also find it really good to keep their attention. Whenever we are searching for information like 'find me a trapezium', they can use Google Images, and so many images come up that it really grabs their attention, and the discussion that you can have around that is really good (S4).

Digital technology increases children's interest, enjoyment and engagement in numeracy

Other teachers have also used apps to practise mathematical skills in an engaging way.

We do a lot of … sequencing work. The apps are fantastic for that and the children think they're playing games, so it's changed the presentation of work and made it more fun (S3).

Across the duration of the project, teachers increasingly talked about the apps they were using and how making iPads an integral aspect of their lessons had increased children's enjoyment, enthusiasm and interest in aspects of numeracy.

> *I would maybe use a lot [of apps] for the introduction of maths lessons and things. I would maybe use the Maths 3-4 and 4-5. I think they're fantastic and the children love them (S3).*

> *I demonstrate skills such as matching, find two the same and so on, then the children try it out. I sometimes start them working individually, then in pairs and then in groups. Using mixed ability groups really helps children to develop their counting skills, number correspondence and match up. They show each other wee tricks and you hear them giggle and think "what was that?" But they're sharing the learning and that way it can make numeracy fun (S5).*

According to one teacher, apps can be used to present complex mathematical concepts in a child friendly manner.

> *… Sometimes the more complex concepts that you're trying to get across so that the children understand… well sometimes there's an app that can do that for them. Some of my favourite apps, include Maths 3-4, Maths 4-5, Bee-Bot, Symmetry and TallyTots (S5).*

Another teacher talked about the complementarity between a range of resources, such as the use of the Bee-Bot programmable device and the Bee-Bot app.

> *So the children give it directions and it goes wherever they want it to go. There is an app for the Bee-Bot as well so it extends what they have already learned in the class as well (S4).*

5.2.4 Gender and iPad Use

Gender was not a prominent topic in discussions. Teachers talked about the positive impact that the introduction of iPads had had on all children's performance. Several,

however, noted that “harder to reach boys” appeared more engaged when lessons were taught using the iPads.

> *Well all the children love them. I see some boys, who are much less motivated than others, just doing their number stories or their sentences as part of their play, which has been good (S1).*

Maintaining children’s interest in lessons was also thought important and one teacher talked about the impact the use of iPads had on children’s concentration.

> *It’s keeping the children interested, which was especially difficult with boys. I have a lot more boys in my class and I can see a difference. They are more motivated and concentrate for longer when I give them an activity on the tablet (S5).*

Boys are more motivated and concentrate for longer when iPads are used (S5).

It was also noted that boys were more likely to be engaged in literacy and that literacy apps made things more ‘accessible’ for boys.

> *Boys are more interested when the iPads are used. If they are trying to do an independent writing lesson normally into their books boys show no interest. But if I give it to them on an iPad they automatically…I think they don’t even realise that they are doing work. It is like “Oh we are getting an iPad”. They automatically associate iPads with fun and excitement and there’s no problem (S1).*

> *…yes boys, younger boys are definitely more likely to produce pieces of writing using the iPad than they are on paper (S4).*

Overall it was thought that both girls and boys enjoyed using the iPad and were engaged when doing so, but there was some gender specific discussion about how the technology had improved boys’ literacy skills and their ability to produce written pieces of work.

5.2.5. Children with additional needs

It was generally thought that iPads offered an additional resource to support the learning of some children with additional needs.

There is potential for digital technology to support the learning of some children with additional needs (S3, S1, S3).

> *Children with special needs, often have very weak fine motor skills. …so [using iPads] they still get the experience of doing the activity and getting it right at the same time as everybody else, without being that behind. The swipe movement works for these children in particular and helps build their confidence that they can achieve the same as the rest of the class (S3).*

> *I have two children in my class with severe autism, and one of them responds very well to the iPad. She finds it difficult to compromise and I use it in defocusing sessions with her. We have a very high percentage of children with special needs (30-40%) and are always looking at new ways to improve their learning experience. The iPads seem to work well for some but certainly not all of our SEN children (S1).*

Teachers noted how tracing letters on an iPad can help less able children to develop letter recognition.

> *It has also helped with letter formation (S2).*

> *There are apps which support letters, sounds and letter formation. There have been a couple which have been great. Especially with my lower and middle groups where they might struggle with the formation, the correct formation, which we are quite strict about to make sure they get it right at the start of P1 (S1).*

5.3 The *Secondary objectives*

5.3.1 Teachers' expectations and concerns during the implementation phase

In the main, teachers were excited and nervous during the implementation phase. Concerns with their own lack of familiarity with iPads were mitigated by their belief that such devices could improve the teaching and learning experience.

Well delighted but dubious and nervous. I'm not a techy person so this was very new to me. Don't get me wrong. I have a Kindle at home, a laptop, iPhone the usual and of course the interactive whiteboard in school. But this [iPad] was to be used as a teaching aid and that's what made it daunting for me (S1).

Similarly nervous, another teacher talked about the benefits the initiative would bring to the school.

For myself, I was just really pleased. A bit nervous but that's about myself. You just have to look around to see this is an area of serious deprivation. Our kids don't have tablets at home and the school is very under resourced. This is a brilliant opportunity for us to offer our children something that other schools buy as a matter of routine; schools in nice leafy areas where the Parents' Association buy them resources (S2).

There was a sense of excitement as to the impact iPads might have on planning and assessment and recording as well as on children's motivation and enthusiasm for learning.

I think it will make planning easier and quicker (S1).

Well I think it should be useful for classroom observations and monitoring and recording pupils' progress. But it would be great if it helped motivate our children, you know, encourage them with their reading and number work (S2).

Some teachers hoped iPads would be useful for the sourcing of educational materials.

We find it difficult to get the resource materials we need. So I'm hoping that it will be help me to research things like short stories or other materials for our children. If I could find the right stories for our age group, I could record them and the children would have eBooks (S4).

Other teachers expressed their expectations regarding how the devices might be used to support children with additional needs.

> *I am hoping it will help children with additional needs or children who are under achieving. By reinforcing their learning it could build confidence (S3).*

5.3.2 Staff training

In anticipation of the project, several schools bought iPads for their P1 and P2 teachers and invested in training for all members of staff.

> *The principal would like to roll this out across the school but we're going to trial it and then look at the strengths and weaknesses of using them across the different year groups and with high, medium and low ability pupils. We want to maximise their impact so the process started well before we got the good news that we were in the initiative (S3).*

There was, however, considerable variation in the training teachers received to support the implementation of the iPads. Whilst a few attended the initial teaching sessions with Nerve Belfast, organised by the Belfast Education and Library Board (BELB), most received their training from their ICT coordinator or from sessions with other external providers. The latter was considered to be "expensive" in terms of releasing staff, paying for staff cover and the cost of the training but the training provided was described as "excellent."

> *We didn't go to the BELB training. That was for ICT coordinators and then they were to come back and teach staff. XXX organised staff seminars on the iPads and it was fantastic. She went through every app and if we have any queries then we can go and ask her (P3).*

In terms of the benefits of attending the BELB training sessions, teachers explained that they provided an opportunity to learn about the range of apps available to support their teaching.

It (BELB training) just raised awareness of all the different apps out there, different tips and tricks with the use of the iPads. It was really beneficial to know a bit more how to use them (S2).

There were new apps that I had never really used before, so it was quite good to see them in action, and she explained them very well. I did feel more confident, I think, because I was able to go back to the classroom and use them with the children (S5).

Others would welcome more training sessions.

I suppose…I haven't been on any training yet but it would be good to get some. I know the ICT coordinator tries to feed back as much as she can and was given pages from the Cluster meetings and training events that we can use which has been great. That is how we found out about Book Creator (S1).

I would just love more training on how to use them better in the class. I would just love…Because when we were doing the initial training it was the principal from another school who came over to take a morning and he was amazing, the possibilities are endless. I would love to be able to do things like that but when your own skills are limited it is hard (S4).

Teachers would welcome further training on how digital technology might be used to greater effect in the classroom (S4)

Criticism tended to focus on the relevance of the material covered during the training sessions and the speed of delivery.

I thought it [BELB training] was a bit over my head, because they went on about cinema, making films, which wasn't appropriate to my age level. Plus, it was all new to me; I hadn't had the experience of using it in the classroom, so it really wasn't what I was looking for. I didn't find it that much help (S1).

The all-day one, to be honest, wasn't very useful for me, because it was very Key Stage 3 focused. If I were a Key Stage 3 teacher, it would have been perfect, but, for my class, none of that was really very relevant. About the afternoon one, I think it was useful… because it went over the general. Yes, it was, because we had to

download specific apps for that one, and they were useful for my age group (S2).

… (We) would have liked more focus on the literacy and maths apps and usage in the classroom (S5).

It was good, but to be honest with you, we felt that for P1 and P2 children it was a wee bit too difficult. The training wasn't so relevant. It's hard for external people like that to appreciate where our kids are coming from and the level that they're coming in at too (S3).

Sometimes I felt that it went a wee bit too quickly, just because of the time constraints and there were so many apps that they wanted to show us. I felt that it was going a bit too fast for me, but with the notes I was able to get it sorted (S5).

All of the schools involved in the initiative have continued to invest in iPad training.

Well, actually we are doing a lot of training on iPads at the minute. The whole school is. It's a whole-school initiative (S3).

A teacher in another school described how, as part of the extended schools cluster, schools share their expertise. Children in P5 at her school will visit a local grammar school with greater expertise in digital technology. The children are working on apps which will be demonstrated by older children who will help each of the children to build a story over several weeks. Teachers are also benefiting from this shared approach:

Our ICT coordinator makes time to visit other schools to learn as much as she can about the best way to use iPads and she brings that back to us. It's the dissemination of good practice and there are gains for everyone (S3).

5.3.3 Teachers' professional development and learning

By the second and third phases of the project, teachers appeared more confident.

> *I am much more confident than I was 18 months ago but that comes from observing the impact technology brings to classroom practice (S1).*

They also talked more positively about the impact training had had on their professional development.

> *We used them [iPad] on a limited basis but this year I hope to make greater use of them and to use them in a more structured way. I attended meetings in the summer term and really it was from seeing other people's practice, you could really see how you should be integrating it into your work and plans (S4).*

Teachers reported an increase in their confidence and competence as the project progressed (S4,S3).

> *There were new apps that I had never really used before, so it was quite good to see them in action, and the trainer explained them very well. I did feel more confident, I think, because I was able to go back to the classroom and use them with the children. It's been less than a year since I started using them and it really is making a difference to my teaching practice and I mean that in a good way. I feel that I am growing as a professional and as a person (S3).*

Despite their increased confidence, teachers are aware that they could use digital technology more efficiently and are keen to bring greater innovation into the classroom.

> *My challenge this year, for me, will be to use the Apple TV. We have bought that in, so I would like to use that, so I can tune into what they are doing in class so I can see on the screen, and they can see mine. That didn't get off the ground at all last year, to do with Wi-Fi and certain things. So that would be a concern. That you are using it as expertly as others are (S1).*

I think it has become more natural in a way because I know the apps a bit better. So it's just becoming a bit more confident and braver and trying new things. Maybe apps that I haven't used before and being a bit more creative and requiring the children to do a bit more. I know they are familiar with the iPads. I know I can have higher expectations from them (S2).

I have gotten to the stage where I wouldn't know what to do without the iPads! They are absolutely brilliant. I think that everything is moving forward to using technology so I think it is important that children are competent in using computers and tablets from a young age (S3).

I feel very confident but am currently using technology about 30% of the time. I want to increase that to 70% and to use it in more creative ways (S4).

Teachers are keen to extend and increase their use of digital technology (S4).

I joined the school last year. I came from a school which had two iPads to a class. So I was thrown in at the deep end, but very quickly got into the swing if it. Maybe because I'm not long qualified [as a teacher], I just find the whole ICT aspect of teaching essential. You do have to ask, how would you possibly teach without them? The challenge for me is how to use them more imaginatively (S4).

To maximise the use of digital technology, and to ensure continuity, one school is planning to take a whole school cross curricular approach:

For example in our Inset days this year there will be a whole day which the ICT coordinator will take where she will have KS1 in the morning and then KS2 in the afternoon. Sometimes what happens is the KS1 sit in on the KS2 input because they take children in the afternoon so it is beneficial for them to see the World Around Us apps that we are using or Literacy apps, as they are used to the KS1 apps. So they have found that beneficial (S4).

5.3.4. Planning, monitoring, recording and evaluating.

Teachers expressed the view that the iPad was beneficial for recording children's work.

> *I get the children to record their thoughts and it helps me to identify areas of strength and weakness. You simply wouldn't have that detail using pen and paper. I think my class has worked really hard with the My Story app and it'll be nice to showcase to their parents at the end of year reports and some of them have already looked and said, "My goodness, did they do that?" Because the pictures are quite detailed, they're taking their time and they're maybe writing a key word or recording their voice and you wouldn't be able to capture that and, you know, especially with the wee infants everything's such a buzz all the time and the evidence in their book isn't always lots. It's a good, quality piece of work, a bit of evidence (S1).*

In recording their thoughts, children's strengths and weaknesses become more apparent to their teachers (S1).

A similar view was shared by a teacher who uses the camera to monitor and assess children's progress.

> *It's really helpful to take photographs of the children while they are involved in various activities, and then I can look back at that later and see how well they understood things from another perspective. It has been really useful for me (S2).*

5.3.5. Leadership and management of use of the iPads

A few schools experienced technical difficulties during the initial implementation phase which slowed their progress and proved frustrating.

> *It's just been so slow. We have problems because of our position to the mountain. Getting Wi-Fi is the biggest problem. I took the iPads home with me to get apps uploaded and in the hope of getting started as soon as possible. But it's been really difficult. We have had the Board IT technician out. He's done his best to set up the initial infrastructure, but our problems are difficult to solve (S4).*

Our delay was to do with CK2. I don't know why but it left us no planning time and we weren't able to incorporate it into the school development plan. We're told it will be solved and then we'll just have to crack on but rather than being ahead we're already behind with our planning (S5).

By the final phase of the project early difficulties were frequently forgotten.

I'd forgotten about our teething problems. They are a great resource and worth the frustration we experienced at the start of the project (S1).

In all five schools, the issue of storage was important. Several schools had been broken into in the past. For that reason and for insurance purposes, the iPads were generally kept in a locked store cupboard with restricted access.

We've been broken into a number of times and we start by taking precautions. The iPads are stored in a locked cupboard with the key available from the IT coordinator (S4).

They all go in a stacking shelf, like a cupboard, and each one is on a tray. They all have a lead, which goes to the bottom of them, into their charger, but they are all in one big case, which gets plugged in. It's really good. It's like a big wide fridge. The problem is that they are quite fiddly. If you're rushing with twenty three to put them away, you really have to make sure they are all clicked shut (S5).

The security of handheld devices presents challenges for all schools, particularly schools in deprived areas with high crime rates (S4, S5).

5.3.6. Parental Involvement

Variation was noted in the amount of information offered to parents about iPad use in school.

We did inform them through a wee letter and through the newsletter (S5).

Another teacher posted an “app of the week” notice on the classroom door for parents. To build continuity between school and home, she encouraged parents to drop in and try out the app.

> *Our P1s and P2s are picked up at their classroom door, so this lets parents get a good flavour of what’s going on and they can ask about the apps and what’s happening in school (S5).*

Some explained that many of their parents see education as the business of the school and less to do with them.

> *For many of our parents we are just doing a job and they leave it to us. We would like them to be more involved and have several initiatives going on at the same time. Some attract parents’ interest and some don’t. We haven’t seen too much interest here (S1).*

5.4. Key Findings

The teachers in this study reported the following issues:

- The introduction of iPads has had a positive impact on the delivery of the Foundation Stage curriculum and the development of children’s literacy and numeracy skills.
- Contrary to initial expectations, the use of iPads in the classroom has enhanced children’s communication skills.
- Children’s fine motor skills are reinforced when they use a stylus to complete letters presented on screen.
- The use of iPads has had a positive impact on reading and writing, particularly with the creation of children’s own digital books.
- Numeracy skills can be developed in an engaging and exciting way using the iPads.
- Children’s understanding of complex numeracy concepts can be supported through the use of relevant apps on the iPad.
- A range of new skills are learnt using iPads such as recording, taking photographs, cropping, drag and drop and also web searches.

- There is potential for the iPad to support the learning of children who require additional support.
- Children view learning using iPads as play and are more highly motivated, enthused and engaged when tasks are presented on iPads than through more traditional approaches.
- The iPads offer an opportunity for children to develop their reflective skills as they record their thoughts when solving problems and writing sentences. These recordings offer teachers additional information about children's thinking and learning.
- Although initially nervous, teachers have developed their confidence and competence in using digital technology to support teaching and learning in the early years.
- More training on using iPads for learning and teaching in the classroom is required to enhance and develop existing knowledge.
- Overall, teachers were enthusiastic about the inclusion of iPads in the early years classroom.

Chapter 6

The Voice of the Child

6.1 Introduction

One of the unique features of this project is the involvement of children at several stages of the study. A group of six children (3 boys and 3 girls) from each of the primary 1, 2 and 3 classes in each of the five participating schools participated in focus group discussions. This approach offered an insight into children's thoughts on the use of iPads in school and sought to bring out the voice of the child. A second distinctive feature of the evaluation lay in the involvement of children in 'virtual tours' of iPads. Here, children displayed their proficiency by navigating the device, identifying, opening and demonstrating their favourite apps. They were also asked to pinpoint a literacy and numeracy app. Each focus group interview and virtual tour was audio-recorded, transcribed and subjected to thematic content analysis. For the purposes of anonymity and confidentiality, each school was allocated a numeric code from S1 through to S5 with direct quotations from children classified as primary 1, 2 and 3. Thus a primary 1 child in school 5 receives the identifier S5, P1. The same consideration was extended to the participating nursery schools with each randomly assigned a code from N1 through to N5.

6.2 Focus Groups

6.2.1 Access to iPads

Almost every child involved in the focus group discussions indicated that they had access to a touchscreen device at home with the majority having access to a tablet device. When it was not their own, it was shared with a sibling or a parent. By way of example:

> *I have a Kindle. Well it's my sister's Kindle and you can play stuff on it (S5, P1).*

This finding is consistent with a report by Ofcom (2014) into children's and parents' media use. Results from this large scale study show that there has been a significant increase in access to, ownership of and use of tablet devices by children of all ages. In contrast, the incidence of TVs and games consoles in the bedroom is declining, while smartphone ownership remains steady.

Likewise, each class used iPads at some point during the course of the school week, although the nature and extent of use varied within and between schools as indicated in the following exemplars.

> *Yeah we use them every day, in the afternoon (S5, P 2).*
>
> *We're doing it after, like we do our work, then we get our tablets out (S5, P1).*
>
> *We don't have them [tablets] every day. We get them when the teacher tells us (S1, P2).*
>
> *We don't use them every day but it's [tablet] used for sums and work. And sometimes on a Friday we can play on them in the afternoon (S2, P3).*
>
> *We use it like when we are writing sums (S1, P2).*

The nature and extend of iPad use varied within and between schools (S1, S5).

In the main, primary 1 pupils use iPads less often than their primary 2 and primary 3 counterparts. Primary 1 children were also more likely to report they used tablet devices for games, as opposed to children in primary 2 and primary 3, who reported using them more frequently as part of a literacy or numeracy lesson

In most classes iPads were used approximately three days a week but there was considerable variation, with a primary 3 teacher in one school making it available for short periods just once a week.

6.2.2 The Role of the Teacher

During the focus groups, the children were asked if they could use the iPad when they wanted or if the teacher decided when it was used.

Teachers tend to decide when and how often the iPads are used (S2, S3, S5).

The majority of children said that the teacher decided when it was used.

For example:

> *The teacher decides (S5, P1).*
>
> *You have to use it when your teacher tells you when to use it (S2, P1).*
>
> *Sometimes like, when at the end of school, if we've been nice and quiet and we might get the iPads out or we might get to play in the classroom (S3, P2).*
>
> *You can have them when the teacher tells you and she gives them out.*
>
> *You're not allowed to walk with them 'cause they might fall and smash (S3, P1).*
>
> *Well sometimes she [class teacher] lets us play games we want and sometimes we go on a game that she wants us to (S1, P2).*
>
> *No we don't. You have to ask the teacher and she says no and then you can't play with them (S2, P1).*

The latter point receives support from evidence that shows teachers are pivotal in determining when and how often technology is used in the classroom (Penuel, 2006). Given that many teachers were trained in traditional teaching pedagogy, the change to technology-led teaching can cause great uncertainty especially for teachers working with young children who may find that iPads have a serious impact on teaching and learning (Blackwell, 2014). According to Blackwell, teachers would benefit from increased training and structured support that not only demonstrates how to incorporate iPads into their curriculum more effectively but that works to shift their mind-sets to more child-centred philosophies in order to leverage the potential of tablet computers (Blackwell, 2014).

In all five primary schools, iPads were used in most classes as an incentive for good behaviour. At a time specified by the teacher, children were given additional time on an iPad and were able to choose the games they wished to play.

In some schools, iPads are used to reward good behaviour (S1, S3).

> *Yeah, at Golden Time I play with the iPad (S1, P2).*
>
> *In Golden Time we use it and we do work on the iPads as well. Sometimes we use it for play but we mostly use them for numeracy and making books (S1, P3).*
>
> *Sometimes like, when at the end of school, if we've been nice and quiet and we might get the iPads out or we might get to play in our classroom (S3, P2).*

Nalder, Timbole-Roles, Greer and Mercer (2013) caution against positioning technology as a reward for good behaviour. They argue that the inclusion of tablet devices in the learning process offers a powerful teaching tool with the capacity to motivate and challenge young children, expand their perception of the world and enhance their language and thinking.

Most classes had a strict policy of not letting pupils take the iPads out of the classroom, although there were exceptions to this (e.g. to keep a non-participating child occupied during PE, or to take photos in the school's sensory garden). Pupils were acutely aware of the reasons for this.

> *No. It will fall and break. The screen will crack (S1, P2).*

…like our rules for the iPads is you're not allowed food, you're not allowed drinks, and you're not allowed to walk about, you must hold it in two hands. You could drop it. That's why you hold it in two hands (S5, P1).

We use it on our desk. We're not allowed to take it out. It might get lost or the bigger ones might say, I want that iPad, and you'd be in trouble if they breaked it (S1, P2).

In case you smash it or in case you have a baby brother or a baby sister and they might take it off you and then drop it on the floor (S4, P1).

6.2.3 Individual and Shared Access

The number of iPads available in each classroom varied greatly. In one school children in each year group had access to an iPad, but were also encouraged to share an iPad in numeracy and literacy lessons. This approach encourages collaborative learning as children share in the co-construction of knowledge with one child modelling how to use the iPad and the other positioning himself or herself as a learner. The following exemplars highlight how peers can help and support each other's learning.

I was helping Mary because she didn't know how to make the words get smaller, so I was helping her (S5, P3).

Yeah it was stuck and I couldn't make it get smaller but she [Ma showed me and I can do it now (S5, P3).

Children help and learn from each other as they demonstrate their skills on tablet devices (S1. 2. 3. 4 & 5).

As Gray and MacBlain (2015) observe, children value the activities preferred by their peers. Peers in turn can role-model new concepts and skills using

the shared language of their childhood. Building on the notion of peer support, in one school all of the primary 1 children were paired with a primary 7 'buddy'. The buddy demonstrated how to navigate an iPad and how to open and close apps.

In contrast, the majority of children in other schools talked about the advantages and disadvantages of sharing an iPad. In the main, children preferred to share an iPad. Explanations for sharing elicited emotive words such as "*kind", "sad", "happy"* and *"fun".* By way of example:

> *Because it means you're being kind and what happens if no one wanted an iPad and all the other classes were using them? You would still have to share with the person (S3, P2).*

> *..If someone said, I don't want to share my iPad with you, they'd feel all sad and if another person came along with an iPad and hadn't a partner they would say, do you want to share with me? And that would make them happy again (S3, P2).*

Some children recognised the benefits of peer support.

> *Sometimes you have to share with a partner. It'll be a bit tricky using one iPad on your own (S5, P1).*

Others noted that sharing could be fun, particularly when they shared a preference for a game or educational app.

> *'Cause I like taking turns. 'Cause Stevie and me like the same games (S2, P1).*

> *I like to share because it's more fun and I like sharing (S2, P2).*

> *Because if someone is on my Mathletics we can go against each other. If we are sharing both of can take turns (S5, P3).*

The majority of children prefer to work with a partner rather than individually (S3, S5, S2).

Few children preferred to work alone. Those who did were concerned that sharing might cause conflict. For example:

Because if the other person wants to do something different and you don't. Then if you are just on your own you can do what you want to do (S1, P2).

I like doing it on my own. He'd put on another game that I don't want to play (S1, P2).

Pupils in one school claimed that they were discouraged from sharing.

You're not allowed to use it with a partner, so you're not. Your partner might not want to go where you want to go and they would use apps and you wouldn't want to do those apps and you would fall out (S4, P2).

Conversely another child claimed that they have to work in large groups.

'Cause we only have two iPads so we have to share them (S4, P2).

Findings from the classroom observations lend support to the latter's claim. In both classes (primary 1 and primary 2) pupils in the school were observed working together to solve problems and were also seen working in small groups to complete group activities.

6.2.4 Educational and Play-based Applications

All schools used their iPads for educational purposes. However, pupils in P2 and P3 were much more likely to use them as part of a lesson and there was evidence of a wider range of apps compared with that in P1. Games and apps mentioned included: Puppet Pals, Book Creator, CBeebies, Minecraft, Crayola DigiTools and Doodle Cast. Others talked about watching films on YouTube, taking photographs and making videos.

Colouring-in was mentioned frequently by P1 and P2 children in each focus group but rarely by older children in P3.

Colouring is good; I like colouring in (S5, P1).

…like the Halloween colouring one. It's good (S5, P1).

A primary 1 pupil also referred to drawing:

You draw yourself. You can hear you by putting your voice in the iPad and then you can see and hear your voice (S2, P1).

Other uses included games, photography (specifically involving the Book Creator app), making videos and watching videos (on YouTube) and these were used during class time in all year groups. Few pupils said that they used iPads for online searches and some seemed unaware that this was a function available on an iPad.

6.2.5 Literacy and Numeracy Apps

In contrast to the lively discussions around their favourite apps, children were much less expansive about the numeracy and literacy apps used in class. Those who offered examples tended to avoid questions about what the app might involve.

Mathletics was mentioned in several P2 focus groups.

I love to do Mathletics. It's all about Mathematics (S3, P2).

We have, I think, I'm not sure is it that Mathletics, that's a good app for sums and things (S1, P2).

Asked the type of things available in Mathletics, another child in the same group offered the following explanation:

Like a competition to…like…. If you want Mathletics and you typed in your code and then you can make yourself look like yourself on the computer. Then that will come up and you can race your friends (S3,P2).

Several identified:

Children easily distinguish numeracy games apps that are fun and can be used to compete against their peers (S3).

Math 3-4 and Math 4-5 (S5, P2).

A few P2 children also referred to the calculator app.

iPad calculators help you with hard sums (S3, P2).

Other apps associated with mathematics included: Bee-Bot, Connect 4, Book Creator, Jungle Coins and Moneyville. The latter two apps were described as useful for "*learning about money"* by a number of children.

Comments regarding mathematics apps included the following:

Mathematics Ninja, Number Fish and Jungle Coins are good apps (S5, P3).

Time, that game, What Time is it Mr Wolf? I like that one (S3, P2).

…you put the right number in and you put them in order, cause….then they get bigger (S3, P1).

Another observed that:

We don't do apps much with sums but we make books and things. But we don't use iPads when we do numbers (S4, P2).

By contrast with mathematics apps, there was greater discussion about literacy apps and how they might be used. Apps identified included Book Creator, BlobbleWrite, My Story, ABC Phonics, Splingo, Puppet Pals and CBeebies Playtime. From the conversations, it would appear that teachers adopt a range of engaging approaches to capture children's interest. For example:

…you see when we were doing our journey thing we were going on holiday and we had to pick what we needed for the holiday like do we need a book that might help us or do we need something else or do we need sunglasses. So we took pictures of them and we put them on our iPads and then we done a book (S5, P2).

..on Book Creator you take a picture and you colour it in to make a clown. Once I took a picture of myself and coloured it in like Batman to make a new book and I called it My Bat Book (S5, P2).

Mine was the farm and I got the pictures from the internet and copied them and then I made a farm book (S3, P2).

Others talked about the Wizard app.

The Wizard… finds you the word…like any word like is or it. In the Wizard game when the Wizard has to say one of these words and then when you get the right one on the right side there's a wee green man comes up (S2, P2).

Children across groups identified BlobbleWrite as their least favourite app.

It's too hard, you have to learn all of the words. That's hard (S1, P2).

According to Hutchinson, Beschorner and Schmidt-Crawford (2012), the learning potential of iPads is directly linked to the teacher's ability to creatively link them to the curriculum. Similar findings were reported by Flewitt et al. (2014) who explored iPad use in a range of settings including a Children's Centre nursery, a primary school Reception class and a Special School. They found that well planned lessons linked to iPads stimulated positive attitudes and behaviours in children where teachers were more able to understand the role of iPads in delivering aspects of the curriculum.

By way of contrast, the majority of younger children participating in focus group discussions were unable to link iPad use to any aspect of learning. Those who did respond offered incomplete answers. For example:

> *I know how…(S4, P1).*
>
> *Ok if you see a T…(S4, P1).*
>
> *Mathematics 6-7…(S5, P2).*
>
> *My Mathematics. My Mathematics, it helps you learn (S3, P2).*
>
> *Yeah, the iPad is quicker, cause you have to say in a minute…(S5, P2).*

Given that the school starting age is 4 years and 2 months, it was perhaps unsurprising that a few children in primary 1 had some difficulty in formulating an answer. Although questions were repeated several times to ensure clarity, one child gave a rather unusual answer to the question regarding learning and iPads:

> *I like curried rice for dinner (S2, P1).*

One or two children offered more rounded answers:

> *Because there's a game, like a big giant game. It's a game that learns you all like there's like there's a skoo button. Hit the skoo button and it tells you all like games that you can play and how you make stuff like….how you…like…(S2, P2).*
>
> *Because it will be good..it will be good playing if you have to do somethings and you haven't got the game you use YouTube and type it in (S5, P1).*

Primary 3 children were more likely to make associations between numeracy and literacy apps and learning.

Sometimes when I play the money game it helps me to learn about money and counting things (S3, P3).

A while ago, we were learning about spring so that helped with numeracy. We were doing our spring walk and were taking photos of dandelions and stuff. We put them on our backdrops. We would stand and someone else would take the photo. When it was their go we would take their photo and do a movie, so we were learning about lots of stuff (S1, P3).


6.2.6 Perceptions of iPad and Computer Use

The majority of children talked positively about iPads. For example, some said that touchscreen devices were better than computers because they had more games and were transportable as indicated in the exemplars below.

I like most about the iPad is that you can do work on it and you can play games on it (S2, P2).

A computer, you can't carry around but an iPad you can (S1, P2)

I really, really like using iPads 'cause there's phonic games and literacy and that helps us learn and I like playing the normal games too. When you draw….it [iPad] would teach you how to do it (S3, P2).

There's hundreds of games on it and that's really cool (S3, P2).

'Cause you can bring it with you (S4, P1).

I like the iPad because it has lots of interesting stuff on it (S1, P3).

Several children attributed their preference for iPads to physical features:

You don't have a mouse, that's good (S3, P2)

In all 5 schools, the majority of children have greater access to and familiarity with mobile technology than with desktop

I like the bit of cover that's all black (S5, P1).

I like the wee buttons (S5, P1).

Children's greater experience with iPads and lack of experience with computers is captured in the following exemplar:

Because you can go on to like games [using an iPad] and you can download them while on a computer you can't (S1, P2).

iPads have YouTube and you can't look things up on a computer. It doesn't have YouTube (S2, P2).

You get stuff to play and can watch stuff and computers don't have that stuff (S2, P2).

The finding that the majority of children prefer to use iPads and to use them for a range of purposes receives support from Kucirkova (2014). Consistent with the present study, Kucirkova employed qualitative and quantitative methods to explore children's interactions with iPads and concluded that children's exploratory approach to iPad use was indicative of effective classroom discourse.

A few children were, however, unequivocal in their dislike of iPads.

I hate it, I just hate it when you have to do stuff and while you're waiting to do all the fun stuff, I just hate it. When you open that flap…I hear the noise and it does my head in. Every day (S3, P2).

It hurts my eyes (S4, P1).

It's really, really boring (S5, P2).

In contrast to the majority of children who preferred iPads, a few children expressed a preference for computers.

I don't like it [iPad] when you have to flick your finger down and it gives you blisters. And if you do that it hurts your fingers (S3, P2).

You don't have to write on it [computer] (S4, P2).

And you don't even have to move it [computer] anywhere you go (S4, P1).

'Cause the wee arrow [mouse] that can move, you can move the wee arrow (S2, P1).

6.3 Focus Group Key Findings

This section offers a synthesis of the findings from the focus group interviews.

- Apart from one child, all of the children participating in the focus groups have access (either individual or shared) to a tablet device at home.
- Children's access to iPads varied within and between schools. As previously outlined, the number of iPads issued per school depended on class numbers (see Chapters 1 and 3).
- In all of the schools, iPads were used at the discretion of the class teacher and this often involved collaborative use.
- Whilst a few children identified the potential for conflict from sharing devices, the majority of children expressed a preference for collaborative use, claiming that it was 'more fun' or that it was 'kind' to share.
- Differences were noted in the frequency of use of iPads within and between schools with primary 1 children tending to use iPads less frequently than children in primary 2 and primary 3.
- Differences were also noted in the nature of usage within and between schools with children in primary 2 and primary 3 more likely to report the use the iPads as part of a literacy or numeracy lesson. Whilst children in primary 1 were more likely to refer to playing games on the devices, some caution is warranted in the interpretation of these findings. It was noted that younger children described literacy activities (such as letter recognition and writing) and numeracy activities (such as matching and ordering) as games.
- Older children in the sample demonstrated a greater appreciation of the educational benefits of using tablet devices.
- Most of the children observed that iPads are often used as a reward for good behaviour.
- Children showed great awareness of the care required when using an iPad.

- Whilst a few children noted that they prefer to use computers, the majority of children expressed a preference for using iPads and spoke very positively about its physical features and potential to do 'lots of interesting stuff'. Again, some caution is warranted in the interpretation of these findings as there is evidence to suggest that some children are not fully aware of the potential to access the internet, videos and games on a computer.

6.4 Virtual Tours

As indicated in the introduction to this chapter, a unique feature of this evaluation was the involvement of children at several stages of the research. Having determined children's views and experiences of iPads at home and in the classroom through focus group discussions, the next stage involved individual virtual tours of an iPad. Each tour was recorded, transcribed and analysed using the thematic approach. To protect the children's anonymity, pseudonyms are used throughout this section. Results are reported at the aggregate level by school with exemplars from discussions included.

All of the children displayed confidence and competence with touchscreen technology. At home they had regular access to a range of touchscreen devices and used them on a regular basis. Safety measures were rarely mentioned. Only one child described the limits his parents set on his use of tablet devices. Holloway, Green and Livingstone (2013) note that parents assume tablet devices are safer than PC and laptop computers. For that reason they relax the boundaries they would typically place on internet use. According to Holloway et al. (2013), offering children access to a wide range of touchscreen devices may compromise their safety. Keeping children safe requires a collaborative approach which engages parents, educators and policy makers in the development of clear guidelines that will enhance public awareness and assist parents in the effective mediation of their young children's internet use.

One child (S2, P1) preferred his own tablet device because *"it has more games*." Despite being amongst the younger children involved in this study, he would like greater access to touchscreen devices in school:

> *The teacher gives it out and some days she forgets. It would be better if you were allowed to get it yourself (S4, P2).*

Frustration with the limited number of apps available in school was of concern to a number of children. For example one pupil said:

> *There's lots of games you can play. Like Princess Dress Up. It's good for matching colours and things. The free app gives you two people to dress up and then you buy the rest. We could have that at school and it would help the wee ones or we could have My Haunted House. My brother got that for his birthday and I can play too. School has work apps and they're rubbish (S5, P3).*

Whilst another proffered a potential solution:

> *I think children who play more apps at home, should have more apps in school. Older ones should have different apps to smaller ones but we get the same and it can be boring (S4, P3).*

Children also understood that games include differing levels of difficulty and talked about starting with the "easy" levels before progressing to the "very hard." They understood that the player could make choices and that some apps were beyond their ability level. By way of example:

> *See that's easy but babies can play that. I'm bigger so I can do harder levels and my sister can do top levels. When I'm bigger I can play harder levels (S3, P1).*

The lack of internet availability was identified by several children.

> *You have to have the internet, if you're not connected then you can't get YouTube and you can't get other stuff, you need to be connected (S2, P2).*

One child said that she enjoyed using Crayola DigiTools Paint but disliked the High Frequency Words app (a phonics-based app) because she finds typing hard.

Another child who said she liked "everything" about iPads was particularly enthused about the benefits of virtual shopping.

> *When you get to the shop you get groceries. You need money so you can buy groceries and then you take them home. You can get your*

groceries through the computer and then they bring it out to the house (S1, P1).

There was only one child who mentioned that his home use was monitored by his mother.

Mummy doesn't like if it's [iPad] not in the living room where she can see. She likes me to tell her about the things I'm doing and sometimes she plays games too (S3, P2).

One child particularly liked the superhero apps he has at home and explained that:

There's nothing I don't like on iPads, well I don't like the Hairy Letters because they don't look nice. I don't like that they don't look nice (S2, P1).

Although he liked the Book Creator app and the Maths 3-5 app, he found it difficult to explain what they can do and concluded that:

I'm good with iPads and apps and things and sometimes it doesn't matter if you don't know lots of things about them. It's important that you know how to use them and can do things on them, that's better than knowing lots of things and not being able to do things (S5, P2).

Worthy of mention was the child whose voice was barely audible at the start of his virtual tour. He shyly identified the apps he most and least liked. As he progressed, and with the encouragement of the researcher, he became more enthused and excited as he navigated the apps. The speech stoppage noted at the start of the tour had disappeared by the end of the discussion. He said he found it easy to use the iPad but was *"no good at games apps, especially the snakes and ladders apps."* At the end of the interview he played snakes and ladders with the researcher. He was delighted when he won and said he would try it again *(S4, P2).*

Of equal merit, children who do not have English as their first language showed similar levels of interest, enthusiasm and competence with iPads as their peers whose first language was English.

6.5 Virtual Tours Key Findings

- All of the children (from primary 1 to primary 3) involved in the virtual tours have regular access to a range of touchscreen devices at home and demonstrated confidence and competence in using touchscreen technology.
- All of the virtual tour participants enjoyed using iPads and would like greater access to them within school.
- They easily navigated the iPad and talked enthusiastically about their favourite apps.
- Children identified differences between the apps used on home devices and those used within school.
- Some children expressed frustration with the limited range of apps available within school.
- Children recognise that many apps offer differing levels of challenge and that they can choose which level suits best.

6.6 Classroom Observations

Phase 3 of the research study involved qualitative classroom-based structured observations carried out across all three year groups. The principal aim of this phase was to assess how iPads were being used to support teaching and learning in literacy and numeracy. Each observation was carried out by an experienced researcher, over the period of one morning per setting. The observations sought to examine the following areas (see Appendix E):

- How the iPads were used by teachers and pupils in the classroom.
- Amount of use and the level of access pupils had to the tablet devices.
- Classroom management of the iPads.
- Pupil to pupil interaction and teacher to pupil interaction when using the iPads.
- Specific apps used during both literacy and numeracy.
- Pupil engagement with and enjoyment of the iPads.

The classroom observations for primary 1 and primary 2 pupils took place at the end of the 2013/14 school year and observations for primary 3 were carried out at the end

of the 2014/15 school year. The observation form was altered slightly between the 2013/14 and 2014/15 testing points to allow the inclusion of more open (as opposed to closed) responses by the researchers, but the focus remained unchanged.

To protect the identity of the school, class teacher and pupils, findings were collated and presented at aggregate level. Numeracy and literacy examples for each year group from primary 1 to 3 are included to highlight good practice.

Digital technology – including interactive whiteboards (IWBs), Apple TV, YouTube clips and iPads – was used within all of the observed lessons with some teachers using the technology for short periods of approximately 5-10 minutes and others employing it throughout the lesson. In the main, children appeared to enjoy these lessons and were keen to work with others and were willing to ask questions of their peers and their teachers.

In some classes, several children adopted their own strategies when they encountered difficulties. For example, a primary 2 child completing simple addition and matching problems presented on the Maths 3-5 app was noted dropping a level when he became frustrated that he couldn't find the right answer. The teacher was working with another group at the time. Asked how she kept track of children's performance, the teacher explained that she roved around the class watching for potential problems. She accepted that children might move to a higher or lower difficulty level than the one set but believed that this is a strength of the system as children are not in competition but able to work at their own ability level. There were other cases of children choosing levels at random. Rather than demonstrate progression they operated on a trial and error basis, as shown in the example below. This approach served to discourage several children who abandoned the task to chat to a friend.

The fact that the children's iPads do not automatically transfer information to the teacher's tablet also means that children's progress is not systematically recorded or reviewed.

6.6.1 Numeracy Observations

Sample Numeracy Lesson in Primary 1

Adults present: class teacher, classroom assistant and a student on placement

Table 6.1 Overview of a Primary 1 Numeracy Lesson

<table>
<tr><td colspan="3">Primary 1 Numeracy Lesson on Position, Movement and Direction</td></tr>
<tr><td>Learning intentions</td><td colspan="2">Use language associated with direction
Count steps needed to reach a certain destination
Become more confident using the iPad and Bee-Bot
Talk and listen to each other</td></tr>
<tr><td>Introduction</td><td colspan="2">Children practised counting forwards and backwards along with a ‘Counting pigs’ song (YouTube).
Teacher accessed the song on her iPad and used Apple TV.</td></tr>
<tr><td rowspan="4">Main part</td><td colspan="2">The teacher reminded pupils how to use the Bee-Bot app and then introduced each of the following 3 activities.
Pupils rotated around each activity. An ‘interval lap’ app was set for 10 min. and used to manage the three activities.</td></tr>
<tr><td>Using Bee-Bots on the ‘busy street’ mat</td><td>Pupils gave the Bee-Bot instructions to move from one shop to another.</td></tr>
<tr><td>Bee-Bot app (individual iPad activity)</td><td>Pupils gave the Bee-Bot instructions to move around the garden and reach the flower. This involves counting the number of steps required (Levels 1 & 2), progressing on to giving instructions involving turning (from Level 3). The Bee-Bot app related to the current primary 1 topic: ‘Garden’.</td></tr>
<tr><td>Human Bee-Bot activity (group activity with iPad)</td><td>One child acted as the Bee-Bot; the others give instructions to move around the large mat. Another child used the iPad to make a video.</td></tr>
<tr><td>Plenary</td><td colspan="2">The children shared what they had been doing in their groups. The lesson finished with children watching videos of the ‘human Bee-Bot’ activity.</td></tr>
</table>

Teacher Use

The teacher used her iPad and Apple TV to play the 'Counting Pigs' song in the lesson introduction and she used an interval lap app – set at 10min – to help manage the three activities which followed. She also demonstrated how to use the Bee-Bot app – how to access the app, how to start playing (beginning at Level 1) and what the various commands mean (clear memory, forwards, backwards, etc.).

Bee-Bot App Activity

The Bee-Bot app was used to reinforce counting steps forwards/backwards and turning left/right. The teacher worked with individual pupils, asking questions, providing support, etc.

There was little pupil-pupil talk, except when pupils encountered difficulty. The initial levels were quite easy to complete. One child, when the Bee-Bot did what she wanted it to, was heard saying, *"It's working!"* Once children got to Level 3 which involved turning, they experienced more problems, especially with orientation. Typical comments included: "*This isn't working", "It's going wrong", "Will you help me?"* In most cases, another child simply said which command to press. For one child who asked for help, his peer reached over and typed in the correct commands to make the Bee-Bot move. When he progressed on to the next level he encountered the same problem again and had to ask for help. One child was observed selecting Level 11! This was clearly too challenging and he was observed typing commands at random, hoping to make the Bee-Bot move towards the flower. He seemed to get frustrated with this 'trial and error' approach. He said, *"That's really hard"* and then pressed the Home button and selected a different level. When the teacher noticed this, she reminded the children to start at Level 1 and not to leave any levels out. Two children with EAL were communicating with one another in Portuguese.

Human Bee-Bot Activity with iPad Video App

A student was working with pupils at this activity. One child acted as the human Bee-Bot and another child was asked to video the movement with the iPad. Some children were observed holding the iPad and scanning around the room.

The student tried to encourage the other children to give instructions but struggled to keep them on task. Most of the talk involved the student asking questions: *"Where do you want to go?", "How many steps do you need to take?"* etc.

In summary, there was a high level of enjoyment in the introductory Counting Pigs song. Pupils were engaged; they were singing along and making finger patterns for various numbers from 1-10. Pupils enjoyed the Bee-Bot activity when they were successful. Initially there was a lot of enthusiasm and engagement but children began to lose interest when they experienced difficulty. Pupils appeared to get discouraged and even frustrated when the Bee-Bot didn't do what they wanted it to. Some children were selecting levels at random and using 'trial and error' to make the Bee-Bot move rather than thinking about the correct commands to use. Pupils appeared to enjoy using the video app during the human Bee-Bot activity. However, it did seem to detract from the mathematics. Pupils appeared to be engaged with the app but not the mathematics and were less interested in giving one another instructions to move.

Sample Numeracy Lesson in Primary 2

Adults present: class teacher and a classroom assistant

Table 6.2. Overview of a Primary 2 Numeracy Lesson

<table>
<tr><td colspan="3">Primary 2 Numeracy Lesson</td></tr>
<tr><td>Learning intentions</td><td colspan="2">Explore the number story of 9; use the addition sign in the sum and record findings (Yellow group)
Sequence the numbers correctly (Red group)
Complete subtraction number stories using counters/number line (Green group)</td></tr>
<tr><td>Introduction</td><td colspan="2">Whole class counting forwards and backwards within 20</td></tr>
<tr><td rowspan="4">Main part</td><td colspan="2">Recap on recording number sentences for the story of 8 on the IWB using the interactive ‘ladybirds on leaves’ resource
Pupils organised into 4 groups:</td></tr>
<tr><td>Red group
Individual iPad activity:</td><td>Caterpillar ordering and sequencing app (http://www.topmarks.co.uk/ordering-and-sequencing/caterpillar-ordering)
Pupils could select from a range of options within the app</td></tr>
<tr><td>Blue group
The classroom assistant withdrew this group to another room</td><td>Worksheet activity. The classroom assistant used an iPad to take photographs of the children’s work.</td></tr>
<tr><td>Green group
Worksheet activity</td><td>Pupils used counters/number line to complete subtraction calculations</td></tr>
<tr><td></td><td>Yellow group
Story of 9 (teacher directed activity with iPads)</td><td>Children used counters to build up addition facts for the story of 9. They worked systematically on a laminated sheet and recorded each combination. They used the camera app to take a photograph of their work and then formed a collage of the various photographs using the PicCollage app.</td></tr>
<tr><td>Plenary</td><td colspan="2">Children in the Yellow group shared what they had been learning. The teacher used Apple TV to support the discussion.</td></tr>
</table>

Caterpillar Ordering and Sequencing App Activity

Children initially worked in silence. After a short time, they started to talk to one another. Most of their comments related to how easy or difficult they were finding the games. Typical comments included:

> *These are hard.*
>
> *All this game's hard.*
>
> *This is easy. Go on this one.*
>
> *When you've done this, it gets harder.*

One child who was working at a higher level said, *"Look what I've done."* Some children were keen to compare progress. For example, one child said, *"We're on the same level."* One child walked to the teacher to ask, *"What does this say?"* but was reminded not to walk around the room with the iPad.

Some of the children were engaged for most of their activity but others found it hard to sustain concentration. Two children in particular were working quietly and independently, ordering higher numbers. However, not all children were as engaged. One child appeared to be daydreaming on several occasions. Another child was heard saying, *"Mine keeps freezing."* Some children were observed 'jumping around' from one game to another. Children did appear to get discouraged when they answered incorrectly. In many such cases, this was due to selecting an inappropriate level. It was interesting to note that children seemed more engaged when the teacher was present.

Pic Collage App Activity

There were 8 children, each with an iPad, a laminated sheet and counters. The teacher explained, *"We have already practised the number story of 8. Today we are looking at the number story of 9 and we are using the iPad to record. We are going to do the number story. Take photos. Then create something to keep."* Each child was instructed to count out 9 counters on a baseboard and record: 9 + 0 = 9. Then they were asked to turn the iPad the same way as the page (portrait) and take a photo. The teacher then told the children to move one counter over and repeat for 8 + 1 = 9. They did this several times. The teacher then reminded the children how to use Pic Collage to make

a collage of their photos. As they continued, she pointed out that some of their photos did not show the whole arrangement of counters and encouraged them to ensure that they photographed all of their work.

Plenary

The plenary session offered an opportunity for pupils in the Yellow group to share what they had been doing with the whole class. The teacher used Apple TV to display one child's work.

One child explained, *"We had to use counters. And we had to get a number story. And we wrote what number story we were doing."*

The teacher asked, *"Can anyone see what number story we were doing?"*

The teacher asked a series of questions, encouraging children to explain how they had created their PicCollage:

> *How did you get your mat from the carpet onto the iPad?*
>
> *How did you get all your pictures on to this image? What app did you use?*
>
> *What did you do? What button did you have to push to get your photos?*
>
> *Which button did you find your photos in?*

The teacher then introduced children to the button at the bottom of the screen and explained that they could explore this next time:

> *This button at the bottom gives lots of exciting backgrounds. You can give it lovely polka dots and stars. You can put your name on the bottom.*

Sample Numeracy Lesson in Primary 3

The lesson was conducted in Irish with children working in groups of eight. The children had their own iPads and used them throughout the lesson. The observed lesson built on work conducted in previous lessons. The primary aim of the lesson was to introduce children to a range of different shapes.

The children had been taking pictures over the last few weeks of various objects (2D and 3D shapes). They had also searched the internet for less familiar shapes. Photographs had been collated and stored on their iPads. Using Book Creator they

were working on developing their own personal stories. They could include their photographs and either type captions or use the voice over facility to include their description.

The children remained engaged and appeared enthusiastic throughout the lesson. No difference was noted in the level of interest displayed by boys and girls. The atmosphere was relaxed and children moved about the classroom taking their iPad with them as they looked at the work of others, commented on it and showed off their efforts. There was considerable discussion between pupils and between pupils and the teacher. The teacher offered lots of praise and wandered around the room asking children about the properties of each shape. She asked them to identify common objects of a similar shape. Children asked the teacher for help when needed and appeared comfortable in asking their peers for help.

6.6.2 Literacy Observations

Similar to the numeracy lessons, children worked on aspects of literacy from between 15 minutes and 1 hour depending on year group.

Table 6.3 Example of a Primary 1 Literacy Lesson

Primary 1 Literacy Lesson	
Learning intentions:	Children will: Recognise parts of a book, using language such as author, illustrator, and photography. Use the iPad and language associated with the iPad. Create a simple sentence in a variety of ways including magnetic letters.
Introduction (The children sat on the mat around the teacher)	There was shared reading and discussion around a nonfiction big book about spring. They looked at the structure of a sentence and did a drag and drop activity using the IWB to make a sentence about spring. They looked at a previous iBook which they had created and recapped how they had used photographs and sentences together in this book. Rules were revised about using iPads.
Main part	Children worked in three groups. The blue group: Used the Colour Pencil app to write sentences with their finger which they then inserted into their iBook. The green group: Used magnetic letters on the whiteboard to make sentences and they took photographs of these with the iPad and inserted them into their iBook with captions. The red table: Sorted words into legible sentences, photographed them using their iPad and inserted these photos into their iBook. Notes: All of the groups had free choice of the colour and pattern of the background in their iBook.
Plenary	The teacher used Apple TV to show some of the children's work and asked the children to tell the others what they had written and how they had done it.

Working independently, the children showed their familiarity inserting sentences they had created in other apps into the Book Creator app. They also demonstrated their skills in using the camera and in inserting photographs into the book and positioning them where they wanted them. They were observed cropping photographs for inclusion in their books.

They created sentences *"I see a flower."* They took a picture of the sentence and saved it to camera roll.

In camera roll they selected a flower, edited the image and included a title for the picture.

Through questioning and observation, the teacher observes children's responses to the instruction given when using the iPad and apps. The children appear engaged throughout the task, they ask the teacher questions and share and discuss their work with their peers.

Table 6.4 Example of a Primary 2 Literacy Lesson

Primary 2 Literacy Lesson	
Learning intentions:	To develop children's accuracy and fluency in literacy though the use of digital devices. To develop children's confidence in using digital devices to present their ideas. To enter text and insert images or sound into Book Creator To present the work to the class with support from the teacher. Children will use the iPad to take pictures and make an interactive story book about their favourite pet using Book Creator.
Introduction	The teacher shows her own iBook created about her pet rabbit. She demonstrates features of the book e.g. a sound button to press to hear a sound. An arrow to press to operate a video.
Main part	The children worked independently on their iPad to insert pictures, text and sounds into their own book using the Book Creator app. They were encouraged to take photographs of soft toys and insert these into their book. They did writing in other apps such as Colour Pencil and also used the pen tool in Book Creator. They enjoyed adding sound. This included reading the sentences and adding animal sounds.
Plenary	The teacher used Apple TV to show some of the children's iBooks and asked them questions about their pets.

A range of digital technology was employed including an interactive whiteboard (IWB), Apple TV, iPad, Book Creator app, toy pets and pet accessories apps.

The task was teacher led with children responding appropriately to her directions. They opened their iPads and selected the camera to take photographs of their favourite pets using toy pets. The children then used Book Creator and created a title page using their picture from the camera roll. They then chose the pen or text tool to enter a title for the book. They were instructed to open a new page and identify a list of pet needs using text or pen tools. Differentiation occurred when the teacher and classroom assistant supported children in completing aspects of the task. The final stage of the lesson involved presenting their ideas to the class for comment.

The children appeared to be engaged with the task but there was very little discussion between the children or between the children and teacher as they completed the task.

Table 6.5 Example of a Primary 3 Literacy Lesson

Primary 3 Literacy Lesson	
Learning intentions:	The children will: Create a story book using Book Creator Add text and photographs of their choice
Introduction	The teacher recapped on the work already done in the class as part of their fairy tales topic. The class discussed different fairy tales and talked about their favourites and there were a range of hard copy books
Main part	The children had already planned out their writing on their favourite fairy tale on a paper writing frame considering the beginning, middle and end of their favourite story. They had also already created a cover page for their story in Book Creator with text and a picture. They were going to create the next page which would use the ideas on their planner about the beginning of their story. They used the pen and text tool to write their sentences and they could also add drawings. Small groups went into the corridor with the classroom assistant to record their sentences as sound files which were added into their page.
Plenary	The teacher planned to use Apple TV to show the children's work to the class and to discuss their ideas for their stories. However, on the day of the observation Apple TV was not working properly.

All of the children were working independently on their own iPad. Most children were very competent in using the iPad but if they needed technical support with using an app they asked other children at their desk and the children were very keen to help each other. There was ongoing discussion amongst the children whilst they were working:

Stand up and you can get a better picture.

Change your writing. Look at mine.

I like purple. (Referring to their choice of colour for their writing)

There were very positive attitudes to writing in the higher ability group with children coming up with lots of ideas and writing independently. The teacher and classroom assistant were supporting the other two groups in the class with their sentences but the children were working purposefully in these groups also.

It was interesting to watch the children moving between the hard copies of fairy tales which were on their desks and their iBooks. They were interested in both and were using both at the same time.

The children were all very interested in the task and were engaged in writing their sentences, choosing backgrounds for their pages and arranging their text and pictures in a format which pleased them.

6. 7 Classroom Observations Key Findings

- The iPads were used in a variety of ways by both teachers and pupils.
- In all of the observed lessons, iPad usage was mainly teacher directed.
- Children were observed working with iPads individually, in pairs and in small groups.
- Children were frequently reminded about the protocol for iPad use. For the most part, they used the iPads while seated at their desks. However, in a number of lessons children were observed carrying the devices, for example, as they moved around the classroom to make a video.
- There was evidence of a range of levels of competency and creativity in the use of iPads by teachers and pupils both across schools and within schools.
- Teacher use of iPads included using presentations and media to review learning or to introduce new skills and concepts, demonstrating particular apps, accessing information and in some cases taking photographs of children's learning
- For the most part, pupil usage included the use of specific apps to reinforce skills and concepts within literacy and numeracy lessons. In addition, there were many examples of pupils using iPads to create presentations and media.
- Open-ended apps such as Book Creator encouraged pupil choice within a range of literacy and numeracy based activities.
- In many lessons, particularly where pupils were sharing iPads, there was a high level of discussion.
- In many of the lessons, teachers took account of the differing levels of ability and adapted the task, the choice of app or level accordingly.

- The majority of pupils did appear to be engaged when using iPads. However, there were some instances when pupils were observed to lose interest, become discouraged and even frustrated, particularly with regard to skills-based apps. This was especially the case when the level chosen was not appropriate.

Chapter 7

Parental Perceptions

7.1 Introduction

This chapter reports the results of the parental questionnaire survey undertaken in Phase 3 of the iPad evaluation. Findings were subjected to descriptive (mean and standard deviation [sd]) and, where appropriate, inferential analysis using Pearson's Chi-square test of association and Analysis of Variance (ANOVA). Reported at aggregate level, the data was interrogated using a range of variables including gender, year (P 1, 2 and 3), home use and school use.

7.2 Survey Results

Despite repeated efforts on the part of the research team to increase the number of parental surveys returned, the response rate remained low. In total, 110 (a response rate of 27%, see chapter 3 for distribution details) questionnaires across the three year groups from the five participating schools were returned. For reporting purposes percentages are rounded to the nearest whole number with the term parent encompassing carers

7.2.1 Respondent Profile

Of the responses received, 91% (n=100) were from the child's mother, 6% (n=7) were completed by the father, and 3% (n=3) were returned by another relative (either an aunt or grandparent). A higher percentage of responses were made by the parents/carers of girls (53%, n=58) than boys (44%, n=49) with a small number failing to complete this demographic section (3%, n=3). Statistical analysis revealed that gender was not a significant factor on "*access to"* or "*use of"* tablet devices at home.

7.2.2 The School iPad Initiative

The majority (79%, n=87) of parents believe they were sufficiently informed about the iPad initiative. Of that group, 51% (n=44) said they were "*very aware,"* or had "*some*

awareness" (49%, n=43) of the project. Similarly, the majority (86%, n=95) of parents were either "*very satisfied"* (44%, n=49) or "*satisfied"* (42%, n=46) with the information they received from school about the initiative.

In terms of gender: a marginal but significant main effect (F (1, 106) = 4.119, p = .045, η = .038) was found between gender and parental awareness of the iPad initiative in school. More specifically, parents/carers of girls had greater awareness of the iPad initiative (mean = 1.62, sd = .875) than those of boys (mean = 1.96, sd = .841). Worthy of note, gender was not significantly related to any other variable.

7.2.3 Year Group

Asked for details about their child's year group, 27% (n=30) of the responses were from parents/carers of children in primary 1, 36% (n=39) from primary 2 and 37% (n=41) from primary 3. Chi-squared analysis showed a significant association between access to a games console and school year (χ^2 = 7.897, df = 2, p = .019, N = 110) with primary 1 pupils having less access to a games console than primary 2 or 3 children. Conversely, there was no association between school year and frequency of console use. No further year group differences were found in the data analysis.

7.2.4 Games Consoles

Although the use of consoles was not the focus of this investigation, they were mentioned very frequently by survey respondents. For that reason they were factored into the analysis to determine if there were any differences by gender, age, access and/or frequency of use. A Chi-squared test of association showed a significant association between gender and games console access (χ^2 = 4.185, df = 1, p = .041, n = 107), with boys having greater access to a console than girls. Likewise, when subject to analysis of variance (ANOVA), a between-group main effect was obtained between gender and frequency of use (F (1, 106) = 16.800, p < .001, n = .138).

These findings suggest that the boys in this study have significantly greater access to and use of games consoles (mean = 3.31, sd = 1.770) than girls (mean = 1.97, sd = 1.611). Similar findings were reported by Cillero and Jago (2011) and Kesten et al.

(2015), who note that boys are more likely to own, use and/or have access to a games console and smartphone than girls. Age was not a significant factor.


7.2.5 Siblings & digital technology at home

Statements regarding the number and age of family members attending the same school revealed that more than two-thirds (67%, n=74) have only one child at the participating school. Of those with siblings (33%, n=36) at the same school, more than two thirds (69%, n=25) have one other child, 28% (n=10) have two (2%) and one parent (3%) has three siblings. In terms of gender, 50% (n=18) have a brother, 25% (n=9) a sister and 19% (n=7) have both a brother and sister at the same school; 6% (n=2) failed to respond.

The section asking if siblings were older or younger than the one involved in the iPad initiative was completed by all 110 respondents. The results show that 75% (n=83) have older, 14% (n=15) have younger and 11% (n=12) have both older and younger siblings. Further analysis using ANOVA revealed that having siblings at the same school has no significant impact on children's use of hand held devices, other than games consoles.

In brief, there was a significant main effect between having a sibling at school and the reported frequency of game console use ($F(1, 109) = 8.433$, $p = .004$, $\eta = .072$). Further, children with siblings at school spend a greater amount of time on game consoles (mean = 3.28, sd = 1.907) than those without siblings (mean = 2.26, sd = 1.639).

Interestingly, children without a sibling at the same school, possibly because they are the youngest or oldest in the family, use a literacy app significantly more often ($\chi^2 = 4.785$, $df = 1$, $p = .029$), than those with a sibling. This finding lends some support for

research by Damian & Roberts (2015) who noted that a higher proportion of literacy apps aimed at encouraging a child's familiarity with letters and to support their emergent reading ability were bought for the first child or only child in the family.

7.2.6 Access to and Home Ownership of Digital Devices

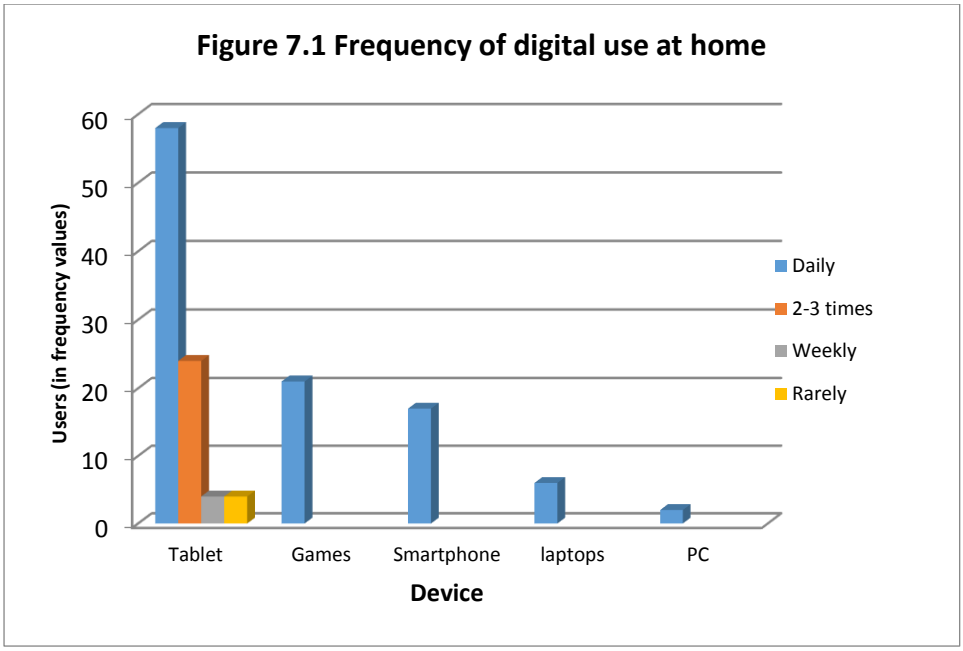
A high proportion of children (92%, n=101) were described as having access to a range of digital technology at home, including: an iPad (44%, n=44) or another [7]brand tablet device (56%, n=57), a games console (52%, n=57), a smartphone (49%, n=50), a laptop computer (40%, n=43) and a desktop PC (14%, n=15). A small number failed to complete this section of the survey (8%, n=9).

Whereas a small proportion of children (6%, n=7) have access to five or more devices at home, almost equal numbers have access to 1 to 2 (44%, n=47) or 3 to 4 devices (45%, n=50). Fewer children (5%, n=6) were reported as having no access to handheld devices at home.

In terms of ownership, almost a third either own (32%, n=35) or share (32%, n=35) a device with a further 23% (n=25) both owning and sharing a device: 13% (n=15) failed to respond. In terms of branding, children without a sibling at school are significantly more likely to own an iPad than those with siblings who tend to share access to another [7]brand device (χ^2 = 5.601, df = 1, p = .018). Support for this finding comes from research by Levy (2013), who concluded that families with two or more children find iPads expensive and source cheaper alternatives often from supermarkets or online.

Statistical analysis revealed significant differences between smartphone ownership, access and use. Specifically, a child who owns or shares a smartphone will use it significantly more often than those who do not own a phone (χ^2= 19.258, df = 1, p < .001). Similarly, a significant main effect was found between smartphone usage and whether or not a child owns or shares a device (F (1, 94) = 6.996, p = .010, η = .070). Contrary to expectation, children who own a smartphone use it less often (mean = 1.89, sd = 1.605) than peers who share a phone with a sibling (mean = 2.83, sd = 1.729).

[7] Another refers to supermarket own brands; SONY, SAMSUNG etc.



Further analysis of the results by *frequency of use* and *brand type* shows that brand has no significant impact on the frequency of use of a tablet device. As seen in Figure 7.1, the majority of children use a tablet device (iPad or another brand) every day at home (52%, n=58), with smaller numbers using them 2 to 3 times a week (22%, n=24), once a week (3%, n=4) or rarely (3%, n=4). Only one child (1%) never uses a tablet device at home and 19% (n=19) failed to complete this section.

Daily use was also reported for game consoles (36%, n=21), smartphones (29%, n=17), laptops (10%, n=6) and, lastly, desktop PCs (3%, n=2). Figure 7.1 depicts the frequency of children's use of tablet devices at home (Apple, or another brand).

Questions regarding gender and age differences in the use of handheld devices at home yielded a poor response. Less than half (44%, n=48) failed to complete this section. Half of the 56% (n=62) who did respond believe that boys use apps more often than girls, whereas the other half reported no gender differences in app usage (50%, n=31, respectively). A higher proportion (71%, n=64) left blank the section about age differences in app use. Of the 42% (n=46) who responded, more than half (56%, n=26) believe that age has no impact on digital use; others were unsure (44%, n=20).

Few survey respondents (6%, n=7) named their child's favourite apps. Those who completed this section tended to use generic terms such as "*games"* or *"learning*

apps". Others mentioned YouTube, CBeebies, Minecraft and Netflix. Given the low response rate to these questions, further analysis was not considered appropriate.

A higher proportion (84%, n= 93) provided information on the educational content of their child's favourite apps. Whereas more than two thirds (69%, n=74) believe that their child's apps involve some elements of numeracy, 18% (n=19) do not. Asked about the numeracy tasks included in these apps, a few annotated this section by explaining that Cbeebies, Mathletics and Subway Surfers support their child's learning through counting, number and measurement.

A similarly high proportion (84%, n= 93) of responses were made to the question concerning the elements of literacy included in their child's apps. The majority (77%, n=72) believe that Cbeebies and talking and listening apps support their child's literacy development. Conversely, 23% (n=21) said the apps they use have no literacy or educational component.

Marsh et al. (2015) caution parents to be vigilant about the apps their children use. They are particularly concerned about apps which may contain advertisements and pop-ups for in-app purchase. They advise parents to look for apps produced by broadcasters or companies with expertise in early years education.

7.2.7 Advantages of Using Portable Tablet Devices in School

This section was open-ended and asked parents to list the main advantages and disadvantages of iPads in the classroom. Of the 65% (n=72) who completed this section, more than half believe that iPads support early learning (58%, n=42) with a further 42% (n=30) noting that it also gives children access to a greater variety of learning resources and experience with technology. A parent took this opportunity to annotate this section with the following comment: "*children need greater experience of technology, it's essential for employment in the world today".* A few (12%, n=8) believe that iPads make learning fun, whereas a smaller number (3%, n=2) claim it improves hand to eye coordination. Noteworthy was the finding that slightly more than a third (34%, n=38) failed to complete this section. Marsh et al. (2013) attribute such findings to the fact that many parents believe their child knows more about tablet devices than they do. Based on findings from an extensive review of tablet use in early years classrooms, Marsh et al. concluded that a number of parents are unfamiliar with

the benefits of modern technology in the early years classroom and feel ill-equipped to comment.

7.2.8 Disadvantages of Portable Tablet Devices in School

Consistent with the previous section, the majority of respondents (70.9%, n=78) failed to identify any disadvantages. Of the 22 who did respond, almost half (n=10) believe that frequent use of iPads may cause a child to become lazy, distracted, overly dependent on technology or to lose contact with and awareness of the world around them. Five believe that iPads impair children's handwriting while a further five expressed concerns about security and internet safety issues. The remaining two were worried that iPads might reduce children's interest in creative and physical activities, cause coordination or eyesight difficulties, hinder independent learning or create problems for those children who do not have access to iPads at home. Support for this latter point comes from a recent study conducted by Marsh et al. (2015), who claim that children from disadvantaged backgrounds may be further disadvantaged by their lack of access and ownership of tablet and other handheld devices. The lack of access to home devices is not necessarily a disadvantage. According to Chung and Walsh (2006), children, with no access to a home tablet or computer, working on collaborative tasks presented on computer or tablet, are more engaged and their interactions with others positively impacts their ability to stay on task.

7.3 Key Findings

Some respondents failed to complete several sections of the questionnaire and so caution is warranted in the interpretation of findings.

- The majority (72%, n=87) of parents believe that they were sufficiently informed about the iPad initiative. Similarly, parents (86%, n=95) described themselves as either "*very satisfied"* (44%, n=49) or "*satisfied"* (42%, n=46) with the information they received from their child's school about the initiative. Girls' parents appeared more knowledgeable and satisfied with the information they received from school than those of boys.
- A high proportion of children (92%, n=101) have access to a range of digital technology at home, including: an iPad (44%, n=44) or another brand tablet device (56%, n=57), a games console (52%, n=57), a smartphone (49%, n=50), a laptop computer (40%, n=43) and a desktop PC (14%, n=15).

- In terms of frequency of use, the majority of children use a tablet device (iPad or another brand) every day at home (52%, n=58), with smaller numbers using them 2 to 3 times a week (22%, n=24), once a week (3%, n=4) or rarely (3%, n=4). Only one child (1%) never uses a tablet device at home and 19% (n=19) failed to complete this section
- Few respondents were able to identify the names of the child's favourite apps and used generic terms such as *'games'* or *'learning.'* There also appeared to be some confusion over play based apps and search engines e.g. Youtube.
- Just over a third (34%, n=37) of respondents failed to complete the section about the educational benefits of iPads in school. For those who did respond, the most commonly noted benefits included making learning easier, exposure to a wider range of learning resources and greater experience with technology. A smaller proportion (7%, n=8) mentioned making learning fun.
- Nearly three-quarters (71%, n=78) of respondents omitted identifying any disadvantages. Those who did respond noted a range of concerns including the impact on the children's attitudes to work, concentration, and awareness of the world around them.
- Five respondents annotated their surveys with concerns about security and internet safety. One parent noted that, *"I look at all the apps. You just wouldn't know what might be coming into your home. I think we need to be vigilant."*

Chapter 8

The Nursery Experience

8.1 Introduction

Whilst a range of technical devices such as computers and interactive whiteboards, amongst others, are available in early years settings, Formby (2014) reports that they are rarely integrated into pedagogic planning. She attributes this to a lack of confidence on the part of some practitioners and to the belief that this might harm rather than enhance the child's early learning experience. This project explored these issues with principals from five nursery schools in the greater Belfast area involved in the iPad initiative. For the purpose of anonymity each school was allocated a code from N1 through to N5. Identifiers are not included for specialist schools to further protect their identity.

8.1.1 Exploring the Primary Objectives

Mirroring the format adopted in Chapter 5, to synthesise and interrogate the data and to faithfully represent the voice of the nursery principals involved in the project, this chapter is presented in two sections. Section 1 reports findings that directly address the primary objectives of the project. There is a particular focus on the impact digital technology has on the development of children's literacy and numeracy skills, their confidence and motivation to learn and how the technology might contribute to raising the achievement levels of children living in areas of endemic deprivation.

8.1.2 Exploring the Secondary Objectives

The second half of the chapter reflects nursery teachers' perceptions of the initiative as it progressed from the implementation stage to a 'bedding down' stage. The secondary objectives of the project are explored here with the focus on teaching and learning; most especially, the impact on the delivery of the curriculum and pedagogy will be considered.

Exemplars from interviews are used throughout this chapter to ensure that the voice of the teacher is given prominence.

8.2 Primary Objectives

8.2.1. Impact on the learning experience

In the main, principals believe that the introduction of iPads has had a positive impact on children's learning experiences. Hand held devices were thought to make the presentation of activities fun and exciting, and to provide a more interactive experience than paper and pencil activities. It was also thought that children engaged for longer periods of time when activities were presented on an iPad.

> *We bought jigsaw apps and children who wouldn't normally be interested in the likes of a jigsaw played with them for ages. We personalised them by including a photograph of each child and made them into jigsaws which they can play as four, eight or even a hundred piece jigsaws (N4).*
>
> *They [iPads] offer another way to play and learn.*
>
> *The children enjoy the fact that there is an instant response if they get something right and you can hear them laugh as they pop the celebration bubbles; they are constantly learning (N3).*

…there is an instant response if they get something right and you can hear them laugh as they pop the celebration bubbles; they are constantly learning (N3).

Overall iPads were thought to have a positive impact on children's motivation and engagement. The iPad was described as an "*excellent motivating factor"* in children's early learning experience.

Prior to the implementation of the device, one principal was concerned that they might be over-used by some children, particularly by boys. However, her initial

concerns were not realised. Quite the contrary, young children simply accept handheld devices as another classroom resource.

> *My initial concern was, once we got the iPads in the classroom, I had visions of certain children, perhaps boys in particular, spending all day on the iPad, and that was a big concern. We were wondering how we were going to be able to manage that, so that everybody got a turn. But it hasn't been like that at all, it's just another activity in classroom. There are children who do prefer activities on the iPad, but not to the degree that they just want to use it, and nothing else (N4).*

Tablet devices may positively impact children's social, communication and literacy skills through collaborative group work (N2, N4).

8.2.2. Impact on Language Development

As indicated in Chapter 5, prior to their introduction into early years classrooms there was a sense amongst the teachers in the study that iPads might have an adverse impact on children's communication and social skills. This concern receives some support from a study reported in Paediatrics by Radesky, Schumacher and Zuckerman (2015). They argue that skills learned through social interaction with the environment, peers and adults, such as empathy, problem solving, turn taking, self-regulation and sharing, may be undermined when preschool children engage in singular activities presented on an iPad.

Conversely, evidence from interview discussions suggests that iPads have had a positive impact on children's social, communication and literacy skills. Talking and listening were thought to have improved. Nursery principals attributed the increase in children's social and communication skills to the fact that they encourage children

to work collaboratively on activities presented on an iPad. Tasks with an educational element such as sequencing were perceived as play by many children.

> *They talk to each other and if some of them can't yet work out how to complete an activity on the iPad; we hear them helping each other. They list the rules and what you do and what you don't do, it helps both the learner and the teacher as they develop a better understanding of the activity (N1).*

The creation of eBooks was popular in several nursery schools.

> *We use books related to our topics, and also create books with their photographs. It's been very useful and we've made lots and lots of books ourselves. We also use talking books as well. I read the book on the iPad, and the children can listen to it (N4).*

In contrast to other nursery schools, some find it difficult to source apps for younger children to reinforce the word sounds.

As part of children's experimenting with writing and interest in letters, some principals mentioned several apps [Blobblewrite and Little Writer] which may be useful in supporting children's emerging interest in writing.

Whilst teachers recognise the benefits the devices afford in terms of providing instant feedback, there is concern that this may prove detrimental in the longer term (N1-N5)

8.2.3. Impact on the development of early mathematical experiences

One principal believes that the inclusion of iPads has proven beneficial for numeracy.

Using apps such as Maths 3-5 to teach basic maths skills has increased pupils' self-confidence and self-esteem. It shapes behaviour by using sounds to indicate a wrong answer and applauds effort when the children get it right. Children don't feel overly criticised, or dwell on mistakes, rather they are able to quickly self-correct their mistake(N1).

In contrast, another principal thought that responses such as *"applause"* and *"good job"* led children to expect *"instant gratification*" for their efforts (N4). She believes this may prove detrimental in the longer term and prefers to engage children by using a variety of "*age appropriate classroom resources, other than iPads."* (N4)

Other nursery principals believe that numeracy apps are colourful and engaging and help to reinforce and consolidate children's emerging numeracy skills, such as matching, counting, identifying shapes, memory games and puzzles.

It's excellent for numeracy. I must say that's what we've been focusing on. Because it's colour, number, shape, we're doing symmetry, opposites, sorting and matching. It's really covering really a wide range (N5).

Young children appear confident and proficient in their use of the iPad (N5)

Another noted the additional skills that children were developing with minimal adult support.

I watch children as young as three drag and drop as though it's a skill they have always had. A few years ago I wouldn't have believed children their age could work so confidently. Even

accessing the apps is no problem for them and they appear more ready to take a chance. That's a skill in itself (N5).

8.2.4. Impact on other areas of the curriculum

All nursery staff are using iPads across curricular areas. The following exemplar captures the innovative way handheld devices can be used in science-based learning activities.

I felt apart from the benefits of literacy and numeracy we were able to use them in a wide cross-curricular way. For example, when it snowed we put snow into the water tray and videoed and photographed the children watching the ice melting (N2).

Research is another way iPads are being used to support and extend children's understanding of the World Around Us.

We were doing penguins and we were able to call up about Emperor Penguins and jumping in and out of the water. We can call up little clips for them, which is great because we don't always get out (N5).

8.2.5. Gender differences

Gender differences in iPad use was not a particular issue in nursery schools. Only one nursery principal with a large number of boys thought that it might cause problems as some children find sharing difficult but reported, on reflection, that this was not the case.

But it hasn't been like that at all. I have pleasantly surprised that it has been in the corner, on its table, and it is just another activity in classroom. There are children who do prefer activities on the iPad, but not to the degree that they just want to use it, and nothing else. I was really expecting two or three boys who would want to use it all the time, and yet they didn't (N4).

Another principal felt that the use of mobile technology had captured the interest of boys. She believes that they stay on task for longer when using the iPads.

8.2.6. Additional needs

Differentiation was not discussed in great detail but it was recognised that use of the iPads helped support a range of educational needs.

It fits in with the overall school development plan this year very well, because we have a lot of children with different needs, and the iPad is good for helping them achieve at their own pace. So, within that context, it really does suit individual needs (N2).

…we have a lot of children with different needs, and the iPad is good for helping them achieve at their own pace (N2)

The use of iPads was thought to facilitate communication between more and less able children which helped them collaborate on activities. It was also thought that iPads could be used to tailor the child's learning, thus meeting individual needs. As a principal observed:

We have a lot of children this year with autistic tendencies, so it's brilliant for those children in particular, especially if they can work together at the iPad, taking turns, sharing and having to relate to each other (N3).

It was also thought that tablets offer an excellent tool for recording children's progress.

> *For the teachers it was an excellent way of recording evidence. In particular for children with Special Needs where we only have a small window where we get the Educational Psychologist out for the child to actually demonstrate or display the symptoms we see every day. So I was able, especially last year, to do a lot of videoing and photographing, and that backed up what we were saying. It was very useful in that way (N5).*

Another principal pointed out the advantages that mobile technology offers practitioners working with newcomer children.

> *We have used Google Translator and that's proved really useful. I think that we will use it as a really good additional resource, which we would look at carefully and tailor it to suit the individual child's needs (N3).*

8.3 Secondary objectives

8.3.1 Teachers' expectations and concerns during the implementation phase

There was considerable variation in staff experience with technology and none had used tablets to inform their teaching ahead of the project. Consequently, a few were nervous about integrating iPads into their teaching. Whilst some showed greater confidence towards the end of the project, one principal thought that members of her staff were still resistant to using iPads as a teaching aid.

Before the project I had never used an iPad. I didn't own one, so this was a learning curve and I was nervous (N3).

…some staff were very reticent, and still are. Their biggest concern is the fear of technology, something like: "I don't want to touch it, I'm too scared of breaking it", and that type of thing (N5).

I suppose over time I got used to them. We don't use them every day but apps are colourful and interactive so they can be used to present work in a different way. They have their place like other resources in the nursery (N1).

The latter principal talked about using iPads in more creative ways. She said that there was a need for staff members with *"vision to realise the more creative"* aspect of iPads. She attributed the perceived limitations of the device to staff attitudes.

It has to do with the teacher's expertise and interest (N1)

I really believe that it has to do with the teacher's expertise and interest. The devices aren't difficult to use but if you don't have some curiosity about how to extend their use then you reach a ceiling and never progress (N1).

Staff in another school accepted that teachers who are inexperienced with technology may be apprehensive.

I think if you haven't been using them then it might put people off. But we found that we were all enthusiastic and we are still! (N5)

There was also a sense that staff confidence would increase if more training was available to inform staff about other practical ways to employ the devices to inform their teaching.

> *For someone really to come out to the school, and train all the staff together. We can all use an iPad, but it is using the iPad for this particular aspect of classroom work. It would make staff a bit more confident in the use of the technology, the appropriateness of various types of programmes, and what their uses can be (N3).*

8.3.2 Staff training

Training was recognised as an important factor in the implementation of portable tablet devices.

> *We had to adapt our plans. It has taken over, to be honest. Because we have never had iPads, we knew nothing about them. I thought that we had to get it right 100% of the time, because we have been very fortunate to get this, so we felt obliged to give it as much as we could, and use it in the best way possible. So, I had to initiate staff training; we had to get people in to train staff. We invested money on staff training and on programmes as well (N4).*

For one principal, the training provided by the BELB was described as being both informative and supportive.

> *They were very useful; brilliant information, and a lot of it. When I came home after the Friday session, I was able to practise with the photographs that I took on my holiday in Spain, and put them all*

together, and inserted music into the background. So, I got a lot out of that, and thought it was great (N2).

In contrast, two principals thought that the training was unsuitable for staff working with preschool children in nursery.

To be honest, the training was not very helpful. It was more for older children, I think. I also think too much time was spent on apps that we weren't going to use. It was more about "illustration' apps". I really didn't it find very helpful (N3).

Making the stories and making different films and movies were things that are too advanced for our children and might be more suited to P4 or 5 …it wasn't something that we would have time to use (N5).

Others would have welcomed an opportunity to send all staff to the training sessions and would like in-house training tailored to the needs of nursery staff.

I think that maybe another full-day of training, because when you are doing a couple of different apps, they take up so much time. So maybe another day, even in the school for all the staff, because it is only me going and I'm cascading it to the staff. I think that, if there was a day for all the staff to go and have a quick run-through that would be very helpful (N1).

The most useful thing would be for someone to come out to the school, and to train all the staff together. We can all use an iPad, but it is using the iPad for this particular aspect of classroom work. It would make staff a wee bit more confident in the use of the

technology, the appropriateness of various types of programmes, and what their uses can be (N3).

Another pointed out that the late delivery of the iPads and late notice of training sessions meant that they couldn't release staff in time to attend and develop their skills.

We would have embraced it, if we had had more notice of training days, and perhaps a little more time to release staff. This is a busy school, and we had to hit the ground running. Perhaps because it came in so late last year, we didn't have an awful lot of time to look into our own training needs in great detail. We will certainly be building it into the curriculum next year (N3).

Mention was made of the clusters organised by the boards which were said to be "poorly attended."

Well, the Board has organised a few clusters, of just nursery schools involved in the project. It's been helpful, but the last time I went to one of the meetings, there were just two other people, so it was quite disappointing (N2).

Nevertheless, the same principal talked about the benefits of the collaboration that has developed over the last 18 months between the feeder primary and her nursery school, and more widely between her nursery and others involved in the iPad project.

Our school is working with another school and staff from nursery through to P7 get a chance to meet and share good practice …the

opportunity to speak to other people, and network helps us avoid pitfalls and we share the pros and cons of apps and programmes (N2).

In summary, some principals enjoyed the initial training offered through the Board, whereas others felt that it did not directly address the needs of the nursery sector. All five would welcome either in-house bespoke training or external training made available to all staff. Whilst the majority said their confidence had increased, staff in nurseries show differing levels of enthusiasm for the inclusion of iPads in the early years classroom.

8.3.3 Professional Development and Teaching

There was a growing acknowledgement that tablets were more convenient and accessible than desktop computers. In particular, the teachers felt that iPads had had a positive impact on monitoring and recording children's progress.

It is at hand and easy to access in the classroom and we use ours to record children's observations. It's faster and more efficient than transferring than the old system (N5).

Monitoring and recording of children's progress is faster and more efficient when using tablet devices (N4, N5)

One of the main benefits for staff is definitely the photographs. Prior to using the iPads, we would have taken photographs with our camera, and they we would have to print them out individually, put them up on boards, and take them down to give them to parents. We can also make them into a book to record the child's work. So, they are time-saving (N4).

There was also a sense that the project had encouraged staff to work closely together to make the best use of the devices.

> *We really developed a good team spirit, because we ended up working very close together as a staff. It just brought us all together and made us all learn together (N2).*

8.3.4. Leadership, Management and Planning

Several principals indicated that they felt pressure to integrate the devices into their planning documents and development plans before they were ready.

> *We had to adapt our plans. Because we have never had iPads, we knew nothing about them. I thought we were very fortunate to get them and felt obliged to rush into using them at every opportunity. This wasn't the best approach, rather than yield to pressure to show how they are used to link to every area of the curriculum it would have been better to reflect on our needs first (N4).*

Another was frustrated at the lack of progress they made in the early stages of the project, which she attributed to technical difficulties. She said this stopped any attempt at reviewing the development plan.

> *It was difficult to get someone out to explain the problem. This went on for weeks and I was ringing most days. In the end we simply had to accept that we would never make the same progress as other nursery schools. We had no plans in place and simply stopped and got on with our everyday business (N2).*

Similarly frustrated, another talked in terms of failing to meet targets.

I understand that they [BELB ICT support] have been very busy with schools in need of their support, but I thought that the system would be up and running by now. It frustrates all of us when we have to wait for a response. Then it's a matter of thinking if this was in my monthly planner, I would have already failed to meet my targets due to fact that the system is down (N1).

Interestingly, one principal believes that some of the technical difficulties reported by staff were due to their own lack of familiarity with iPads rather than with the devices themselves.

It's good to know that there's somebody there that we can call upon, because sometimes it's just a matter of staff misunderstanding or assuming an app or facility on the devices isn't working when it's simply human error (N3).

8.3.5. Planning for appropriate apps

Although nursery schools did not initially receive information regarding age appropriate educational apps, they were made available within the first few weeks of the project. In the early stages staff were keen to identify apps that would have an educational component rather than simply offer games. Several thought that too much time was wasted by staff on finding apps that would suit the needs of their children. For example:

Again, that has to do with the planning ahead of the implementation phase of the project. More thought should have been given to helping schools identify apps at the start of the project so that we

had a resource which we could have extended. Instead hours were wasted trying to find something suitable (N4).

…with regard to individual apps, and what's available for children, it would be nice if there was a bit of guidance, or perhaps something like a written booklet of appropriate apps, what they're for, and the benefits of them (N3).

Irish Medium Apps

The specific circumstances of the Irish Medium nursery school affected their management of apps, in particular Irish language applications. Initially it was found that many of the apps could be used creatively with Irish even though they were technically in English.

…there are apps and the video or pictures can be used with a voiceover in Irish. We can also use photographs to create story books, and then I can put some text into it. It's more time consuming for us but we'll build a wee library of apps as we go along.

8.3.6. Parental Involvement

Parents were informed about the iPad project through the newsletter sent home each month to update parents on activities in the nursery school. There appeared to be little general discussion with parents about how or when they might be used. There was, however, interest in the apps the children were using and several parents offered suggestions about the educational apps they have on their home devices.

Practitioners assumed that the *"the vast majority"* of children in their setting have their own or have access to a device. This notion receives support from an Ofcom (2014)

report that provides statistical evidence indicating that as many as 1 in 3 children in the UK own their own tablet device, with 1 in10 children aged 3-4 years also owning a device. The report also notes a sharp increase in the proportion of very young children who surf the web, play games and watch videos on a handheld device before school.

Further support for the contention that children own or have access to a device comes from practitioners' observations of children starting nursery school with ICT and touchscreen specific skills. As one principal noted:

> *…nearly every one of the children would talk about having this game or that app. Some tell us that they "have that game on my iPad" but it might be another brand (N2).*

Another principal recalled being surprised at the extent of children's familiarity with tablet devices when the initiative was first introduced into the school.

> *When we first introduced iPads into the classroom, I was amazed at how many of our children knew how to use them and were already expert in using some of the apps (N4).*

There was some concern regarding home usage. Whilst there was a general acknowledgement that home and school usage would be different, it was hoped that parents would encourage their children to use educational apps. A few of the concerns expressed by school principals are presented below.

> *At home, they use it for games like Angry Birds, whereas in here, we hope it is going to be used to promote it much more as a learning resource (N3).*

And I honestly hope that their mums don't let them use it when they want. We want to impress on parents the need to use them properly and to make links between home and school use. (N4)

You have to emphasise to the parents that in school children aren't sitting playing games. It is an educational resource and there is an expected learning outcome (N5).

Several principals were concerned, however, that the devices would be used as a *"baby sitter"* and children allowed to spend long periods of time on a device so that mum can have *"quiet time."*

8.4 Key Findings

- The introduction of iPads has had a positive impact on the delivery of the Pre-School Curriculum and the development of children's emergent literacy and numeracy skills.
- The use of iPads is thought to have enhanced children's communication and social skills.
- Numeracy apps help to reinforce and consolidate children's emerging numeracy skills. Although they offer instant feedback on children's learning, there is some concern that this may prove detrimental in the longer term.
- Children bring a range of digital skills into the nursery. They are familiar with a range of apps, can confidently navigate an iPad and are familiar with the camera and recording facilities on the device.
- There was considerable variation in staff confidence and enthusiasm for the inclusion of iPads into nursery classrooms.

- The use of iPads have significantly reduced the amount of time staff spend on monitoring and recording children's progress.

Participating Schools

The research team extend their sincere thanks to each of the participating schools. To ensure the anonymity of the participants, each primary and nursery school was allocated a random code (S1-5 and N1-5 respectively). To preserve anonymity further, the schools listed below are organised alphabetically.

Primary schools	**Nursery Schools/Classes**
Black Mountain Primary School	Black Mountain Nursery Unit
Donegal Road Primary School	Arellian Nursery School
Elmgrove Primary School	Ravenscroft Nursery School
Gaelscoil na Mona	Gaelscoil na Mona Nursery Unit
Holy Trinity Primary School	St Martin's Nursery School

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Glossary of Terms

Application/App

A piece of software that you can download to a device such as a smartphone or tablet, for example to look up information or to play a game.

Apple TV

An Apple TV is a digital media adapter (DMA) developed and marketed by Apple. It is a network device that connects to a high-definition television (HDTV) or enhanced-definition television (EDTV). The Apple TV supports the streaming of various media derived from YouTube, iTunes Store, etc. It also streams iTunes data from computers using Windows or Mac OS X to their TV. Media can be streamed through a wired or wireless network.

Bee-Bot

A programmable floor robot with a simple and child friendly layout. For teaching control, directional language and programming to young children. A Bee-Bot app which 'makes use of the Bee-Bot® keypad functionality and enables children to improve their skills in directional language and programming through sequences of forwards, backwards, left and right 90 degree turns' is also available.

C2Kni

The C2k project provides the infrastructure and services to support the enhanced use of ICT in schools in Northern Ireland.

Collaborative Learning

Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product.

Classroom Assistant (CA)

A classroom assistant, also referred to as a teaching assistant or educational assistant, in schools is a person who supports a teacher in the classroom. Duties can differ dramatically from school to school, though the underlying tasks often remain the same.

Cropping

The removal of the outer parts of an image to improve framing, accentuate subject matter or change aspect ratio. Depending on the application, this may be performed on a physical photograph, artwork or film footage, or achieved digitally using image editing software. The term is common to the film, broadcasting, photographic, graphic design and printing industries.

Differentiation

Differentiation is defined by the UK Training and Development Agency for Schools as ‘the process by which differences between learners are accommodated so that all students in a group have the best possible chance of learning’.

Drag and Drop

In computer graphical user interfaces, drag and drop is a pointing device gesture in which the user selects a virtual object by "grabbing" it and dragging it to a different location or onto another virtual object.

Early Childhood

The periods before compulsory schooling; in Northern Ireland the early childhood period extended from birth to 4 years and 2 months.

Foundation Stage

Primary 1 and 2

‘Golden Time’

A behaviour management technique which rewards positive behaviour by letting children have some time to do something of their own choice.

ICT Co-ordinator

The Information and Communications Technology Coordinator

Interactive Whiteboard (IWB)

An interactive whiteboard (IWB) is a large interactive display that connects to a computer. A projector projects the computer's desktop onto the board's surface where users control the computer using a pen, finger, stylus, or other device. The board is typically mounted to a wall or floor stand.

Pedagogy

Can be conceived of as a holistic, interactive process where one individual contributes to the learning and development in another.

Tablet Device

A small computer that is easy to carry, with a large touch screen and sometimes without a physical keyboard.

Appendices

Appendix A (i): Principal/ICT Co-ordinator Interview Questions

Initial Interviews

School Principal/ICT Co-ordinator

1. Why did you get involved in the iPad project?
2. How does this fit in with the overall school development plan?
3. Were staff willing to get involved?
4. What do you hope will be the main benefits?
    - For teachers
    - For children
    - For the school
5. When were the iPads delivered to school?
6. How are they being implemented in school? (classes, number per class)
7. Did you feel you had enough time for planning their implementation? (technical set-up etc.)
8. What technical support is available?
    - Within school
    - From BELB
9. What training has been provided? When?
    - From BELB
    - Within school
    - Between schools
    - Other

10. Is there any time provided to release staff for professional learning/development related to this project?
11. What information, if any, was provided to parents concerning the introduction of iPads?

Appendix A (ii): Teaching Staff

Background

School

Position

Year group

How did you feel about getting involved in this project?

Prior experience

What different forms of technology do you use on a regular basis?

- Mobile phone
- PC
- Tablet devices (kindle)
- IWB
- Other

How would you rate your competence with technology? (very good – quite good – good – weak)

Before involvement in this project, had you ever used an iPad for personal use? Yes / No Please explain …

Before involvement in this project, had you ever used an iPad in your teaching? Yes / No Please explain …

Current experience

In which of the following curriculum areas are you currently using the iPads:

- All curriculum areas
- Language and literacy
- Mathematics and Numeracy
- Other (including The World Around Us, The Arts, PDM, PDMU, RE)

In what ways are you currently using the iPad (personally)?

- Emails
- Internet searches

- Calendar
- Camera
- Listening to podcasts, watching videos
- Apps
- Games
- Facetime
- Other

How are you currently using the iPad to support your actual teaching?

- Demonstration of skills
- Multi-media presentations
- Note-taking
- Observation / assessment of children
- Other (mind-mapping, notes…)

In what ways have children been using the iPads?

- Educational apps
- Games
- Camera
- Listening to/ creating podcasts
- Reading/ creating e-books
- Watching /creating movies
- Internet searches
- Other

What specific apps have children been using?

Management and organisation

How many iPads are available for you to use with your class?

What access do children have to the iPads?

- When (all day, part of day, every day of week …)
- How (individual, pair, group)

Do they stay in your classroom or are they shared with other classes?

Benefits and challenges

What do you consider to be the main benefits for teaching?

What do you consider to be the main benefits for pupil learning?

What are the main benefits for developing children's literacy skills?

What are the main benefits for developing children's numeracy skills?

Do you have any concerns about using the iPads?

What challenges, if any, have you encountered so far? (technical, time, etc.)

How have these been addressed?

Training and support

Which of the following BELB training sessions have you attended?

- Monday 23 September at Studio On (2.30pm-4.30pm)
- Friday 8 November at Studio On (all day)

How helpful did you find these training sessions in addressing your needs?

(very good – quite good – good – weak)

Have you attended any other training courses?

What access do you have to technical support within school?

What are your immediate training/support needs?

Finally

What impact do you think this technology will have on your classroom practice?

What impact do you think it will have on the learning environment?

Follow-up Interviews

School Principal Final Interview (June 2015)

How have they been implemented in school? (classes, number per class)

Did your school encounter any problems throughout this project? (Introduction and ongoing use of iPads in school?

If so, were they resolved to your satisfaction?

What technical support was available throughout the project?

- Within school
- From BELB

What training has been provided? When? Who initiated the training?

- From BELB
- Within school
- Between schools
- Other

Was there any time provided to release staff for professional learning/development related to this project?

Reflecting on your experiences with the iPad project, what have been the greatest benefits:

- For teachers
- For children
- For the school

In terms of pedagogy, what impact do iPads have on early numeracy teaching and learning?

Has the school invested in specific numeracy apps?

In terms of pedagogy, what impact do iPads have on early literacy teaching and learning?

Has the school invested in specific literacy apps?

Has the school invested in any additional apps? (more generic apps)

Have teachers been using iPads to assess/monitor pupil progress in literacy and/or numeracy?

Have teacher attitudes to iPads changed over time? How?

Do teachers report any change in children's motivation due to the inclusion of iPads in teaching sessions?

If yes which areas of the curriculum are most/least affected?

In terms of children's social skills, do teachers report any changes which they attribute to iPad use?

e.g. in children's ability to interact with teachers or their peers?

Based on your own observations, which areas of teaching and learning gain most from the use of iPads?

Would you recommend iPads to other schools? Why?

What advice would you offer a teacher who is about to introduce iPads in his/her classroom?

Has your school invested in other handheld devices?

If yes, how do they complement iPad use?

Have you changed the school development plan to accommodate iPads?

Have parents been informed or involved in any way? When? How?

If yes, have you received any feedback?

Lastly if you could feedback directly to the BELB what would you tell them about investment in handheld devices?

Appendix B: Teacher Focus Group

Background

School:

iPads supporting teaching

1. How confident do you feel about using the iPad to support your teaching?
2. In what ways have you been using he iPad to support your teaching in:

- Literacy
- Numeracy

3. In what different ways have the children been using iPads to support their learning in:
    - Literacy
    - Numeracy

Benefits and challenges

4. Based on your experience, what do you consider to be the main benefits of iPads for teaching and learning?
5. Do you have any concerns about using iPads in the education of young children?
6. What impact, if any, has the use of iPads had on the development of children's social skills?
7. What impact has the use of iPads had on children's motivation/engagement with literacy and numeracy?
8. Have you noticed any gender differences in using the iPad?

9. What are the main challenges in using iPads in the classroom? How have these been addressed?

Training and support

10. Now that iPads have been in school for 2 years and are used up to Year 3 how is continuity and progression managed?

11. What training/ support have you received?

- What did you find most helpful?
- What are your immediate training/support needs?

Finally

12. Overall, what impact do you think using iPads has had on your classroom practice?

13. Overall, what impact do you think using iPads has had on your children's learning?

14. What advice would you give to a teacher who is trying to integrate this technology into their teaching in literacy / numeracy?

Appendix C: Pupil 'Virtual Tour'

Teddy/toy as an artefact. Examines choice and preference

Child should switch it on and demonstrate its use.

1. Do you have an iPad at home or a Huddle/Kindle Fire/Nexus?
2. What do you do with it at home?
3. Do you like using an iPad?
4. Are they fun to use?

Introduce the school iPad

Can you show teddy how you use the iPad? Child selects an app – ask the child what the app is called - researcher names the app for recording purposes,

Ask –

- Can you show me how to use it?
- What does it do?
- What do you like about this app?
- Is it easy to use this app?

Can you show me another one?

- Can you show me how to use it?
- What does it do?
- What do you like about this app?
- Is it easy to use this app?

Is there one you use in class you don't like?

Can you show me?

What do you not like about it?

Anything else you would like to show teddy about using the iPad?

Thank you

Appendix D: Pupil Focus Group

1. How often do you use your iPad in class?
2. Do you use it when you want to or does the teacher decide?
3. Do you use your own iPad in school or do you share with a partner? Which do you prefer?
4. What do you do with the iPad?
5. Where do you use your iPad? For example, around the class, school at home?
6. What are your favourite apps to use in maths time?
7. What are your favourite apps to use in literacy time?
8. Are there any other apps you enjoy using?
9. What else do you do with your iPad? e.g. Do you take pictures, videos, do you use the internet
10. Do you prefer to use an iPad or a computer, why?
11. How does the iPad help you learn?
12. What do you like about using the iPad?
13. What do you dislike about using the iPad?
14. Would you like to use your iPad again next year in school?

Questions for focus groups P3 (2015)

1. How often do you use your iPad in class?
2. Do you use it when you want to or does the teacher decide?
3. Do you use the iPad on your own in school or do you share with a partner sometimes? Which do you prefer?
4. What sorts of things do you do with the iPad?
5. Where do you use your iPad? (e.g. in class, around the school, outside, at home)
6. What are your favourite apps to use in maths time?
7. Are you using any new apps in maths this year which you haven't used before in school?
8. How does the iPad help you to learn about maths?
9. What are your favourite apps to use in literacy time (reading/writing)?
10. Are you using any new apps in literacy this year which you haven't used before in school?

11. How does the iPad help you to learn about literacy/reading/writing?
12. Are there any other apps you enjoy using?
13. What else do you do with your iPad? (e.g. take photos, videos, use internet)
14. Do you prefer to use an iPad or a computer? Why?
15. What do you like about using the iPad?
16. What do you not like about using the iPad?
17. Would you like to use your iPad again next year in school?

Appendix E: Observation Form

Observation Schedule (Spring 2014)

Name of school _____

Class teacher _____

Year group ____

Number of children in class ____

Collate information on the aims of the teaching session and purpose of Apps being used by the children. Ask the teacher how they support the learning objectives of the lesson.

Area of learning

Language and literacy □ Mathematics and numeracy □

<u>Classroom management</u>

Access

Are the iPads being used:

1 per class □ 1 per small group □ 1 per pair □ Individually □

Are children using iPads:

At their desks □ In a designated area? □

Do children transport the iPads:

Around the classroom □ Around the school □ Outdoors □

<u>Time</u>

At what stage of the 'lesson' is the iPad in use?

Introduction □ Main part □ Plenary □

How much time do children spend on the iPad?

For the whole activity □ For part of an activity □

How the iPad is being used to support children's learning

Teacher use:

□ Demonstrating an app

□ Using presentations and media (to review learning or to introduce new skills and concepts)

□ Accessing information (internet, iBooks, etc.)

□ Recording observations of children's learning (making notes, taking photos, video clips)

□ Giving feedback on children's learning

□ Other

_____

Pupil use:

□ Using an app to reinforce skills and concepts

□ Creating presentations and media (such as an e-book, video or podcast about their learning)

□ Accessing information as part of a mathematics activity

□ Sharing resources with one another

□ Reflecting on their own learning (making notes, taking photos)

□ As a reward for 'good work'

□Other

_____

How much autonomy/control do the children have over their own learning?

Is the iPad activity:

Teacher directed □ Pupil choice □ Both □

Who sets the level of difficulty (where applicable)?

Teacher □ Pupil □

Differentiation

Are all children working on the same applications?

Yes □ No □

How are children's diverse needs catered for?

Interaction

Are children working:

Individually □ Collaboratively □

Pupil talk

- Who do children talk to as they work with their iPads?
- What are they saying?

Mathematics and Numeracy

What specific apps are being used?

Specific aspects of mathematics and numeracy addressed: Mathematical knowledge, skills and understanding, for example:

- *Counting*
- *Number recognition*
- *Number relationships (comparing, ordering, partitioning)*
- *Number operations (addition, subtraction)*
- *Pattern*
- *Money*
- *Pre-measure*
- *Shape*
- *Position, movement and direction*
- *Sorting*
- *Handling data*

Mathematical processes, for example:

- *Problem solving*
- *Working systematically*
- *Understanding and use of mathematical language*
- *Explaining their work*

Other comments

- *Level of engagement*
- *Level of enjoyment*
- *Attitude*

Language and Literacy

What specific apps are being used?

Specific aspects of language and literacy addressed

Talking and listening

- *Following instructions*
- *Listening to stories*
- *Repeating familiar phrases, sounds, words*
- *Discussing with a partner*
- *Predicting*
- *Describing*
- *Explaining*
- *Phonological awareness (rhyme, syllable work)*

Reading

- *Phonics*
- *Word recognition*
- *Reading a range of texts*

Writing

- *Forming letters*
- *Experimenting with writing*
- *Writing captions – titles, names etc.*
- *Writing sentences*

Other comments

- *Level of engagement*
- *Level of enjoyment*

Attitude

Observation Schedule (P3, Summer 2015)

Name of school _____

Class teacher _____

Number of children in class ____

Area of learning

Language and literacy □ Mathematics and numeracy □

What are the aims of the teaching session (including purpose of apps)?

(Attach lesson plan)

Use of the iPad in the lesson

At what stage of the 'lesson' is the iPad in use and by whom? (Brief notes)

	By the teacher	By the children
Introduction		
Main part		
Plenary		

How the iPad is being used by the class teacher

Tick which apply:

□ Demonstrating an app

□ Using presentations and media (to review learning or to introduce new skills and concepts)

□ Accessing information (internet, iBooks, etc.)

□ Recording observations of children's learning (making notes, taking photos, video clips)

□ Giving feedback on children's learning

□ Other

_____

How the iPad is being used by the pupils

Tick which apply:

□ Using an app to reinforce skills and concepts

□ Creating presentations and media (such as an e-book, video or podcast about their learning)

□ Accessing information as part of a mathematics activity

□ Sharing resources with one another

□ Reflecting on their own learning (making notes, taking photos)

□ As a reward for 'good work'

□ Other

_____

Access to iPads

Are the iPads being used:

1 per class □ 1 per small group □ 1 per pair □ Individually □

Does each child have access to the iPad at some stage during the lesson?

Yes □ No □

How much time do individual children spend on the iPad?

Throughout the whole lesson □ For one task/activity □

Are children using iPads:

At their desks □ In a designated area? □

Do children transport the iPads:

Around the classroom □ Around the school □ Outdoors □

How much autonomy/control do the children have over their own learning?

Is the iPad activity:

Teacher directed □ Pupil choice □ Both □

Who sets the level of difficulty (where applicable)?

Teacher □ Pupil □

Differentiation

Are all children working on the same applications?

Yes □ No □

How are children's diverse needs catered for?

Interaction

Are children working:

Individually □ Collaboratively □

Pupil talk

- Who do children talk to as they work with their iPads?
- What are they saying?

Other comments

For example:

- *Level of engagement*
- *Level of enjoyment*
  Attitude

Mathematics and Numeracy

What specific apps are being used?

Specific aspects of mathematics and numeracy addressed: Mathematical knowledge, skills and understanding, for example:

- *Counting, reading, writing numbers*
- *Place value*
- *Simple fractions*
- *Patterns*
- *Number operations (addition, subtraction, multiplication, division)*
- *Mental strategies*
- *Money*
- *Measure (length, weight, capacity, area)*
- *Time*
- *Shape*
- *Position, movement and direction*
- *Sorting*
- *Handling data*

Mathematical processes, for example:

- *Problem solving*
- *Organising their work and working systematically*
- *Understanding and using mathematical language*
- *Representing work, using symbols were appropriate*
- *Asking and responding to questions*
- *Explaining their work*
- *Checking their work*

<u>Language and Literacy</u>

What specific apps are being used?

Specific aspects of language and literacy addressed

Talking and listening

- *Following instructions*
- *Listening to stories*
- *Repeating familiar phrases, sounds, words*
- *Discussing with a partner*
- *Predicting*
- *Describing*

- *Explaining*
- *Phonological awareness (rhyme, syllable work)*

Reading

- *Phonics*
- *Word recognition*
- *Reading a range of texts*

Writing

- *Forming letters*
- *Experimenting with writing*
- *Writing sentences*

Appendix F: Parent Questionnaire

Portable Tablet Devices in the Early Years

This study examines children use tablet devices inside and outside school. To understand how children use these devices and what the apps they prefer, please complete the following. Please note information held in strictest confidence. Please circle or tick the appropriate answer below.

****Background Details***

I am the child's: Mother Father Other:
Please specify……

Child's Age_____ Gender_____

My child is in P1 P 2 P 3

I have more than one child at the school, they are aged……
I have ……Boys and ……Girls.

They are in P1 P2 P3

Please tick if your child/ren have access in the home to: iPad □ Other brand tablet □
Laptop□ Desktop PC □ smartphone□
Games Console □

Do they share these devices or own their own device?.....

iPads in school

How aware are you about iPads in schools initiative at your school?
Very aware□ some awareness □ Not very aware □No knowledge of iPads being used in school □

How satisfied are you with the guidance provided by the school in relation to iPad use?

Very satisfied □ satisfied □ uncommitted □ unsatisfied □ very unsatisfied □

In your view, what are the main advantages and disadvantages of iPads in the Classroom?

Advantages

_____

_____

Disadvantages

_____

_____

In the Home

Outside school hours how often would your child/ren use:

	Never	Rarely	Once Weekly	2-3 times a week	Daily
iPad					
Other brand Tablet					
Smartphone					
Laptop					
Desktop PC					
Games Console					

If you have more than one child, who uses the devices most often?

Boys Girls No difference

Older children Younger children No difference

At home, what apps does your child/ren most like to use?

Older----------

Younger----------

Does your child use apps that include elements of maths? Yes □ No □

E.g. counting, sorting, shapes?

Does your child use apps that include elements of literacy? Yes □ No □

If yes, in what areas

	Yes	No	Name of App
A. talking and listening			
B. Phonological awareness (e.g. identif syllables)			
C. Reading			
D. Writing			

Have any other areas of your child's education benefitted from iPad use? (E.g. art, personal development)

Please include any comments you might have with regards to using iPads in the classroom

Any other comments:

*****Please use the enveloped provided to return your completed survey and consent form to your child's teacher. Thank you**

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