Centre for Technology Enhanced Learning | LANCASTER UNIVERSITY

Titan Partnership

iPads Study

Final Report

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Contents

1. EXECUTIVE SUMMARY

The Titan Partnership pilot

- The Titan Partnership piloted uses of iPads in four schools (10 iPads in each of two primary and two secondary schools) in 2012.
- The Titan Partnership provided training sessions for teachers involved in the pilot, prior to their main uses of the iPads, between May and December 2012.
- The Centre for Technology Enhanced Learning at Lancaster University was commissioned to evaluate this pilot, and this report presents evidence gathered, findings and conclusions.

A context and background

- Features and affordances of the iPad described in company materials indicate that they are strongly focused on aspects of communication.
- There are a wide range of applications (Apps) that can be used on the iPad, but levels of use and forms of use to support learning are likely to depend both on the range of Apps available to support specific subject and topic needs, and teacher knowledge of how to use these, operationally and pedagogically.
- From existing research, it is likely that certain types of learning activity will be enhanced by uses of iPads.
- Reports can be readily found that widely promote and endorse uses of iPads, but limited evidence is available that provides details of how enhancements to learning arise, when and under what circumstances.
- Reports indicate that some specific learners in hospital schools have been supported effectively with uses of iPads. Aspects of communication, uses of multi-modalities, and ease of access and handling are highlighted particularly in this respect.

Training

- Training is an important element to support development of uses of iPads in educational settings. Training should be accessible for teachers wanting to use digital technologies such as iPads.
- However, this training needs to identify many Apps that can meet specific subject and topic needs.

School uses

- Within the Titan Partnership project, iPads have been used easily by pupils across Years 4 to 13, and these uses have covered applications within core subject areas as well as in other subject areas.
- Levels of use have depended on levels of teacher awareness of features and the range of Apps available, and how teachers perceive they can be used pedagogically.
- Teachers have applied features and Apps to support a range of pedagogies, including those involving and using elements of communication and discussion. iPads have been integrated into activities to support and develop co-operative working, independent learning, motor skills, and engagement.
- Teachers have used iPads with all ability ranges.
- Teachers have indicated how iPads have supported curriculum needs through appropriate applications in activities involving research, capturing and using imagery and video clips, presentations to teachers and peers, discussions of captured and presented work with teachers and peers, recording and sharing ideas with peers, providing anonymous feedback, pupils creating their own notes and books in multimodal formats, discussion of strengths and weaknesses in presented work shared by pupils, creating videos for presentation to wider audiences, presentation of perfect models or techniques, organising notes and work, and pupils recording video clips of lessons for later playback.

- Some individuals have benefited greatly from uses of iPads, while others have not benefited to the same extents.

School impacts

- Heightened engagement in learning has arisen in the short-term. However, what happens in the longer-term is not known.
- Many pupils in this study had some prior knowledge of the iPad, and this awareness appears to have aided their rapid and easy use of iPads operationally.
- Impacts of iPads on learning have varied according to subject, topic and learner. Teachers need opportunities to share practices more to enable such differences to be further identified and considered.

Special needs and hospital schools

- The features and Apps on the iPad that focus on elements and aspects of communication offer particular support for pupils whose needs can be supported through enhanced communication. Pupils with special needs, in communication and motor areas, as well as pupils in hospital schools and remote locations, have been supported effectively by appropriate uses of iPads.

2. THE BACKGROUND TO THIS STUDY

2.1 The Titan Partnership and the iPad pilot

The Titan Partnership piloted uses of 'hand-held' technologies in schools during 2012. The project presented in this report, the focus of an evaluation study, concerned uses of iPads (although Titan also piloted uses of other devices at the same time). The pilot involved two primary and two secondary schools. The Titan Partnership commissioned the research study reported here, to investigate impacts of uses of these resources on learning and teaching.

The Titan Partnership purchased 40 iPads, enabling 10 iPads to be provided for each of 2 secondary and 2 primary schools. The schools received these devices just after half term (February) 2012. The iPads were available to the four schools from that time for the remainder of that calendar year.

One school had used iPad devices prior to this wider pilot, and the lead teacher in that school provided some continuing professional development (CPD) for teachers involved in the project, as well as supporting other interested schools through training sessions. The CPD was run in the form of discussion and training sessions.

The Titan Partnership targeted 4 schools for the iPads project, and worked with them directly from February 2012. In terms of the research study, the schools were provided with details of expectations of the pilot – what it would involve from them in terms of providing evidence to investigate levels and forms of impacts on learning and teaching.

2.2 The scope and proposed research design

The pattern of implementation meant that the 4 target schools could consider how to use the iPads from February 2012. For the study, it was proposed that baseline evidence be gathered, and baseline tests be devised, during the second half of the Spring Term 2012. This design enabled evidence to be gathered between the Summer Term 2012 through to December 2012, when more focused use was planned. The overall research plan is shown in Table 1 following.

Table 1: Summary of the initial research plan and activities

Second half of the Spring Term 2012	Attendance at CPD sessions, and discussions with 4 primary schools already using iPads Gathering contextual evidence to identify key aspects to include in baseline tests and subsequent tests Production of a baseline test to be provided online for pupils and teachers prior to them using their iPads Completion of the baseline tests by teachers and learners
Summer Term 2012	Production of two subsequent tests (one for primary and one for secondary school pupils) to be provided online for pupils and teachers to complete using their iPads Attendance at a project meeting to gather evidence of current and potential future uses Completion of an online test to identify uses and impacts on learning and teaching by teachers and learners each half term
Autumn Term 2012	Production of two final tests (one for primary and one for secondary school pupils) to be provided online for pupils and teachers to complete using their iPads Attendance at a project meeting to gather evidence of current and potential future uses Completion of an online test to identify uses and impacts on learning and teaching by teachers and learners each half term

To accommodate practices that arose, some changes were made to this initial plan. Subsequently, data gathering involved:

- Attendance at two CPD sessions.
- Collecting contextual and background details to frame the study, through a literature review and through discussions with key personnel in the Titan Partnership and in one secondary school.
- Collecting details of the then current and projected uses of iPads and other computer devices to define questions for a baseline and subsequent questionnaires.
- Creating 4 online questionnaires for pupils (a baseline and a subsequent questionnaire for primary and for secondary school pupils separately), and a data gathering instrument to collect details of uses from teachers.
- Providing these questionnaires online, providing details of uniform resource locators (URLS) to access these, and providing these additionally in electronic and paper formats.
- Collating and analysing evidence after the pilot was completed.

The remainder of this report focuses on the analysis of findings from these sources, and the drawing of conclusions. Implications for future development and research are also highlighted.

3. EXISTING LITERATURE – A REVIEW

3.1 Digital technologies and impacts on learning

Many previous studies exploring uses of educational technologies and technologies used in educational settings have sought to identify learning impacts arising. These have included some studies that have looked at an overview of prior studies, such as those by Schachter and Fagnano (1999), Underwood (2009) and Tamim et al. (2011). All these studies, through their individual overviews and approaches to meta-analyses, have concluded that, while forms of evidence vary across studies in a range of ways and in some respects, there is nonetheless sufficient evidence to indicate that digital technologies have positive impact overall on pupil learning (albeit somewhat modest). Indeed, as Passey (2013) concludes, the evidence that digital technologies impact learning is not so much in question. He argues that the specifics of how this arises through mediation from teachers, and for which learners the effects are greatest or least, is much more worthy of detailed investigation.

This study focuses specifically on uses of iPads in learning settings, and how they might support learning mediated by teachers. The literature review in this chapter draws details from a range of sources, covering reports of how iPads have been used in educational settings, reported by commercial, institution and newscast sources as well as academic sources. Details offered through those sources explore some of the ways that iPads have and could be used to support learning in general mainstream practices, as well as learning to support those with specific needs (particularly those in hospital schools). Overall, three more specific focal aspects are considered in this chapter:

- Features and affordances of iPads – the features that can support learning.
- Reports from research studies – how features and devices can be used in learning environments to support learning.
- Reports of studies in specific locations – such as those in hospital schools.

3.2 Features and affordances of iPads

The iPad was first released in 2010; within a mater of weeks, over 3 million devices had been sold (Murray and Olcese, 2011). The iPad is light-weight, provides easy access to the internet, and there are over 250,000 low-cost or free Apps that can be used on the device (Murray and Olcese, 2012). It has a multi-touch screen, and a virtual QWERTY keyboard.

What learning can arise when an iPad device is used will certainly be affected by the applications (Apps) and affordances that are available or accessible on those iPad devices. The device manufacturer Apple details on its website (Apple, 2012) a range of in-built features that the iPad devices have. It says that features such as the screen reader is there to support those with visual impairment, while other features support those with hearing or physical impairments, or with learning disabilities.

Clearly these features are aimed at supporting those with communication needs. The website describes certain features of the iPad in more detail. Those specific features that are likely to offer support for learning are *VoiceOver*, *Adjustable speaking rate*, *It speaks your language*, *Wireless braille displays*, *Zoom*, *White on Black*, *Speak Selection Tactile Buttons*, *Large Text*, *Headset Compatibility*, and *Audible Alerts*.

For those with visual impairment (and for those who choose to use them), features of the iPad supporting engagement through audio access, text and reader access, or specialised access:

- *VoiceOver*, which is called a ‘gesture-based screen reader’. The feature provides audio descriptions of items on the screen, when these are touched. This facility allows items on screen to be located without seeing them directly, intended to support those with visual impairment to gain an understanding of the layout of items on-screen. Functional levels, such as battery power, and features such as screen orientation or time of day, are also enabled with audio functionality.

- *Adjustable speaking rate* within *VoiceOver*. The audio can be set to speak at a particular speed, to suit an individual. Other sounds being played are lowered in volume when *VoiceOver* is activated, so the user can hear these audio alerts or descriptions.
- *Speak Selection*, a facility that enables text in different applications to be highlighted. The highlighted text can then be cut, copied, pasted, and read out.
- *Audible Alerts*, a facility that provides an audible signal to alert the user to certain operations. These operations can cover incoming mail, calendar alerts, and keyboard actions, for example.
- *Zoom*, a facility that allows zooming in and out of items on screen. This allows texts or images to be enlarged easily, to aid reading or viewing of specific items according to user need.
- *White on Black*, allowing the display features to be changed from black on white to white on black. The user can choose this alternative form of contrast.
- *Large Text*, a facility that allows font size to be increased. This facility is enabled for displays that include messages, mail, calendar, or alerts, for example.
- *Wireless braille displays*, another feature within *VoiceOver*, where audio is generated as a braille output. The facility also allows braille input devices to control iPad functionality.

For those with hearing impairment (and for those who choose to use them), features of the iPad supporting engagement are:

- *Headset Compatibility*, allowing a range of headsets, earphones and headphones to be used with the device. The device allows voice recording and playback.

For those with physical or motor impairment (and for those who choose to use them), features of the iPad supporting engagement are:

- *Tactile Buttons*, located around the device, performing perform basic functions. Functions such as on/off, sleep/wake, volume level and locating home, are all accessed by physical contact with these buttons.

For those whose native language is not English, or those choosing to access the device in another language, features of the iPad supporting engagement are:

- *It speaks your language*, a facility within *VoiceOver* that allows the audio language to be selected. There are 36 languages that are available, supporting easier access for those whose native language is not English, for example.

It is clear that the iPad has a range of affordances that can support aspects of learning, but that these focus on aspects to support communication, and to assist those with specific communication needs. In terms of Apps used by schools, a manager from KRCS Group Ltd. and KRCS (Digital Solutions) Ltd. listed those most commonly used in the following order:

- *iMovie.*
- *GarageBand.*
- *Pages.*
- *Keynote.*
- *Comic Life.*
- *Google Chrome.*
- *Aurasma.*
- *Evernote.*
- *createAmonster.*
- *Nearpod.*
- *Explain Everything.*
- *Showbie.*
- *Background Eraser.*
- *Redlaser Barcode Scanner and QR Code Reader.*
- *SoundCloud.*
- *Math Bingo.*

- *Puppet Pals HD Director's Pass.*
- *Morfo 3DFace Booth.*
- *Create a Car.*
- *Book Creator.*
- *Creative Book Builder.*
- *Sketch Nation Studio.*
- *iBooks.*
- *iTunesU.*
- *MagicPlan.*
- *My Story.*
- *Nosey Crow Cinderella.*
- *123D Catch.*

What is not clear from this list is the way in which these Apps are used, or the frequency with which they are used. As will be seen later in this report, using evidence from pupils using iPads in a small sample of schools, this list may not be representative of a more specific picture, at a school, at a subject or at an age level. Uses of features and Apps need to be considered carefully in the context of subject and topic learning, as well as in relation to the age of learners. Indeed, the level of use of an iPad may relate more directly ultimately to the range of Apps meeting specific age and topic-related learning needs, as these are the features that are largely mediated by teachers.

3.3 Reports from research studies

The features and affordances detailed above are all likely to support learners and learning, but they are not likely to support every learner on all occasions. This is certainly true also when the very many Apps that can be used on the iPad, and selected for use to support specific learning needs or purposes, are considered. As Passey (2010) stated about uses of mobile devices mediated by teachers to support learning, forms of activities that are supported include what he termed:

- *""Review and reflect", where pupils capture audio, imagery and video during lessons, used in plenary sessions to reflect on what has been covered, the key elements learned, how these fit into wider pictures, and how ideas might be taken further outside the classroom can support higher cognitive and metacognitive levels of learning.*
- *""Think forward", where pupils access future topics via the internet and capture relevant thoughts or ideas to contribute to these in class or through on-line discussions can support aspects of the transfer of learning.*
- *""Listen to my explanations", where pupils record audio to complete homework assignments and teachers mark these verbal explanations can support active engagement and reflection.*
- *""Snap and show", where pupils capture imagery that is downloaded, for wider pupil discussion, made accessible to parents so that they can see and discuss events that have happened in school can support enhanced participation.*
- *""This is what I've done and how I've done it", where pupils create presentations of how they have used mobile technologies to tackle particular activities, these are recorded and made accessible on appropriate web-sites for teachers and parents to see can support enhanced social interactions.*
- *""Tell me how I could improve this", where pupils share their work in multimedia formats with peers, mentors, teachers or trusted adults in order to seek evaluative feedback, assessments of their work, and ideas for improvement on which they can act can support the development of supportive social networks."* (Passey, 2010, p.69)

The author went on to argue that these forms of activities need to be developed and used more if mobile technologies are to provide support for learning that uses their specific affordances and gains from the benefits that these offer. He argued that his research and that of others highlights how mobile technologies can allow the capture of ideas and examples in context, allow discussion as points of

interest or as opportunities arise, allow a sharing of ideas and work, and allow enhancements and details to be built into existing ideas and work in specific contexts.

To what extent do the features and affordances of the iPad device and associated Apps allow these forms of learning activities to be developed by teachers? Certainly newscast reports have indicated the ways that certain features and affordances have been welcomed by those in education. For example, in 2011, the New York Times reported that educators were welcoming the iPad, as it had a large touch-screen, it could be handled so that eye contact with teachers was maintained, and was lightweight.

Rose (2011) reported research also at that time, conducted in the United States (US) with university-level students, stating how Abilene Christian University had been examining advantages of using these devices in cases of student mobility. One study reported that annotation of texts led to a 25% higher score rate on questions concerned with information transfer, when compared to those using paper methods. This method does not, of course, identify the score gains arising from uses of iPads compared to other devices. Another of their studies indicated that iPads were welcomed by students for developing their coursework, and that the iPads were helping students to be more 'efficient' using their time.

Other research from the US has identified learning gains arising. The 'iPads for learning' website (2012) states that for 'hundreds' of middle school pupils (11 to 14 years of age) in California, the use of Apps for classwork and homework appears to be leading to more engagement with the learning activities. It also states that test scores are 'climbing'; in one school pupils with iPads scored 90.5% on proficiency benchmark tests, compared to 60% for classes without iPads. However, starting scores when all pupils did not use iPads were not reported, and whether these groups were balanced in other ways was also not reported.

An early report of research on iPad use in four primary schools in Birmingham in the United Kingdom (UK) (BeLF, 2012), states findings more cautiously. For example, the report states that: "iPad ownership seems to improve a child's development of a confident outlook and a responsible, independent attitude toward learning", "Children's engagement and motivation to learn seems to have been enhanced", "New patterns and practice of homework seem to be emerging", and "Parents seem to be more directly engaged in their children's education".

A session at the Wolverhampton e-Learning Conference in March 2012 provided more direct evidence about the Apps that might bring about these forms of impacts. The presenter discussed uses of iPads in an independent preparatory school. The lead teacher decided to use iPads with classes some two years previously – and chose them because of their different operating system from that used with other devices in the school, the fact that peripherals could be integrated easily with the iPads, and that updated Apps from Apple were provided free of charge. The teacher stated that he was able to match uses of Apps to learning outcomes and subjects routinely, and that there had been no need to show pupils how to use the iPads, as they quickly gained operational facility. He indicated that the Apps he used included:

- Spellboard - for weekly spellings, and the word could be retained in audio form also.
- Garage Band – for creating music, including backing music for a Year 6 report.
- Mathsboard – for setting tests to match needs of pupils.
- Book creator – for creating pupils' own iBooks, with Year 6 pupils making stories for Year 2 pupils.
- Video – for capture of events or lessons as chosen by pupils themselves.

The teacher stated that his experiences with pupils demonstrated that the iPad is a highly tactile device, it is handled often and easily by pupils, they use the width of visual, textual and audio facilities available, that iPad files could be linked to an interactive whiteboard for presentation purposes, or they could be used with headphones so that pupils could listen to items on them individually. As one of the Year 6 pupils said, it is "useful to have the internet just there in your hands."

A case study reported by KRCS (n.d.) also highlighted the ease with which pupils accessed iPads. The case study highlighted rapid loading and no use of passwords or logins as features offering advantages in terms of ease of use. Immediate feedback from Apps used in activities was also identified as an important element for pupils in terms of gauging their levels of success.

From the range of findings above, studies are currently only indicating gains arising after short periods of using iPads. Whether such gains will be sustained over a one or two year period, or longer, remains to be seen. At this stage, research evidence points to the fact that iPads support learning engagement and short-term learning outcomes. The evidence points to the fact that enhanced engagement and outcomes can arise for a wide variety of learners, however. But, as will be seen in the evidence from this study, the width of enhanced engagement may be localised or contextualised.

A report from Burden, Hopkins, Male, Martin and Trala (2012), of a study exploring uses of iPads in eight schools in Scotland, did not look at learning gains arising at subject or topic levels specifically. However, the study did report that the devices facilitated achievement. The study looked in more detail at and reported on positive aspects arising in terms of widening access to information and online facilities within classroom settings, increasing engagement with learning and the ownership of learning by pupils, supporting emerging pedagogies and teaching approaches, and engaging parents in interactions with their children and their children's learning.

The elements that are identified, particularly where enhancements arise, are concerned with communication (between stakeholders) and with developing digital literacy to support aspects of subject or topic learning. The latter point was highlighted by a recent report, and although not specifically focused on uses of iPads, the PISA report (OECD, 2011) looked at development of digital reading (the reading component of digital literacy) in pupils and found that when the background factor of academic abilities was accounted for, frequency of computer use at home (especially for leisure purpose) was positively associated with digital navigation skills and reading performance, while frequency of computer use at school was not. The researchers concluded that pupils develop their digital reading literacy mainly in home environments when their pursuing their own interests.

These results support the need for teachers to be more aware of both how to utilise digital reading within school environments to support learning, and to frame learning activities to enhance the digital reading skills that learners need within educational environments. As Pilkington (2012) stated in conclusions from her research study into uses of iPads, pupils develop multi-modal forms of literacy when they research, write and illustrate work, but that the most important feature identified was a gain in independent learning, learning 'skills of how to learn more', and taking more 'mature responsibility' for learning.

3.4 Reports of studies in specific locations

Several recent studies have looked at uses of iPads in specific locations, identifying ways that affordances and Apps have supported engagement and short-term learning outcomes for those with special or specific needs. A case study report from the Royal Children's Hospital (RCH) Education Institute in Victoria, Australia, which is published on their website (2012), stated that this hospital was one of ten sites included in a trial using iPads to support learning. In this setting, 20 iPads were deployed in the Children's Neuroscience Centre. This hospital centre is a 32-bed ward, caring for children with 'neurological, neurosurgical, ophthalmological and otolaryngology conditions', including those with muscular skeletal and brain injury.

The hospital centre welcomed the use of the iPads, as these devices were found to integrate well in an environment where there is limited space. Teachers found they could use the devices to develop more group work and peer support, linking pupil interactions from other wards across the hospital, including those confined to bed. One of the aims of this initiative was to use the devices to support the transition of children back to their school environments. The case study highlights the level of this issue, stating that in 2010, over 45,000 young people aged 6 to 18 years spent at least one day visiting the hospital,

with some spending at least one night there too. Teachers in the hospital spend time with the young people, supporting communication with their schools and supporting their on-going learning. Teachers have found that iPads have supported these aims, and the iPads have been used in three different units and wards particularly.

In the Intensive Care Unit, the case study describes the use of the iPad with a 16-year-old patient, who had been in the ward for more than 200 days, with limited physical and communication abilities. The touch-screen facility enabled the young person to access the device, and it was reported that this assisted her therapy in learning how to 'apply pressure through her fingertips'. The touch-screen, coupled with the audio capability, was reported to enable a full communication between her and hospital staff. She also used *Doodle Buddy* and *Scrabble* for her school work, communicated with her friends, and used a Mandarin language App to continue learning that language.

In the Adolescent Ward, young people have a 'school session' each morning. As young people may be in the ward for between one week and two months, and sometimes returning to continue treatment or when their illnesses recur, maintaining links and communication with their peers is found to be important. The iPads have been used for this purpose, as well as for other more specific subject learning.

The Neuroscience Centre uses iPads to support more individual learning needs. Young people in this ward may stay there between four weeks and twelve or more months. The iPads are used to support literacy and numeracy development, and links with peers in their schools. The iPads are used to enable links with schools that support the young person's transition back to their school.

The website also reports a case study of uses by a particular patient, focusing on the ways the iPad facilities supported his learning needs. As the report said, this 10-year-old patient was suffering from a condition that led to motor paralysis and sensory impairment. This affected his limbs particularly, so that he had difficulty in sitting upright for periods of time, he had limited right arm movement with limited strength, slight movement ion the left hand, and patchy sensory sensation in all his limbs. He is visited regularly by his school teachers and friends, and enabling him to work on academic areas has been discussed with school and hospital staff. Having received an iPad, and having practised use through the touch-screen facility, he was able to gain access to Apps to support his learning. For example, he was reported to have been involved in a class-based project on the environment, and used *Safari* to research on the internet, and presented details using *Keynote.* His favourite Apps were reported to be *Puppet Pals, Doodle Buddy* and *Scrabble.*

Similar outcomes are being identified here; aspects of communication, uses of multi-modalities, and ease of access and handling are highlighted particularly. The research at this hospital also identified a range of factors that need to be accommodated, at an organisational and management level, if such practices are to be adopted and to be successful. These included: the need for sufficient physical space for pupils to use the devices; facilities to recharge the iPads regularly; having a timetable plan for when the devices are accessible for different wards and groups; and having a number of young people who have iPads that can be used by them for evaluating uses of the devices and Apps so that this information can be used to support other users.

Findings from uses at the hospital have already generated discussion and thinking about next steps. As they stated, they have been exploring uses of social networks that could run over a fibre-optic network (avoiding potential problems with contentions when using wireless networks). It is reported that particular benefits being identified are concerned with maintaining links for young people between the hospital and their school, and enabling multidisciplinary teams in helping to take a young person's 'mind off procedures they need to undergo'.

The RCH in Victoria, Australia is not the only hospital to be trialling uses of iPads. Versel (2010) reported that two centres in the US were exploring the uses of an App (*Medical Video jLog from*

Eagle) to help hospital staff explain tests such as computer tomography scans and magnetic resonance imaging to young patients, using videos and question and answer facilities. The aims are to support understanding of medical procedures, and to allay fears or concerns that young people or their parents might have.

In addition to uses in hospitals, iPads have been used in other settings to support educational provision and learning for young people with specific needs. For example, iPads have been used to support learning by individuals on the autistic spectrum (Neely, Rispoli, Camargo, Davis and Boles, 2013). Autism is a lifelong disorder associated with social and communication difficulties and limitations, and sometimes restricted interests and challenging behaviours. Neely et al. (2013) suggest that there are reasons why iPads may be popular with young people on the autistic spectrum. They argue that a large touch-screen enables easy access, that pictorial forms engaging, that there are ways to personalise facilities commonly used, and the wide popularity and use of the devices reduces stigma as their use lets them feel less excluded or isolated. The authors reported from their study how the iPad increased engagement in the learning activity.

Kagohara, Sigafoos, Achmadi, Reilly and Lancioni (2012) have shown that video-modelling can be used on this device as an effective instructional strategy. These researchers studied the spelling of words when using a spell-check function. Before the video-modelling intervention, the two pupils scored 30% on average in a spelling test, while they scored 100% on average post-intervention. However, this was a short-term study, and the specific benefits of the iPad compared to other technologies were not demonstrated. Jowett, Moore and Anderson (2012) also studied the impact of video-modelling on 5-year-old pupils learning numeracy. Their evidence indicated that video instruction supported greater independent in identifying and writing certain numbers.

Learners with Attention Deficit Hyperactivity Disorder (ADHD) have also been seen to benefit from the use of iPads. Learners with ADHD may talk continuously, make inappropriate comments and act impulsively. McClanahan, Williams, Kennedy and Tate (2012) studied the impact of the iPad on reading skills for a learner with ADHD. Before using the iPad, the pupi interrupted the flow of lessons and did not stay focused on task. This pupil was working at a reading level 3 grades below the average for his age. Reading skills when using the iPad were improved, as was his attitude generally towards learning. The authors suggested that kinaesthetic interaction through touch with the iPad screen coupled with enhanced visual interaction supported these improvements. They argued that multimodal effects supported engagement, so that the pupil felt more in control and could self-pace his learning.

It is clear from this short literature review that:

- Features of the iPad can support aspects of communication, and some learners are using these features to enhance their communication needs.
- Many learners find the device is relatively easy to handle, and operational techniques can be developed readily (although this may well depend upon levels of background knowledge of how to operate other devices).
- Features of the iPad and some Apps selected by teachers or learners can support independent learning, heightened levels of self-control and self-pace, developing higher levels of research techniques and digital reading.
- Multimodal facilities are being used effectively by some learners in some contexts.
- A range of teachers and mediators have found they can integrate iPads relatively easily into their pedagogies and approaches to support learning, and that the devices can enhance or widen these approaches.
- iPads are being used by learners widely, and this includes learners with specific or special needs.
- The ways that iPads are involved with and supporting learning at subject and topic levels, by age, are not easily identifiable from the current reported research literature.

4. PROFESSIONAL DEVELOPMENT AND TRAINING SESSIONS

In the Titan Partnership iPad pilot, teachers in the schools involved were provided with training opportunities. Observations of two training sessions are reported here.

4.1 The first training session

The first training session was introduced by the project manager from the Titan Partnership, and run by a lead teacher who had had experience of using iPads previously. The Titan Partnership manager introduced the iPad trial, stating that 10 iPads would be available for use in each of two primary and two secondary schools.

The lead teacher trainer focused on issues concerned initially in providing some background to the uses of the iPads – factors to consider when developing innovative approaches, and focusing on learning and learning needs before considering teaching and the selection of Apps. He considered in his introduction whether iPads could support longer periods of engagement, especially for boys, heighten skill levels, reduce absenteeism, target those with different abilities, foster independent learning, and support positive classroom behaviour.

The lead teacher trainer discussed technological issues in this session too. He said that for those wishing to link the iPad output, there is a need for a converter to feed to a projector, and that also an Apple television (TV) box is needed. At a cost of about £118, he stated that this was the only way to gain portability and to project from the iPads. He showed specific features of the iPad – *Notepad* and emailing features, *Messenger, Calendar, Maps,* and access to *YouTube*. He explored the settings on the iPad – the need to access external sources either via the school network or another carrier, how to use the *iCloud* for backups, listing contacts, using cameras, accessing the news-stand, photo booth, and the Appstore. He raised the need to consider copyright issues, and said that while many Apps are free, some are not and need to be purchased by a school (a typical cost for an App was stated as being perhaps £6.99).

He demonstrated a range of Apps:

- *iBooks*. Papers and books can be downloaded into this App, so they can then be accessed at will. It is possible to make notes on books and papers, collect them together and email them to pupils. The library has many free books.
- *Video activity*. Teachers were asked to take a video of a piece of paper being dropped and falling to the ground. One person dropped the paper and another took a video of it falling. From the video records it was then possible to tell how long the paper took to fall to the ground.
- *Chalkboard*.
- *ShowMe*. It was stated that it is possible using this facility to record a whole lesson and make it accessible to others.
- *MS PowerPoint*. Resources in this software can be played on an iPad, and it converts into *Keynote* (but loses hyperlinks).

From the details covered in the session it was not clear how well the iPad could integrate with other tools or operating systems. However, one teacher from a hospital school felt that the iPad would be a useful device for use on the ward – being light, easily cleaned, and easily handled.

4.2 The second training session

The second training session was run by the same lead teacher trainer. He started the session by showing a stylus that allows writing on the iPad – available from Poundstretcher at a cost of £1 for two styluses. He stated that the aim of this session was to look at ‘Apps and impacts on learning’.

The Apps demonstrated were:

- *ShowMe*. This records items in audio or in text. It is possible to search for images, which pupils can copy, select and drop into their work. A teacher was able to use this App in the session to create images, to record in audio and to play back.
- *Explain Everything*. This App can be used to create a lesson. Articles from the Internet can be included, it has an inbuilt pointer, and it is possible to annotate the items. Pupil work can be displayed and pupils can peer mark it. The App costs in the region of £1.99.
- *Flashcardlet*. This App is free, and is used to create flashcards. These can be imported from the *Quizlet* website, according to age and topic.
- *iThoughts*. This App allows mindmaps to be built up. There is a cost for this App.
- *Evernote*. Allows notes to be added from different meetings or events. It will synchronise to Smartphones.
- *TED*. This App is free, and provides access to inspirational speakers.
- *Logo Quiz on iPhone*. This App can be downloaded onto iPad.
- *Action Movie*. The App allows you to 'blow up' a picture.
- *Videolicious*. Allows the making of videos and recording of audio, and selected images can be included.
- *Vital signs*. Identifies heart beat and breathing, and it is possible to compare heart beat and breathing rates before and after exercise.
- *Dropbox*. This App is free and provides online storage, up to 2Gb for individuals, or 16 Gb for institutions that are registered. It provides storage for documents and access to other people's shared materials.
- *iPhone configurator*. This App allows Apps to be taken off or put onto all connected iPads.
- *Socrative*. This App is free, and allows connected iPads to sign into a 'room'. A teacher can set questions and pupils can then respond, providing quick feedback for pupils in lessons, and access can be synchronised from a personal computer (PC), iPhone, Smartphone, iPad, or other device, and can be accessed from different locations.
- *iTunes U*. This App is free, and provides access to university and college lecture items, by topic.

The lead teacher trainer stressed that the battery recharge facility of the iPad generates 75% battery power for only a 10 minute recharge period. He said that a charged battery can last for a whole day.

The session focused largely on novel items (Apps), and teachers took note of these. However, they were not taking note of learning levels or impacts at the same time. It was not clear from the session what learning would arise from the use of these Apps, or how they would be integrated into a curriculum.

5. USES OF IPADS IN THE SCHOOLS

In this chapter, uses of the iPads within the pilot schools will be explored. In each section, the evidence has been provided by lead teachers in the four pilot schools.

5.1 Uses in Primary School A

In this primary school, Year 4 pupils used the iPads. As the school principal stated, teachers focused uses of the iPads in certain ways:

- As an incentive, or to support engagement in learning.
- As a tool for recording and for providing an audience for their work.
- As a tool for self and peer assessment.

In one activity, pupils created a shape movie using *Morfo 3D Face Booth*, *Puppet Pals* and *iMovie*. This activity was reported to engage the pupils positively in learning about the properties of 2D and 3D shapes. They used the same programmes for creating and retelling their own stories during literacy lessons, and creating stories that supported them in empathising with a character.

During a topic on money week, pupils used price comparison websites to find the best value for money for the ingredients for a product. They used the *Keynote* function to write their own sales pitch for their product and made a video advert for a pizza product, which they were able to show to different classes.

In physical education (PE) lessons, the pupils were able to film each other performing basic movements; they then self and peer-assessed their recordings to check their performance in gymnastics. In a unit on dance (on silent movies), they were able to bring visual and musical aspects of silent movies to the hall to help develop their dance routines.

Overall, it was reported that the Year 4 pupils enjoyed both the level of accessibility of the iPads (as they did not have to log on and wait for systems to load) and the mobility of the iPads (as they could take them wherever they were learning, either around the school building or outside, as they were light enough to do this easily).

It was reported that the iPads were used in teaching mainly as an assessment tool. Video evidence was captured, showing the pupils 'during different stages of their learning journey'. These videos were then shown on the interactive whiteboard and discussed, as a way of addressing any misconceptions or extending the pupils' learning during plenaries and discussion sessions.

5.2 Uses in Primary School B

In Primary School B, the iPads were used with Year 5 and Year 6 pupils. Some of the classes and sessions involved mixed ability groups, while others involved groups of pupils identified as high, middle or low abilities, or pupils with special educational needs.

The iPads were used for two activities with Year 5 pupils, both involving mixed ability groups. The topic covered in both sessions was the Greeks – finding the story of Jason and the Argonauts, and telling the story. Pupils used *Safari* to find different versions of the story, and *Camera* to create freeze frames from the story. Pupils were reported to work co-operatively throughout the sessions.

A small group of Year 6 pupils with special educational needs used *Safari* in one session to create a setting. The pupils viewed videos to help them visualise a scene. The teacher reported the activity supported the development of language skills.

A Year 6 mixed ability group used the iPads for three activities:

- In a geography topic on the local area, the App *Maps* was used to create a map. Pupils were reported to work co-operatively.
- In a science topic, *Safari* was used to create a food chain. Pupils were reported to gain independence.
- In a science topic on bodies, *Labyrinth* was used to understand hand-to-eye co-ordinations. Pupils were reported to develop motor skills.

A Year 6 low ability group used the iPads for four activities:

- In a literacy topic, *Photo Gallery* was used to describe a story setting. Pupils were reported to be engaged.
- In a second literacy topic, *Safari* was used to create a non-fiction page. Pupils were reported to gain independence in browsing for information.
- In a mathematics topic, *Maths Quiz* was used to support written methods for addition. Pupils were reported to be more productive.
- In a second mathematics topic, *Maths Quiz* was used to support written methods for subtraction. Again, pupils were reported to be more productive.

A Year 6 middle ability group used the iPads for five activities:

- In a literacy topic, *Grammar Test* was used to choose correct verb tenses. Pupils were reported to be motivated to complete the task.
- In a second literacy topic, *Safari* was used to create a non-fiction page. Pupils were reported to gain independence when browsing for information.
- In a mathematics topic, *Maths Quiz* was used to recall times tables. Pupils were reported to be motivated to complete the task.
- In a second mathematics topic, *Maths Quiz* was used to support written methods for multiplication. Pupils were reported to be more productive.
- In a third mathematics topic, *Maths Quiz* was used to support written methods for division. Pupils were reported to be more productive.

A Year 6 high ability group used the iPads for two activities:

- In a literacy topic, *Safari* was used to create a non-fiction page. Pupils were reported to gain independence when browsing for information.
- In a mathematics topic, *Maths Quiz* was used to support written methods for division. Pupils were reported to be more productive.

5.3 Uses in Secondary School C

Ten iPads were used in this secondary school with pupils in lessons, and a further 5 devices were used for training purposes. Pupils generally shared the devices one between two, with activities most frequently run in business studies and economics classes, and in physical education (PE), with some uses in some other subject areas too.

All groups using the iPads across this school were mixed ability groups. Table 2 shows the subjects and topics in which the iPads were used, how the iPads were used in those lessons, the features and Apps used, and the Year groups involved.

Table 2: Uses of the iPads in Secondary School C

Lesson and Topic	Overview of how the iPad was used	Features and Apps used	Year group
Business and economics			
Motivation	The lesson focuses on Maslow's hierarchy of needs – an overview of motivation and discussion of the concept. Students take pictures of levels of Maslow's hierarchy to reinforce the learning and judge progress. Using *Explain Everything* App the students use pictures to present back to peers.	*Mobile Learning* to take pictures, *Explain Everything* App, Apple TV to present/feedback to the class	10
British Brands	Students research a British brand that they think would be successful in another country. Using the iPad for research and to present back to the class. *Chalkboard* App is used instead of mini wipe-boards for the plenary.	Research using *Webnotes*	10
AFL - Exam Practice	Students explore: Why do businesses fail? This lesson includes a virtual me starter, trial discussion/brainstorming. Students answer an examination question about Woolworths' failure - developing examination techniques using the iPad.	*Secretive Quiz* App, *Moron* App	10
AFL - Exam Practice (follow up lesson)	Students explore: Why do businesses fail? The teacher takes photos of the students' responses and students peer mark in class using the iPads and project up on the board. How the mark is arrived at is discussed and what skills and levels the candidate has shown.	*Explain Everything* App, *Camera*	10
Spotting Business Opportunities	On the way to work the teacher stopped and took a few pictures of the local area. He asked the students to identify potential business that they believe will be successful. Students presented findings back to peers.	*Camera* and *Explain Everything* App	10
Business Start-ups	Students explore: What do businesses need to consider when setting up? This lesson includes pair discussion/brainstorming. Students use *Popplet* to brainstorm and record responses. Students share with the rest of the class.	*Popplet* App – for brainstorming	10
Transferable Analytical Skills and Game-Based Learning	How do students develop transferable analytical skills? This lesson includes students analysing and evaluating the performance of a peer on a game. They discuss findings, and then apply these to an examination question using the same skills. Students share with the rest of the class.	iPad, Apple TV, *Game* and *Projector*	11
Case Study and Questions (Assessment)	Students use an iPad for research using the *Webnotes* App and *Pages* App to write their answers. Pupils send completed case studies to the teacher for assessment via *Documents Pro* App. It is paperless and engaging.	Research, with answers written and submitted on the iPad	11
Cash Flow	Starter - *Videoscribe* created on the iPad. Students will explore cash flow. Using the App *Penultimate* students write and draw to explain cash flow. This lesson also includes students in pairs completing a cash flow forecast on the iPad and sharing with the class. The *Chalkboard* App is used instead of mini wipe-boards for the plenary.	*Video scribe* App, *Penultimate* App, *Numbers* App and *Chalkboard*	11
Demand	Students explore; What is the impact of demand on hotels due to the Olympics? This lesson is based on students developing analytical skills. Students that were shy (mainly girls) could record their discussions and their presentation using an App called *ShowMe*.	*ShowMe* App	11
Acti-votes	A replacement for acti-votes as they are now obsolete. Students an app called socrative.	*Socrative Quiz* App	11

Lesson and Topic	Overview of how the iPad was used	Features and Apps used	Year group
Study skills	Students develop a revision guide using *Book Creator*. This will be tailored by the students to accommodate what they need to learn in the subject and for examination tips.	*Book Creator*	11
Motivation	Ways to motivate staff. Students used *iBrainstorm* to record many ideas. This is the starter for further development of learning in the lesson. The *Socrative* App is used for the plenary to check progress.	*iBrainstorm* and *Socrative* App	12
The News (Starter)	Students use the iPad to access the latest business news and discuss with peers.	Internet via iPad	12
Organisational Structures	Students develop understanding of organisational structures. This lesson involves students organising themselves according to a structure based on the roles issued. Discussions are recorded to show progress. Using the iPad pictures of the structures arranged by students are taken. These are then displayed and discussed. New terms are introduced and applied to the student structures/pictures.	*Camera* and *Video Camera*	12
Wiki Page for Notes and Revision	Students use the iPad for research and send their findings to the teacher via *Documents pro* App. It is paperless and engaging. This was put on the Year 12 wiki page for students to access and update throughout the year.	Internet and iPad	12
Standards of Living	The teacher saves an image or images of gross domestic product (GDP) and standards of living on the iPad and display using the *ShowMe* app. Students explain why Luxembourg might have a higher GDP than China or India. They load the previously saved website instantly in the App regarding standards of living. They discuss, and then mark a student's response on how standards of living might be raised in lesser economically developed countries from the previous lesson.	All using *Explain Everything* App	12
Exam Pre-Release Research	Students research the context of their examination pre-release. This lesson involves mobile learning and working in triads. Students explore the question 'is placing a toll on Britain's roads in the best interest of Britain'. Using *ShowMe* the groups go off and find their own space and present back.	*ShowMe* App	13
Corporate Culture	Students take pictures of levels of the corporate culture of the school. Students then use the pictures to feed back on what they believe is the corporate culture of the school. This reinforces the learning and develops higher level analytical skills. Using the *Explain Everything* App students use pictures to present back to peers.	*Explain Everything* App, *Camera*	13
Subsidy	Students explain supply and demand using the *ShowMe* App. They then explain how a government subsidy impacts on the supply and demand diagram.	*ShowMe* App	13

Lesson and Topic	Overview of how the iPad was used	Features and Apps used	Year group
Mathematics			
Display students' work to facilitate discussions as to how it can be improved	Using Apple TV, the teacher connected his iPad to the projector and using an App called *ShowMe*, took photos of their work and the class identified what they liked and what they felt needed to be improved. The students responded very well to this and over the course of 2 weeks make excellent progress. It was very powerful to be able to show a poor example next to a good example at an instant and for a student to annotate both on the iPad to highlight the differences.	*ShowMe* App, Apple TV	11
Personal, social and health education			
Olympic PSHE Day	Use of the iPad to record the day through photos and videos. Then create a trailer using *iMovie* to showcase aspects of the day. Some groups used *Facetime* to contact one another and compare work and progress. This helped to motivate the students and increase their confidence in what they were doing as they observed other groups in action.	*iMovie*, *Camera*, *Facetime*	Mixed
World Sports Day	Sixth form students develop independent skills and take pictures and create a movie to celebrate the day using *iMovie.*	*iMovie* and *Camera*	Mixed
Enterprise	The Olympic Cocktails project is based on the Columbian Cocktails Enterprise. The teacher used the iPads to record aspects of the day. Each group had an iPad which they used effectively to record videos and adverts. The plan is to create an *iBook*.	*Pictures*, *Video* and *iMovie* App	Mixed
Olympic PSHE Day	The Olympic Cocktails project is based on the Columbian Cocktails Enterprise. This group had an iPad which they used effectively to record videos and adverts. The teacher communicated using *Facetime* to other classes, this also motivated staff and pupils - sharing good practice.	*Pictures* and *Video*	Mixed
Physical education			
Various Lessons	Use of the iPad *Camera* to record pupils' techniques and skills, then the pupils peer-assess or self-assess that performance. The teacher quickly used the iPad to display *YouTube* and other videos of the internet of professional athletes for comparison.	Internet, *Camera* and *Video Camera*	Mixed
Football	The teacher uses an App called *Coach* to discuss and show team tactics for many different sports. He also gets students to use Apps such as *Scoreboard* to umpire other activities.	*Coach* App, *Scoreboard* App	Mixed
Frosby Flop	Use of the iPad camera to record pupils frosby flop techniques, then the pupils peer-assess or self-assess that performance. The teacher quickly uses the iPad to display other videos of the perfect technique.	*Camera* and *Video Camera*	GCSE
Art			
Sketches x 2 lessons	Inspired by David Hockney, pupils use *Sketchbook Pro* to create sketches for their portfolio.	*Sketchbook Pro* App	12
Year 9 Taster Day	Using *Prezi Viewer* to display the presentation, this taster session involves an introduction to using the iPad for learning. Students use the iPads to create a video using *iMovie*.	*iMovie*	9
Sky Sports Festival	Handball is undertaken at the school by our feeder primary schools. Pupils from the school recorded the interviews with the participants, their teachers and this motivated and engaged all. The event was then evaluated and refined for next year.	*Video Camera*	KS2
BBC School Report	Pupils used the iPads to produce creative reports on areas such as: the youth games; Jamaica/USA training camps; Birmingham/Jamaica legacy programme, etc. The iPad allowed more focus and independence from the students.	Variety	Mixed
DofE	Two iPads were loaded with a copy of the Midlands *OS Maps*. Independently students were able to check different details and zoom in to find appropriate routes. The level of detail students found useful. This made route planning much more accessible for all.	*OS Map* App, Internet	12

In business studies, groups in Year 10 used the iPads to explore the concept of Maslow's hierarchy of needs. The iPads were used to gather data to exemplify Maslow's hierarchy. Images were captured, and then used in an App to explain Maslow's hierarchy. These were played back via Apple TV and pupils needed to explain their data and identification of levels; they needed to justify their choices. The sessions involved some less engaged pupils. The teacher looked at the quality of work produced by these pupils, and normally their handwritten work is assessed to be of poor quality (gaining a result in the region of 4 out of 15), which equates to a grade F. Using *ShowMe*, the work was judged to be of a quality at a higher level, perhaps at grade C or D, at it showed more understanding in written and verbal form. The teacher reported that girls particularly were gaining when using *ShowMe*, as the material is previously recorded so there is no need to present it at that time – it is possible to present a pre-recording, which takes a great deal of stress out of the activity.

In business studies in Year 11, three groups used the iPads. The first group used it to support revision, to revise terms. It was reported that pupils found it quick and easy to use. The second group used the iPads to prepare examination technique, using photographs of marked answers to examination questions from some pupils. The pupils completed some peer marking and peer review of the work. It was reported that they liked the facilities, offering instant use and response. The third group used the iPads to complete some cash flow examples. There were gaps in cash flows that they needed to complete, and to discuss.

In these examples, the iPad is clearly a tool that provides a focus for discussion of ideas and points arising in pupil work. Talking about the work is clearly important in these scenarios. Pupils are finding they can work at a comfortable pace, they can record items, or discuss points or use the iPad, or share experiences from different iPads. The iPads used in a revision session at a weekend allowed discussion between 50 pupils; in this context, incorrect marks generated debate and an analysis of what to do and how to move forward. The teachers are here accommodating the need for time and opportunity for discussion and its generation. Discussion and talk are being seen as important parts of pedagogy. Some other work has not involved shared discussion to the same extent – updating or adding to material on a wiki, for example.

As a consequence of this trial, the business studies department is considering using the iPad as an equivalent to an interactive whiteboard, as it can be purchased at a quarter of the cost (£300 versus. £1200). The iPad at a cost of £280 comes with a built-in microphone, visualiser, and hand-held projector.

5.4 Uses in Secondary School D

In this secondary school, the iPads were used in two subject areas. In the first, iPads were used with a Year 13 mixed ability group studying A2 law. The iPads were used in lessons on murder, law and morals, fraud, burglary and blackmail. The aims and objectives the teacher had for using the iPads in the lessons was to make the lessons more 'vibrant in getting recent data and articles quickly to pupils'. The iPads were found to be particularly useful for research tasks in a classroom without computers, for communicating with pupils 'in a two way process', and 'organising their study notes with flashcards and mindmaps of key learning points', which became invaluable. The ability to record lessons as delivered was found to really help 'the weaker pupils later as they could replay the lesson and get a depth of understanding they may have missed in the lesson at the time so it really helped using *Evernote* to achieve deep learning this way'. 'The instant use of *Mindmap* software enabled the creation of structured model answers to questions during the lesson, which could be printed or stored in *Dropbox* for use in revision, again saving time and really motivating' those with lower abilities.

Overall, the iPads were used in lessons to record notes, research on the internet and access materials on the school virtual learning environment (VLE) and to communicate via email and *Facetime* with pupils. Features and Apps used were: *Evernote* (in the murder topic); *G-Whizz* to access Google Apps, BBC News, Channel 4 News, Appstore, *Facetime*, *Simplemind+*, *Tutor 2U*, *iTunes U*, Google *Drive*,

Parliaquiz and *Dropbox* (in the law and morals topic); *Flashcards+* (in the fraud topic); *E-printer* (in the burglary and blackmail topic); and the video camera and audio recording in all topics.

In terms of noticeable effects on pupils, it was reported that for one boy in the class 'there was a considerable improvement in attention, and willingness to engage in learning'. It was found that he developed excellent organisation skills, recording lessons, creating mindmaps of lessons on the iPad, using Apps to create revision cards and undertake more background reading as it was all instantly accessible to him. It was found that he improved so much that when the school took the iPad from him he went out and bought one himself to continue using it in lessons. The use by girls in the class was found to be less intensive, with a few completely disinterested in using them, not bringing them to lessons, and not fully utilising the technology to improve their learning. The girls were found to be less motivated in improving learning than was found for the boy in the class.

The other subject using the iPads in this school was religious education. The teacher used the iPads in lessons with pupils in mixed ability groups in Years 7, 8 and 10.

In Year 7, an overview of the lessons and its aims, the features and Apps used, how they were used, and noticeable effects on pupils are shown in Table 3 following.

Table 3: Uses of iPads in Year 7 RE lessons in Secondary School D

Lesson topic	Overview (what your aims and objectives were for the lesson)	Particular Apps that were used	iPad Use (how the iPads were used)	Any noticeable effects of the iPads on learning or behaviours
The Island: Festivals	Students are on a stranded island and have to build a community. To celebrate their success they create a festival. They have to make an invite to give out to the community explaining what was happening.	*Keynote*	One per group. Copy and paste images onto one slide and print into books	Interaction and engagement
Being a Muslim	Students needed to learn the basic features of being a Muslim e.g. Holy book, prayer, etc.	*iBooks*, *iBook Author*	An *iBook* was created with levelled chapters with differentiated tasks in each chapter. *Videos* and *Keynote* presentations were added.	A selection of ways to learn, students are keen to use all available resources

In Year 8, an overview of the lessons and its aims, the features and Apps used, how they were used, and noticeable effects on pupils are shown in Table 4 following.

Table 4: Uses of iPads in Year 8 RE lessons in Secondary School D

Lesson topic	Overview (what your aims and objectives were for the lesson)	Particular Apps that were used	iPad Use (how the iPads were used)	Any noticeable effects of the iPads on learning or behaviours
Assessment of Sikh worship	A summative assessment of their learning about Sikh worship.	*Selection*	Students were given the opportunity to use whatever Apps they wished to demonstrate their learning.	Students were keen to find a unique way to present their work and we had *iMovie*, *Keynote*, and *Morfo 3D Face Booth* amongst them

In Year 10, an overview of the lessons and its aims, the features and Apps used, how they were used, and noticeable effects on pupils are shown in Table 5 following.

Table 5: Uses of iPads in Year 10 RE lessons in Secondary School D

Lesson topic	Overview (what your aims and objectives were for the lesson)	Particular Apps that were used	iPad Use (how the iPads were used)	Any noticeable effects of the iPads on learning or behaviours
Life after death	Students were enquiring about life after death and sharing their views on the afterlife.	*Inkflow*, *Strip designer*, *Keynote*	Students used *Inkflow* as a whiteboard to give immediate responses to images. A *Keynote* was created where different people's beliefs on the afterlife were displayed, they had to choose one that they agreed with/disagreed with. *Strip designer* was used for students to demonstrate their beliefs.	The students were found to be keen, engaged, using a new medium to demonstrate opinions
Sanctity of life	A study of sanctity of life and Christian and other religious views on life being sacred and a gift from God.	*iBooks*, *iBook Author*	The teacher created an interactive *iBook* that students used totally independently.	The students demonstrated independence, a little competitive to complete before others
Abortion	Students are expected to know the basic laws and procedures involved in abortion before they can study the religious attitudes.	*iBooks*, *Safari*	An interactive hyperlinked *PowerPoint* was used as a teaching buddy.	The totally independent learning engaged students and encouraged some students to extend their learning with personal research
Christian attitudes to abortion	An investigation into what different Christians think about abortion, why they think it and what the Bible says about it.	*QR scanner*, *Holy Bible* App	*QR codes* linking to *Videos*, religious responses and bible references.	Competitive attitude amongst students to complete the tasks quickly
Euthanasia	Christian, Muslim and Sikh attitudes to euthanasia and why they think this way.	*Prezi*, *Safari*	*Prezi* had all information needed and links to websites and videos that could be used to complete tasks.	Engaged by the task and the Apps used
Sikhism and abortion	Students needed to know the Sikh attitudes to abortion and why they have these attitudes.	*Sonic Pics*	The teacher created a *PowerPoint* that she added to *Sonic pics* and recorded information and instructions over the images.	Students used their listening skills and worked at their own pace as they could pause the video and go back whenever they wanted

Overall, for all groups, the teacher used the iPads to support pupil evaluations. The RE Department was able to gain confidential feedback from pupils about how they felt about topics. *GoogleForms* was used to create an evaluation form, and this was accessed by pupils through Moodle.

The teacher tried to include iPads in at least one Key Stage 4 RE lesson each week (they had 3 lessons each week in total) and two Key Stage 3 lessons during a scheme of work (in 6 or 7 lessons). The teachers reported that they 'found it reasonably easy to incorporate them into planning and once the pupils got over the excitement of the pads they were very engaged and learnt independently'.

However, the teachers did report that: ‘The only issue that we found seemed to be that it was difficult to find ideas of apps and uses of the pads that were worthwhile. People in the know don’t seem to share. The sessions that we went to through Titan and other providers did not seem to give us many unknown apps but stick to the basics. We had to find these ourselves’.

6. BASELINE AND FINAL QUESTIONNAIRE RESULTS

Surveys were completed by pupils prior to and after uses of the iPads. The details from these surveys enabled an analysis of more specific ways in which the iPads were being identified by the pupils in terms of supporting their learning. The analyses from one secondary school are presented in this chapter.

In secondary school D, quantitative data were gathered from two groups of pupils through completion of surveys before and after using iPads (the surveys are shown in Appendices A and B). The two groups used the iPads in the same subject lessons, but they were in different year groups – Year 7 (aged 11 to 12 years) and Year 10 (aged 14 to 15 years).

6.1 Results in Secondary School D from a Year 7 group

In the Year 7 group, 23 pupils (13 boys and 9 girls) in a religious education (RE) class completed the survey initially, and 19 (11 boys and 6 girls) completed a survey after using the iPads. Overall, average response rates from this class indicated that their interest in learning had been greater when they had used iPads. This is shown in Table 6 by average response rates to four questions across the two surveys.

Table 6: Interest levels in learning in a Year 7 group in Secondary School D

Question	How would you rate your interest in learning generally, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?	How would you rate your interest in learning with computers at the moment, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?	How would you rate your interest in learning when you use an iPad, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?	How would you rate your interest in learning when you are not using an iPad, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?
Average response level	5.43	5.87	6.26	4.47

The group was asked a number of background questions, about their awareness of iPads, and their previous experiences with this and other computer devices to support their learning. Results are shown Table 7 following.

Table 7: Awareness of and experiences with using digital technologies including iPads in a Year 7 group in Secondary School D

Question	Have you used an iPad before?	Do you own or have access to any sort of computer or laptop at home?	Do you have internet access at home?	Do you have broadband internet access at home?	Have you seen iPads advertised or shown on television or the internet?	Have you seen someone else using an iPad?	Do you think it would be good to use an iPad?
Average response level (where 1 indicates 'yes' and 2 'no'	1.39	1.09	1.09	1.57	1.00	1.09	1.13

These responses indicate that some pupils had used an iPad before, most had access to a computer or laptop and internet at home, but fewer reported broadband access at home. All were aware of iPads

being advertised, most had seen someone else using an iPad, and many thought it would be a good idea to use an iPad. When asked if computers and internet were a help, and whether they helped with learning, responses indicated uncertainty across the group as a whole (1.52 in each case).

Pupils were asked three questions across both surveys about ways that computers could be used to support learning:

- What they thought they could use an iPad for prior to using one in school.
- What they use computers and the internet for at home and in school.
- What they actually used the iPad for when using it in school.

They responded as shown in Table 8 following. The ratio in each case can have a maximum value of 1, and a minimum of 0. Responses in the second column (possible uses for iPads that were identified by pupils prior to their using them) have been placed in rank order, from highest to lowest.

Table 8: Uses of iPads in a Year 7 group in Secondary School D

Use	Possible use for iPads	Use of computers and the internet at home and in school	Actual use of the iPads in school
Learning	0.96	0.91	0.95
Finding information	0.96	0.96	0.89
Discussing information and ideas	0.70	0.43	0.58
Creating diagrams	0.57	0.30	0.58
Making presentations	0.57	0.43	0.84
Taking images	0.57	0.43	0.58
Playing games	0.52	0.78	0.42
Making videos	0.52	0.35	0.42
Communicating with friends	0.39	0.52	0.32
Drawing	0.30	0.17	0.37
Keeping a diary	0.26	0.04	0.11

In the second column, shading shows where pupils felt the iPads would exceed or go beyond the use of computers and internet that they had already at home and in school (that is, the response rate was proportionately lower in the case of existing uses). So, these pupils believed on average that they could use the iPads more for 8 out of the 11 different uses identified. After use, their responses to remembered uses are shown in the right-hand column and these figures relate fairly well to their pre-conceived possible uses for the devices. In one case, making presentations, their actual reported uses are much higher than their pre-conceived possible uses.

In all cases, whether pre-conceived uses of the iPads, actual uses of computers and the internet at home and at school, or uses of iPads when they have them in school, their reports are high in terms of uses for learning. Other data from the surveys asked pupils to identify the ways both existing devices and the iPads were helping them with their learning. Table 9 shows a comparison of two sets of data. Responses in the second column (using computers and the internet at home and in school) have been placed in rank order, from highest to lowest.

Table 9: Ways iPads supported learning in a Year 7 group in Secondary School D

Ways that learning is helped	Using computers and the internet at home and in school	Using iPads in school
Can find information more easily	0.91	1.00
Can easily make notes	0.91	0.84
Can put ideas down quickly	0.83	0.74
Keeps things organised better	0.70	0.79
Watching videos is useful	0.65	0.58
Putting presentations together to show others is more interesting	0.65	0.74
Reading on screen is easier	0.61	0.63
Discussing information and ideas helps me understand things better	0.61	0.53
Seeing things helps me to understand	0.57	0.74
Helps me to write more easily	0.57	0.53
Taking tests and getting quick feedback is a good way to learn	0.52	0.47
Sharing experiences with others helps me to develop ideas more easily	0.52	0.53
Presenting to others is easier when you use pre-recorded visual materials	0.48	0.42
Recording what happens in lessons helps me review and revise	0.48	0.53
Can use the calculator or a spreadsheet easily	0.43	0.58
Revising using on-screen texts is better than using paper copies	0.43	0.68
Listening to audio files is easier	0.39	0.26
Redrafting and rewriting is easy	0.39	0.53
Taking images or making videos helps me to remember important things	0.39	0.63
Moving things around helps me to learn	0.35	0.53

In the third column (using iPads in school), it is clear that the rank order is not the same. In some cases uses have increased (these are shown in green where this is an increase of 5% or more), while in other cases uses have decreased (shown in yellow where there is a decrease by 5% or more), according to the pupils' perceptions of the ways in which these are supported by the different devices. According to this class in this subject area, therefore, the learning aspects that were supported to a greater extent by the iPads were:

- Can find information more easily.
- Keeps things organised better.
- Putting presentations together to show others is more interesting.
- Seeing things helps me to understand.
- Recording what happens in lessons helps me review and revise.
- Can use the calculator or a spreadsheet easily.
- Revising using on-screen texts is better than using paper copies.
- Redrafting and rewriting is easy.
- Taking images or making videos helps me to remember important things.
- Moving things around helps me to learn.

Those aspects of learning not supported to the same extent as existing facilities at home and in school were:

- Can easily make notes.
- Can put ideas down quickly.
- Watching videos is useful.
- Discussing information and ideas helps me understand things better.
- Taking tests and getting quick feedback is a good way to learn.
- Presenting to others is easier when you use pre-recorded visual materials.
- Listening to audio files is easier.

To put these outcomes into a context, pupils also reported that:

- They did not feel overall that they used the iPads very much in lessons.
- They still used other devices in the school.
- They had internet access on the iPads.
- They mostly felt it had been useful to have the iPads in lessons.

Pupils were asked which Apps they thought were the most useful for learning. The Apps they reported were:

- *Safari* (indicated by 2 pupils).
- Wikipedia (indicated by 2 pupils).
- *Calculator*.
- Google *Encyclopedia*.
- Internet.
- *Keynote*.
- *PowerPoint*.
- *Reading*.

There were no aspects of learning that pupils could identify where they thought an App might be helpful but where at the moment there was no App available to them.

6.2 Results in Secondary School D from a Year 10 group

In the Year 10 group, 24 pupils (18 boys and 6 girls) in a religious education (RE) class completed the survey initially, and the same pupils completed a survey after using the iPads. Overall, average response rates from this class shown in Table 10 indicate that their interest in learning was lower generally at the time the second survey was completed, but their interest was higher when using iPads compared to those times when they were not using them.

Table 10: Interest levels in learning in a Year 10 group in Secondary School D

Question	How would you rate your interest in learning generally, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?	How would you rate your interest in learning with computers at the moment, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?	How would you rate your interest in learning when you use an iPad, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?	How would you rate your interest in learning when you are not using an iPad, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested?
Average response level	5.79	5.63	5.46	5.04

The group was asked a number of background questions, about their awareness of iPads, and their previous experiences with this and other computer devices to support their learning. Results are shown in Table 11 following.

Table 11: Awareness of and experiences with using digital technologies including iPads in a Year 10 group in Secondary School D

Question	Have you used an iPad before?	Do you own or have access to any sort of computer or laptop at home?	Do you have internet access at home?	Do you have broadband internet access at home?	Have you seen iPads advertised or shown on television or the internet?	Have you seen someone else using an iPad?	Do you think it would be good to use an iPad?
Average response level (where 1 indicates 'yes' and 2 'no'	1.71	1.00	1.00	1.04	1.00	1.17	1.04

These responses indicate that not many of these pupils had used an iPad before; all reported access to a computer or laptop and internet access at home, and only a very small number reported they did not have broadband access at home. All were aware of iPads being advertised, most had seen someone else using an iPad, and many thought it would be a good idea to use an iPad. When asked if computers and the internet were a help, and whether they helped with learning, responses indicated some uncertainty across the group as a whole (1.33 and 1.42 respectively).

Pupils were asked three questions across both surveys about ways that computers could be used to support learning:

- What they thought they could use an iPad for prior to using one in school.
- What they use computers and the internet for at home and in school.
- What they actually used the iPad for when using it in school.

They responded as shown in Table 12 following. The ratio in each case can have a maximum value of 1, and a minimum of 0. Responses in the second column (possible uses for iPads that were identified by pupils prior to their using them) have been placed in rank order, from highest to lowest.

Table 12: Uses of iPads in a Year 10 group in Secondary School D

Use	Possible use for iPads	Use of computers and the internet at home and in school	Actual use of the iPads in school
Finding information	1.00	0.92	0.88
Learning	0.96	0.92	1.00
Discussing information and ideas	0.79	0.33	0.63
Making presentations	0.79	0.71	1.00
Creating diagrams	0.71	0.21	0.83
Making videos	0.71	0.17	0.88
Taking images	0.67	0.42	0.71
Playing games	0.63	0.58	0.58
Communicating with friends	0.46	0.96	0.17
Drawing	0.42	0.08	0.50
Keeping a diary	0.21	0.08	0.08

In the second column, shading shows where pupils felt the iPads would exceed or go beyond the use of computers and the internet that they had already at home and in school (that is, the response rate was proportionately lower in the case of existing uses). So, these pupils believed that they could use

the iPads more for 10 out of the 11 different uses identified. After use, their responses to remembered uses are shown in the right-hand column. In some cases, their actual reported uses are much higher than their pre-conceived uses (shown in green), while in others they are lower (shown in yellow).

In this group, pupils reported that some pre-conceived uses were found to be as they expected or better, while others were found to fall short of their expectations. Other data from the surveys asked pupils to identify the ways both existing devices and the iPads were helping them with their learning. Table 13 following compares these two forms of data. Responses in the second column (using computers and the internet at home and in school) have been placed in rank order, from highest to lowest.

Table 13: Ways iPads supported learning in a Year 10 group in Secondary School D

Ways that learning is helped	Using computers and the internet at home and in school	Using iPads in school
Can find information more easily	0.96	1.00
Watching videos is useful	0.88	0.93
Putting presentations together to show others is more interesting	0.79	0.88
Can put ideas down quickly	0.71	0.71
Can easily make notes	0.67	0.71
Seeing things helps me to understand	0.67	0.88
Discussing information and ideas helps me understand things better	0.63	0.38
Taking tests and getting quick feedback is a good way to learn	0.63	0.33
Revising using on-screen texts is better than using paper copies	0.63	0.63
Helps me to write more easily	0.58	0.46
Sharing experiences with others helps me to develop ideas more easily	0.58	0.33
Presenting to others is easier when you use pre-recorded visual materials	0.58	0.58
Keeps things organised better	0.54	0.54
Reading on screen is easier	0.50	0.75
Can use the calculator or a spreadsheet easily	0.46	0.25
Listening to audio files is easier	0.46	0.63
Redrafting and rewriting is easy	0.46	0.50
Taking images or making videos helps me to remember important things	0.33	0.71
Recording what happens in lessons helps me review and revise	0.25	0.46
Moving things around helps me to learn	0.21	0.38

In the third column (using iPads in school), it is clear that the rank order is not the same. In some cases uses have increased (these are shown in green where this is an increase of 5% or more), while in other cases uses have decreased (shown in yellow where there is a decrease by 5% or more), according to the pupils' perceptions of the ways in which these are supported by the different devices. According to this class in this subject area, therefore, the learning aspects that were supported to a greater extent by the iPads were:

- Watching videos is useful.
- Putting presentations together to show others is more interesting.

- Seeing things helps me to understand.
- Reading on screen is easier.
- Listening to audio files is easier.
- Taking images or making videos helps me to remember important things.
- Recording what happens in lessons helps me review and revise.
- Moving things around helps me to learn.

Those aspects of learning not reported to be supported to the same extent as existing facilities at home and in school were:

- Discussing information and ideas helps me understand things better.
- Taking tests and getting quick feedback is a good way to learn.
- Helps me to write more easily.
- Sharing experiences with others helps me to develop ideas more easily.
- Can use the calculator or a spreadsheet easily.

To put these outcomes into a context, pupils also reported that:

- They felt overall that they had used the iPads quite a lot in lessons.
- They still used other devices in the school.
- They had internet access on the iPads.
- They mostly felt it had been useful to have the iPads in lessons.

Pupils were asked which Apps they thought were the most useful for learning. The Apps reported were, in descending order of popularity:

- *Keynote* (18 pupils).
- *Popplet* (13 pupils).
- *Prezie* (13 pupils).
- *iMovie* (12 pupils).
- *Edmodo* (11 pupils).
- *iBooks* (11 pupils).
- *ComicStrip* (7 pupils).
- *Safari* (7 pupils).
- *Book Creator* (4 pupils).
- Internet (2 pupils).
- *Presentations* (1 pupil).
- *Bible* (1 pupil).
- *Temple Run* (1 pupil).

The aspects of learning that pupils could identify where they thought an App might be helpful, but where at the moment there was no App available to them, were:

- Making books and being able to read them.
- Having a religious topics App, or a textbook App.

7. KEY FINDINGS AND CONCLUSIONS

7.1 Key findings

From the evidence gathered from pilot uses in the Titan Partnership schools, key findings are summarised as follows:

Training

- Training sessions have been welcomed by teachers adopting uses of iPads, and some teachers have recognised features and affordances that can support specific teaching and learning needs.
- Teachers have welcomed the opportunity to find out about the range of features and Apps available to them, but they have also identified needs for more suggestions of Apps to meet specific subject and topic needs.

Primary school uses

- Primary schools have used the iPads across Years 4, 5 and 6, within core subject areas as well as in other subject areas such as history and physical education.
- Numbers of reported uses by class groups in primary schools have appeared limited.
- Reported outcomes for pupils in primary schools have included co-operative working, independent learning, development of motor skills, and engagement.
- Reported outcomes in primary schools have spanned all ability ranges.

Secondary school uses

- Secondary schools have used the iPads across Years 7 to 13, mainly in subject areas beyond core subjects, but including mathematics.
- Numbers of reported uses by class groups in secondary schools have varied according to subject area, but some subjects report a lack of appropriate Apps to support wide teaching and learning.
- Reported uses have covered activities involving research, capturing and using imagery, capturing and using video clips, presentations to teachers and peers, discussions of captured and presented work with teachers and peers, recording ideas, sharing ideas with peers, providing anonymous feedback, pupils creating their own notes and books in multimodal formats, discussion of strengths and weaknesses in presented work shared by pupils, creating videos for presentation to wider audiences, presentation of perfect models or techniques, organising notes and work, and pupils recording video clips of lessons for later playback.
- Reported outcomes have varied according to subject, topic, and learner. In some subjects and lessons, enhanced engagement, independent learning and exploration of new techniques to support learning have been reported. Some specific cases of important enhancements to learning attitude, engagement and results for an individual have been reported.
- Reported outcomes in secondary schools have spanned all ability ranges.

Secondary school impacts

- In one secondary school, survey data indicates that pupils have been more interested in learning when using iPads, in both Year 7 and Year 10 groups.
- Pupils generally had a good prior knowledge of the iPad.
- Pupils reported that the learning aspects supported to a greater extent by iPads than by existing digital technologies were: putting presentations together to show others; seeing things to help understanding; taking images or making videos to help remember important things; and moving things around to help learning.
- Pupils reported that the learning aspects not supported as well by iPads compared to support from existing digital technologies were: discussing information and ideas to help understand things better; and taking tests and getting quick feedback.

7.2 Conclusions

From the findings from pilot uses in the Titan Partnership schools, conclusions are summarised as follows:

Training

- Training is needed and can be effective in helping to prepare teachers wanting to use digital technologies such as iPads.
- Teachers need more suggestions of Apps available to meet specific subject and topic needs.

School uses

- iPads can be used across Years 4 to 13, within core subject areas as well as in other subject areas.
- Levels of use are likely to depend on teacher awareness of features and Apps available, and how they can be used.
- iPads can be used to support pedagogies to develop co-operative working, independent learning, motor skills, and engagement.
- iPads can be used to support all ability ranges.
- Uses can cover aspects of and activities involving research, capturing and using imagery, capturing and using video clips, presentations to teachers and peers, discussions of captured and presented work with teachers and peers, recording ideas, sharing ideas with peers, providing anonymous feedback, pupils creating their own notes and books in multimodal formats, discussion of strengths and weaknesses in presented work shared by pupils, creating videos for presentation to wider audiences, presentation of perfect models or techniques, organising notes and work, and pupils recording video clips of lessons for later playback.
- Some individuals are likely to benefit greatly from uses of iPads, while others may not benefit to the same extents.

Secondary school impacts

- Heightened engagement in learning is likely to arise in the short-term.
- Many pupils are likely to have some prior knowledge of the iPad, which aids them operationally, allowing quick and easy use.
- Impacts of iPads on learning vary according to subject, topic and learner. From the data available, across subjects, the learning aspects most likely to be positively influenced by iPads are: putting presentations together to show others; seeing things to help understanding; taking images or making videos to help remember important things; and moving things around to help learning.
- Similarly, from the data available, across subjects, the learning aspects most likely not to be positively influenced by iPads are: discussing information and ideas to help understand things better; and taking tests and getting quick feedback.

8. IMPLICATIONS

From evidence from previous studies, as well as from evidence, findings and conclusions drawn from pilot uses in the Titan Partnership schools, the following implications are highlighted:

Training

- Training should be accessible for teachers wanting to use digital technologies such as iPads.
- This training needs to ensure high levels of suggestions of Apps that can meet specific subject and topic needs.

School uses

- iPads can be used by pupils across Years 4 to 13, and uses can be applied within core subject areas as well as in other subject areas.
- Levels of use are likely to depend on teacher awareness of features and Apps available, and how they can be used.
- Teachers should consider features and Apps that will support their pedagogies that involve and use elements of communication and discussion. iPads can be integrated also into activities that support and develop co-operative working, independent learning, motor skills, and engagement.
- Teachers can consider the use of iPads with all ability ranges.
- Teachers should consider how their curriculum needs require activities involving research, capturing and using imagery, capturing and using video clips, presentations to teachers and peers, discussions of captured and presented work with teachers and peers, recording ideas, sharing ideas with peers, providing anonymous feedback, pupils creating their own notes and books in multimodal formats, discussion of strengths and weaknesses in presented work shared by pupils, creating videos for presentation to wider audiences, presentation of perfect models or techniques, organising notes and work, and pupils recording video clips of lessons for later playback.
- Schools should be aware that some individuals may well benefit greatly from uses of iPads, while others may not benefit to the same extents.

School impacts

- Heightened engagement in learning is likely to arise in the short-term. However, what happens in the longer-term is not yet known.
- Schools should be aware that many pupils are likely to have some prior knowledge of the iPad, and that this awareness may well aid them in quick and easy use of iPads operationally.
- Impacts of iPads on learning can vary according to subject, topic and learner. Teachers need opportunities to share practices more to enable differences to be identified and considered.

Special needs and hospital schools

- The communication features and Apps on the iPad offer particular support for pupils whose needs require enhancement through communication.
- Pupils with special needs in communication and motor areas, as well as pupils in hospital schools and remote locations may well be supported by appropriate uses of iPads.

References

Apple (2012). Accessible at: http://www.apple.com/education/ipad/

Birmingham e-Learning Foundation (2012). *The Birmingham e-Learning Foundation (BeLF) has piloted the use of iPads by pupils in four primary schools in Birmingham.* Birmingham: BeLF.

Burden, K., Hopkins, P., Male, T., Martin, S. and Trala, C. (2012). *iPads Scotland Evaluation.* Hull: University of Hull.

iPads for Learning (2012). Accessible at: http://ipadsforlearning.com/?p=194

Jowett, E.L., Moore, D.W. and Anderson, A. (2012). Using an iPad-based video modelling package to teach numeracy skills to a child with an autism spectrum disorder. *Developmental Neurorehabilitation, 15* (4), 304-12

Kagohara, D.M., Sigafoos, J., Achmadi, D., O'Reilly, M. and Lancioni, G.(2012). Teaching children with autism spectrum disorders to check the spelling of words. *Research in Autism Spectrum Disorder, 6* (1), 304-310

KRCS (n.d.). *iPads in your school: KRCS supporting you on your iPad journey*. Nottingham: KRCS.

McClanahan, B., Williams, K., Kennedy, E. and Tate, S. (2012). A Breakthrough for Josh: How Use of an iPad Facilitated Reading Improvement. *TechTrends, 56* (3), 20-28

Murray, O.T. and Olcese, N.R. (2011). Teaching and Learning with iPads, Ready or Not? *TechTrends, 55* (6), 42-48

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

New York Times, 5 January 2011. Accessible at: http://www.nytimes.com/2011/01/05/education/05tablets.html?pagewanted=all

O'Connor, S. (2012). Personal communication

OECD (2011). *PISA 2009 Results: Students on Line: Digital Technologies and Performance (Volume VI).* Accessible at: http://dx.doi.org/10.1787/9789264112995-en

Passey, D. (2010). Mobile learning in school contexts: Can teachers alone make it happen? *IEEE Transactions on Learning Technologies: Special issue on mobile and ubiquitous technologies for learning.* Jan-Mar 2010, 3(1), 68-81

Passey, D. (2013). *Inclusive Technology Enhanced Learning: Overcoming cognitive, social, emotional and geographic barriers.* New York, NY: Routledge.

Pilkington, R.M. (2012). *Perceptions of the impact of the iPad: initial pilot findings*. Presented at the BeLF iPad Pilot Event, 31st May 2012, Canavan Centre, Birmingham, U.K.

Rose, M. (2011). iPad-enabled students get performance boost, says ACU study. The Unofficial Apple Website. Accessible at: http://www.tuaw.com/2011/09/18/ipad-enabled-students-get-performance-boost-says-acu- study/

Royal Children's Hospital Education Institute (2012). Accessible at: http://www.rch.org.au/edinst/index.cfm?doc_id=10385

Schachter, J. and Fagnano, C. (1999). Does Computer Technology Improve Student Learning and Achievement? How, When, And Under What Conditions? *Journal of Educational Computing Research, 20* (4), 329-343

Tamin, R.M., Bernard, R.M., Borokhovsi, E., Abrami, P.C. and Schmid, R.F. (2011). What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study. *Review of Educational Research, 81*(1), 4–28

Underwood, J. (2009). *The impact of digital technology: A review of the evidence of the impact of digital technologies on formal education.* Coventry: Becta

Versel, N. (2010). Florida, Idaho hospitals test iPad for patient education. Accessible at: http://www.fiercemobilehealthcare.com/story/florida-idaho-hospitals-test-ipad-patient-education/2010-04-13#ixzz1pTzWSavo

Appendix A: Baseline questionnaire

Titan iPads Pilot Project

Before you use the iPads

The Titan Partnership has provided a number of iPads for use in your school. Lancaster University has been asked to run a research study, to gather evidence about your uses of iPads.

To help us with the research, we will ask you to fill in surveys to give us some feedback. Taking part is entirely voluntary; all survey responses will be reported anonymously. You will not be asked for your name, but we will ask you for the name of your school and your year group and gender. Your responses will be collected, and used to produce a report that will initially be presented to your school, and the Titan Partnership, the group supporting the project. Overview results may be reported more widely as a public research report or findings in a journal or article.

In this survey, we will ask you a few questions to find out how you use computers already, before you start using the iPads.

With many thanks for your help.

Don Passey
Senior Research Fellow
Department of Educational Research
Lancaster University

Email contact: d.passey@lancaster.ac.uk

A few background details

Your school:

Please enter:

Your year group:

Your gender (M or F):

The subject lessons in which you will use the iPads:

Your interest in learning

1. How would you rate your interest in learning generally, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested? Please circle or tick the box that applies to you.

1	2	3	4	5	6	7
Extremely disinterested	Disinterested	Not very interested	Neither interested nor disinterested	Interested only a little	Interested	Extremely interested

2. How would you rate your interest in learning with computers at the moment, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested? Please circle or tick the box that applies to you.

1	2	3	4	5	6	7
Extremely disinterested	Disinterested	Not very interested	Neither interested nor disinterested	Interested only a little	Interested	Extremely interested

Access to digital technologies

3. Have you used an iPad before?

1	2	3
Yes	Not sure	No

4. Do you own or have access to any sort of computer or laptop at home?

1	2
Yes	No

5. Do you have internet access at home?

1	2
Yes	No

6. Do you have broadband internet access at home?

1	2	3
Yes	Not sure	No

Thinking about using an iPad

7. Have you seen iPads advertised or shown on television or the internet?

1	2
Yes	No

8. Have you seen someone else using an iPad?

1	2	3
Yes	Not sure	No

9. Do you think it would be good to use an iPad?

1	2	3
Yes	Not sure	No

10. If so, what do you think you could use it for? Please tick or circle all that apply.

Playing games	
Learning	
Communicating with friends	
Finding information	
Drawing	
Making videos	
Creating diagrams	
Keeping a diary	
Making presentations	
Taking images	
Discussing information and ideas	
Others (please say what the others are)	

Do digital technologies help you to learn?

11. When using computers and internet at home or in school, what do you use them for generally? Please tick or circle all that apply.

Playing games	
Learning	
Communicating with friends	
Finding information	
Drawing	
Making videos	
Creating diagrams	
Keeping a diary	
Making presentations	
Taking images	
Discussing information and ideas	
Others (please say what the others are)	

12. Do you think using computers and the internet help you?

1	2	3	4
Yes	Sometimes	Not sure	No

13. Do computers and the internet help you with learning?

1	2	3	4
Yes	Sometimes	Not sure	No

14. If so, in what ways do they help you? Please tick or circle all that apply.

Keeps things organised better	
Can find information more easily	
Seeing things helps me to understand	
Moving things around helps me to learn	
Listening to audio files is easier	
Watching videos is useful	
Helps me to write more easily	
Can put ideas down quickly	
Can easily make notes	
Reading on screen is easier	
Can use the calculator or a spread-sheet easily	
Redrafting and rewriting is easy	
Presenting to others is easier when you use pre-recorded or visual material	
Putting presentations together to show others is more interesting	
Taking images or making videos helps me to remember important things	
Recording what happens in lessons helps me review and revise	
Taking tests and getting quick feedback is a good way to learn	
Revising using on-screen texts is better than using paper copies	
Discussing information and ideas helps me understand things better	
Sharing experiences with others helps me to develop ideas more easily	
Others (please tell us what the others are)	

Thank you for completing the survey. We very much value your responses.

Appendix B: Final questionnaire

Titan iPads Pilot Project

After you have used the iPads

The Titan Partnership has provided a number of iPads for use in your school. You have now used these iPads in some lessons. Lancaster University has been asked to run a research study, to gather evidence about your uses of iPads.

To help us with the research, please can you complete this survey to tell us about your uses of the iPads. Taking part is entirely voluntary. All survey responses will be reported anonymously. You will not be asked for your name, but we will ask you for the name of your school and your year group and gender. Your responses will be collected, and used to produce a report that will initially be presented to your school, and the Titan Partnership, the group supporting the project. Overview results may be reported more widely as a public research report or findings in a journal or article.

With many thanks for your help.

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A few background details

Your school:

Please tell us:

Your year group:

Your gender (M or F):

The subject lessons in which you used the iPads:

Your interest in learning when you use an iPad

1. How would you rate your interest in learning when you use an iPad, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested? Please circle or tick the box that applies to you.

1	2	3	4	5	6	7
Extremely disinterested	Disinterested	Not very interested	Neither interested nor disinterested	Interested only a little	Interested	Extremely interested

2. How would you rate your interest in learning when you are not using an iPad, on a scale from 1 to 7, where 1 is not at all interested, and 7 is extremely interested? Please circle or tick the box that applies to you.

1	2	3	4	5	6	7
Extremely disinterested	Disinterested	Not very interested	Neither interested nor disinterested	Interested only a little	Interested	Extremely interested

Access to digital technologies

3. Have you used the iPad much in lessons?

1	2	3
Yes	Not sure	No

4. Do you still use any other computer or laptop in school?

1	2
Yes	No

5. Do you have internet access on the iPad?

1	2
Yes	No

6. Do you think it has been useful to have an iPad?

1	2	3
Yes	Not sure	No

Using the iPad

7. What have you used the iPad for? Please tick or circle all that apply.

Playing games	
Learning	
Communicating with friends	
Finding information	
Drawing	
Making videos	
Creating diagrams	
Keeping a diary	
Making presentations	
Taking images	
Discussing information and ideas	
Others (please say what the others are)	

8. Which Apps do you think are the most useful for learning? Please list up to 10 that you find most useful.

9. Are there any aspects of learning that you think could be supported by an App, but where at the moment there is no App available to you? Please list up to 10 Apps that you think could be useful to you.

10. Has the iPad helped you in any of these ways? Please tick or circle all that apply.

Keeps things organised better	
Can find information more easily	
Seeing things helps me to understand	
Moving things around helps me to learn	
Listening to audio files is easier	
Watching videos is useful	
Helps me to write more easily	
Can put ideas down quickly	
Can easily make notes	
Reading on screen is easier	
Can use the calculator or a spread-sheet easily	
Redrafting and rewriting is easy	
Presenting to others is easier when you use pre-recorded or visual material	
Putting presentations together to show others is more interesting	
Taking images or making videos helps me to remember important things	
Recording what happens in lessons helps me review and revise	
Taking tests and getting quick feedback is a good way to learn	
Revising using on-screen texts is better than using paper copies	
Discussing information and ideas helps me understand things better	
Sharing experiences with others helps me to develop ideas more easily	
Others (please tell us what the others are)	

Thank you for completing the survey. We very much value your responses.

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