www.accs.ie

40+

ACCS

Cumann na Scoileanna
Pobail is Cuimsitheacha

Association of Community and
Comprehensive Schools

*The Use of Tablet Devices
in ACCS Schools*

MICHAEL HALLISSY
ANNE GALLAGHER
SEAMUS RYAN
JOHN HURLEY

The Use of
Tablet Devices in ACCS Schools

Michael Hallissy

Anne Gallagher

Seamus Ryan

John Hurley

Acknowledgements

Table of Contents

Executive Summary

Background to this Report

Early in 2013 the Association of Community & Comprehensive Schools (ACCS) secured the services of H2 Learning to research the impact of tablet devices across their network of ninety-three schools nationally. ACCS recognised that many second-level schools were exploring the adoption of tablet devices for students and this report was commissioned to provide evidence of current practice in relation to such programmes. With the assistance of the ACCS Executive, H2 designed an online questionnaire that sought to capture current practice among the ninety-three schools in relation to the use of tablet devices. This School Survey was subsequently used to identify three schools where tablet programmes were already in operation. In these schools, more qualitative data were gathered from senior management, teachers, students and parents.

In addition, ACCS was keen to establish what the current academic literature has to say on the use of tablet devices in schools. This literature informed the creation of the online questionnaire and the interview schedules in the three schools. The report provides a snapshot of current practice within ACCS schools and it is hoped that it initiates a series of conversations around the use of ICT and, specifically, tablet devices in schools.

The Contents of the Report

Section One of the report reviews a selection of current research on the deployment of tablet devices in other countries. The report acknowledges that the adoption and use of such devices is relatively new and therefore we also reviewed literature on the deployment of laptop devices where appropriate. Section Two presents the findings of the ACCS School Survey and the qualitative data from the three in-depth school visits. The survey data capture the views of schools in relation to their current and future use of tablet devices, the challenges schools anticipate with any such programmes and the supports they would require in implementing them. The qualitative data provide an in-depth report on the use of tablet devices within three ACCS schools. The report is not an evaluation of the impact of these devices on teaching and learning; rather, it's an attempt to share professional practice with other schools. The schools involved were most generous with their time and in sharing lessons learnt with the research team. This information should assist all schools in planning and implementing one-to-one tablet programmes in the future. Section Three, the final section of the report, outlines some practical steps that schools might take in rolling out a one-to-one initiative. This section is organised into four sections – Plan, Prepare, Implement and Evaluate. It is designed to help schools begin a conversation internally and with other schools around the deployment of tablet devices and the issues they should consider if embarking on such a journey.

What the Study Found Out

The study found that most ACCS schools currently have not embarked on deploying tablet devices. To date, a small number of pioneering schools have deployed tablet devices, while many more schools are actively considering it in the near future. The main reason for adopting such programmes was to tackle the problem of heavy school bags and the report found that they succeeded in addressing this issue. Parents in particular were especially

pleased with the success of the devices in reducing the weight of their children's school bags.

The study found that the schools with tablet programmes were in the initial stages of implementation. All reported that they had under-estimated the significant amount of work such programmes entailed. They found that procuring the tablet devices for students was the easiest element of the programme, while issues such as the provisioning of ebooks and Apps, along with the extension of robust wireless services around the school, proved more challenging. Despite the challenges, however, the schools reported numerous positive outcomes arising from the introduction of the tablet devices. These included an increased enthusiasm among students, higher levels of independent learning, increased communication and collaboration among students. In addition, they found that the devices helped to realise savings in areas such as photocopying and printing.

Teachers reported that students were better prepared for class as all their materials were stored in one place and they were of the view that students took greater responsibility for the devices than with their books. Teachers noted that the devices are currently being used primarily as ebook readers and in the main they wanted additional, subject-specific professional development on using the devices to transform student learning. While acknowledging that the devices enhanced student engagement, they were very conscious that students would have to sit a written examination in Third Year. Teachers see great potential for these devices in their classrooms and are keen to capture and share their professional practice with colleagues both within and outside of their own school.

Students also reported that the tablet devices had impacted positively on them. In particular, the reduction in the weight of the school bag and the easy access to content and student resources were highlighted. However, many students found that, on occasion, particular Apps on the tablet distracted them when studying and completing homework. They also found reading on the device for long periods challenging and in many cases they indicated a preference for textbooks over ebooks.

The report has found that schools are currently at the initial stages of transforming their teaching, learning and assessment practices in light of the arrival of these digital tools. Schools are currently substituting tablets and ebooks for older technologies, such as books. Research on the adoption of digital technologies has found that this substitution approach commonly occurs in the initial stages. This report suggests that schools should initially construct a vision for teaching, learning and assessment that considers the role of tablet devices. All too often schools begin by a selecting a device and then consider how it might be used once it arrives in the school. Digital technologies, such as tablets, have the potential to transform student learning yet to date this has proved challenging in many countries. Where such transformation has occurred it requires teachers to redesign their classroom activities and their roles within them.

There is no doubt that digital technologies hold tremendous promise in relation to transforming student learning; however, the realisation of this promise requires careful planning and implementation. Selecting appropriate digital devices, though important, is not the key decision in such transformation programmes. Schools need to carefully consider how they wish to redesign teaching, learning and assessment and what role

devices, such as tablets, might play. This is the key conversation in which schools need to engage before deciding on what device to procure or recommend to their students.

Section 1 - Review on the use of Tablet Devices in Schools

Introduction

The most recent Horizon Report (Johnson et al., 2013) sees mobile learning becoming an integral part of education at primary and second level. The Horizon Report, which is one of the most respected barometers of technology adoption in education, has witnessed the rise in popularity of mobile learning devices in schools. The authors predict the adoption of certain technologies across three horizons – near, medium and long term. They believe Cloud Computing and Mobile Learning are the two technologies that will be most sought after in first and second-level education over the next twelve months.

Mobile learning has been redefined in recent years with the advent of smart phones and tablet devices. In particular the development of educational Apps has expanded the range of resources available for learners and teachers right across the educational system, from pre-school to higher education. In compiling this report we have reviewed literature from the following areas:

- Mobile learning
- 1:1 initiatives
- Bring Your Own Device (BYOD)

There is a range of terminology in use as indicated by the following excerpts from a recent European Schoolnet (2013) report.

> **1:1** indicates the ratio of items per user, i.e. one netbook or laptop or notebook or tablet per learner. It refers to the current trend of low-cost computer devices ranging from mobiles and handhelds to laptops or tablets, which have gained ground in educational settings. Typically the device is connected to the Internet and owned by the learner.

They go on to say that the term 1:1 computing typically includes the following:

> ***Laptops or notebooks*** are personal computers designed for mobile use, integrating most of the typical components of a desktop computer.

> ***Netbooks*** (sometimes also called mini notebooks or ultra portables) are laptops that are small, light-weight, economical, energy-efficient and especially suited for wireless communication and Internet access.

> ***Tablet PC*** refers to a slate- or tablet- shaped mobile computer device, equipped with a touchscreen or stylus.

Though there is a range of terminology in use around the use of mobile and 1:1 computing, we will use the term **tablet devices** in this study, as they are currently capturing the imagination of many teachers and schools in Ireland and across the globe. As the use of tablet devices in formal education settings is a relatively recent innovation, the literature related to their use is still an emerging field (Ludwig, 2012). Specifically the research in this area has been dominated by the use of iPads in educational settings over

the past two to three years. We will briefly review some of the reasons for the popularity of these devices below before exploring their use more deeply in the following section.

Positive Impact of iPads in Education

The literature in relation to the use of iPads has been generally positive (Melhuish and Falloon, 2010; Sauers and McLeod, 2011; Ludwig and Mayrberger, 2012). Sauers and McLeod (2011) found their introduction contributed to improvements in the following areas:

- Writing, literacy and science
- Student engagement, attendance, behaviour, and motivation
- Student attitude to attending school
- Student attention and participation in project-based learning and a decrease in traditional seatwork
- Greater use of independent inquiry/research and a decrease in direct instruction
- Improved academic achievement and teacher engagement
- Deeper development of cross-disciplinary knowledge and more in-depth "21st century skills

In general there has been a very positive reaction to the use of these devices in education with a recent study in German second-level schools identifying the following reasons for their adoption:

- The tablet is a personal device and suitable to act as a 1:1, anywhere, anytime learning device
- The iPad´s instant startup character implies more time for learning in class
- The abundance of Apps and access to information on a vast range of topics allows students to pursue areas they are interested in learning about
- Notes can be kept in one spot, commented on and available anywhere
- The touch interface correlates with the students´ technology use in everyday life and allows for a high level of interactivity
- A 10 hour battery life means the iPad can be used throughout the entire school day
- Light and portable, easily carried in the school bag and to and from class
- The iPad is considered an intuitive device for which minimal technical support is required.

<div align="right">(Ludwig and Mayrberger, 2012; page 2180-81)</div>

Others, such as Melhuish and Falloon (2010), believe their popularity is also associated with their ability to support mobile or m-learning as outlined below:

- **Portability:** Mobile devices offer portability in such a way as to change the pattern of learning or work activity (Laurillard, 2007; Sharples, 2007; Klopfer, Squire, Holland and Jenkins, 2002);
- **Affordable and ubiquitous access:** Mobile devices (e.g. the 4.5 billion cellphones worldwide) put web access and 'high-spec' functionality in the hands of more users than any other digital technology;

- **Situated, 'just-in-time' learning opportunities:** There is a social expectation that we can engage and process information whenever and wherever we want, and the development of cloud-based computing supports the way in which mobile devices can decentralise our learning experiences (Johnson, Levine, Smith and Stone, 2010; van't Hooft, 2008). M-learning affords a process of exploring and collaborating within multiple contexts using interactive tools (Sharples, 2007);
- **Connection and convergence:** M-learning is often concerned with enabling social interactivity and connectivity. Mobile devices connect us to other people, other devices, other networks, and other technologies (Klopfer, et al., 2002);
- **Individualised and personalised experiences:** Mobile devices offer individuality, a "unique scaffolding that can be customised to the individual's path of investigation" (Peters, 2009, p.117). iPhones, iPads and iTouches offer an array of applications ('Apps') that can be easily commissioned for local use and can be selected to meet the learning topics and themes that an individual requires.

(Ibid, pages 4-5)

A Word of Caution

Though the literature is relatively positive in relation to the use of iPads and similar tablet devices in education, their integration into education settings requires significant planning and preparation. The devices contain a range of features that have the potential to work well in formal education, however the selection and deployment of the technology on its own will not automatically result in learning gains for students. Todd Oppenheimer (2003) has highlighted that *technology which works well outside of school, will not work just as well in school*, and that it is the role of teachers and principals that is critical in determining if it has an impact. Schools that place their faith in the technology alone without redesigning their teaching, learning and assessment practices will undoubtedly be disappointed with their impact. The literature surrounding the use of digital technologies (i.e. the use of laptops, computers, IWBs and VLEs) is disappointing when educational institutions don't change their practices (Kirkwood and Price, 2013). Schools need to carefully consider how they plan to transform teaching, learning and assessment and plan accordingly. This is a task that needs to commence long before the arrival of any tablet devices.

In the remainder of this section we will review a number of studies in depth on the use of tablet devices across a range of educational settings. We will explore the impact of tablets on the role of students, teachers, administrators and parents. In addition we will revisit the need for schools to change their teaching approaches as well as highlighting the challenges schools typically encounter when integrating tablet devices into the life of a school.

The Impact on Students

A recent in-depth study of second-level school usage in the UK focussed on one school, Longfield Academy (Heinrich, 2012). Students aged between 11 and 18, i.e. across the entire school, used tablet devices during the project. The majority leased iPads for use in school, while others used their own personal devices. Staff were also provided with iPads to aid their teaching.

Usage Patterns in Longfield

Students reported iPad use across the range of subjects taught but the greatest usage was in Maths, English and Science classes with strong usage also in History, Geography, Art, Music and Drama.

Students reported three main forms of iPad use in class:

- Researching Online – watching videos, online maps, and historical resources.
- Mind-Mapping – using Popplet App.
- Creating Presentations

Students reported two major uses of iPads at home:

- Completing assignments (71%)
- Social Networking/Gaming (87%)

Other uses at home included:

- Creative and design activities
- Making videos and music
- Taking photos

Student Responses: Longfield

Overall the students responded very positively to the iPads with a high demand for increased usage in terms of how and when the iPads are used.

- 69% of students considered themselves to be more motivated in class when using the iPads
- 73% of students felt that the quality of their work improved with use of the iPad and that they were making better progress
- 61% of the students thought that their achievement in school had risen
- 73% felt that the iPad allowed them to work more effectively
- 65% of students felt that the iPads promoted collaboration (47% agreeing and 18% strongly agreeing)
- 90% of the students said they were happy using iPads in school

(Heinrich, 2012, pages 28-36).

Benefits noted by the students also included:

- Ability to instantly send work to teachers for email response
- Increased amount of research at home
- Using the iPads at home allowed them to support their learning in ways that met their particular needs
- Mind mapping and note taking were easier on the iPad as it allowed rapid edits, faster notation and the ability to share their work with friends online
- Easily editing and accessing information and graphics for school work.

Some problems were also noted:

- Students were frustrated by web filtering and the inability to access YouTube and other common websites.
- Some students found using the iPad difficult and confusing, with at times faulty buttons, screens, audio and an inability to download an App.
- Occasional poor network access hindered students work
- The inability for Apple products to go on to flash based websites was a problem for teachers and students.

Clarke and Svanaes' (2012) evaluation study One-to-one Tablets in Secondary Schools

Clarke and Svanaes' (2012) evaluation study *One-to-one Tablets in Secondary Schools* researched the impact of the introduction of tablet devices in three schools in the UK; in Belfast, Kent and Essex, one of which was Longfield Academy. The principal focus of the study was on the Essex school, Honywood School.

In all three schools an increase in pupil-led learning was perceived by teachers to be a major benefit of tablet devices. This was supported by increased pupil-teacher communication and feedback via e-mail, whereby work could be reviewed, marked and returned to students so as to facilitate 'more immediate' learning. Teachers felt that this immediacy helped them in monitoring student progress.

Teachers noted increased motivation to learn among the students, who were reported as more creative, independent and engaged with their schoolwork (pages 46-47).

The authors noted that increased collaboration between pupils was evident although there were some differences between the year groups; teachers noted that Year 7 pupils appeared to have adapted best to the change in teaching style that tablets had prompted.

In Longfield, staff were less confident than students about the level of collaborative work taking place, with 56% overall agreeing (39%) or strongly agreeing (17%) that students worked more collaboratively with iPads than without (Heinrich, 2012, p.35).

Clarke and Svanaes (2012) describe the innovative ways in which schools have developed collaborative processes and communities of learning.

> ...collaboration led to the sharing of ideas and apps, and all schools had a means of communicating appropriate content, or apps, or ways the devices could be utilised (e.g. using the device for recording, film and photographs). For one school this was through the school intranet, another had a newsletter, and all had a common place where 'App of the Week' for each subject could be displayed. In all three schools pupils were contributing in positive ways to this process, often discovering suitable content or apps before teachers were aware of them. It was also common to all schools that teachers were beginning to develop their own apps. (p. 10)

Pupils with special educational needs (SEN) also experienced the benefits of the tablet devices. The simplicity and intuitive nature of the touch screen interface enabled access to learning in a variety of ways. Communicating via e-mail was found to be helpful and teachers reported feelings of pride and increased self-worth amongst these students from being able to use the same devices as their peers (Clarke and Svanaes, 2012).

A recent evaluation by Dr. Conor Galvin (2010) on the use of laptops in the CONNECT Project[1] notes the positive impact they also had on students:

> ...the initiative has had a positive learning impact upon the student body although we do note that a number of students have emphasised the need to increase student involvement in the use of ICT in the classroom setting. In general, teachers noted improved student engagement and in-class participation ... The interactive and multi-sensory nature of the project was judged to be useful to students, especially among the weaker and middle band students. It is also apparent that this environment has improved the ICT skills of the students and has fostered independent learning although unsurprisingly, the level of independent learning is variable across classes and individuals with the ACE[2] students proving most capable of independent learning. (p. iii)

Thus the introduction of the laptops has had a positive impact on the students, particularly among the weaker and middle band students.

The Impact on Teachers

Tablet devices have also impacted on the role of the teacher within schools. This finding has been widely documented across a range of studies that capture similar impacts across varied school contexts.

Many teachers have noted that "access to the Internet and other knowledge tools associated with the iPad altered the dynamics of their classroom and enabled a wider range of learning activities to routinely occur than had been possible previously" (Burden, Hopkins, Male, Martin and Trala, 2012, p. 9).

Clarke and Svanaes (2012) note that teacher 'enthusiasm' increased as they began to understand the full potential of the devices.

---

1 The CONNECT School Project in St Aidan's Community School, Brookfield, Tallaght involved the provision of 1-1 computing devices for the entire school population over a five-year period. A Virtual Learning Environment was developed using Moodle and Google Apps for Education was also implemented. The project was funded by South Dublin County Council.

2 These are the students in the Access to College Education (ACE) Programme – a programme designed to encourage progression to third-level education.

However, the lack of appropriate educational content was a challenge to teachers and the schools recommended "a larger investment by educational publishers and content providers in innovative and compelling interactive educational content" (p.11). Teachers had responded to this lack by starting to create their own content, such as interactive iBooks.

Clarke and Luckin (2013) report that teachers have begun to explore the use of the iPad as an assessment tool. Burden et al. (2012) also note what they term "the possibility for the redefinition of homework" so as to more strongly develop "both the creativity and independent work of the student" (p.110).

Teachers report that the devices enable them to promote more independent learning, to differentiate learning more easily for individual student needs and to easily share resources both with students and with each other (Clarke and Luckin 2013, p. 4).

Similar impacts were also noted in the *iPad Scotland* report (Burden et al., 2012).

'Ownership' of Devices

The *iPad Scotland Evaluation,* (Burden et al., 2012) was conducted in a total of eight schools (three secondary and five primary) in Scotland by a team of researchers from the Faculty of Education, University of Hull.

Approximately three hundred and sixty-five students had access to iPads and were involved in the pilot. The majority of teachers in the pilot were provided with a personal iPad before or at the start of the initiative.

Three "models of 'personalisation'" of the technology were found in the schools:

1. 'Class sets' whereby devices were retained in the school and issued to students for particular lessons or purposes;
2. Students were allocated individual devices for use across lessons but they were not allowed to take them home;
3. A third group of schools adopted the most personalised approach and gave students the device for the duration of the pilot for use in school and at home.

Sometimes schools used a hybrid of these three main approaches.

The study identifies personal 'ownership' of the device as the single most important factor for successful use and was the critical element in:

- increasing student levels of motivation, interest and engagement;
- promoting greater student autonomy and self-efficacy;
- encouraging students to take more responsibility for their own learning.

Correspondingly, a key recommendation from the authors is:

"The use of a 'full personal ownership' model for implementing mobile computing devices in school, where pupils are able to make use of their device at all times in school and are also able to take it home, is strongly recommended on educational grounds and for strengthening parental engagement" (p. 13).

The authors also recommend that teachers have access to personal devices before their introduction with students; this was seen as "responsible for the significant 'buy in' and low level of resistance from teachers" (p. 9).

Parental Involvement and Responses

In the iPad Scotland study, Burden et al. (2012) found that parents "appear to become more engaged with the school and their child's learning when the iPad travels home with the student" (p. 10).

The overwhelming majority of parents in the study believed that students should use mobile technologies in school before they reach the secondary stage and reported that their children developed greater motivation, interest and engagement with learning as a result of access to the iPad. Over 80 per cent of parents viewed the pilot project as valuable for their children – it "significantly changed their child's enjoyment of and attitude towards school" (p. 10).

Clarke and Svanaes (2012) also explored the role and attitudes of parents. They concluded that:

- Involving parents in the planning stage
- Providing training and information
- Providing reassurance around safety and security

assisted in fostering parental engagement with and support for the initiative and an increase in parental satisfaction with the schools (p.10).

They also noted some concerns among parents in relation to:

- Costs
- Security - parents of students who had not yet used Tablets voiced this concern; parents of children using Tablets admitted to having had these concerns at the early stages of the project, but they had diminished with the successful introduction.
- Children 'never switching off'- this is a concern widely held by parents about their child's interaction with digital technology (Digital Kids and Youth, 2012). The authors recommend that parents be encouraged by schools to impose limitations on their child's Tablet use at home, for example, not taking them to their bedrooms at bedtime, and limiting the time spent online at home (p. 11).

In the Longfield study only a small sample of twenty-three parents returned questionnaires and the authors caution around drawing conclusions from their responses, as the sample was so small. In contrast to other studies, many of the responses were less than positive. For example, only 35% of parents considered their child more motivated and able to work better with the iPad than without, with 30% disagreeing and 35% remaining neutral (Heinrich, 2012, p. 48).

In Ireland, the role of parents in the successful introduction of new technology initiatives in schools is also recognised. The evaluation of the *CONNECT Project* in St Aidan's Community School (Galvin, 2010) noted that one element of the initiative – the *Bring IT Home* P*rogramme* – encourages the use of project laptops in the student's home. This policy is aimed at developing "a deeper connection between the school, home and community and reflects the objective of developing a culture of lifelong learning within the community by means of fostering such a connection" (p.viii). The school also provides training in ICT for parents.

Pedagogy and Mobile Devices

In their study of iPads in New Zealand schools, Melhuish and Falloon (2010) propose that tablet devices offer five potential benefits for education:

- Portability
- Affordable and ubiquitous access
- Situated, 'just-in-time' learning opportunities
- Connection and convergence
- Individualised and personalised experiences

However, they also recognise that "identifying and realising this potential are two totally different matters" (p. 5).

Melhuish and Falloon (2010) are among those who highlight the significance of innovative pedagogy and practice in maximising the potential of mobile devices for teaching and learning in the 21st century.

> A critical review of the way the iPad may support learning, that draws on learning theory, contemporary articles and e-learning literature, suggests that the device may offer an exciting platform for consuming and creating content in a collaborative, interactive way. However, of greater importance is that effective, evidence-driven, innovative practices, combined with a clear-sighted assessment of the advantages and limitations of any product, should take priority over the device itself.
>
> (Melhuish and Falloon, 2010, p.1)

They advocate "seeing beyond the hype surrounding a device, so as to inquire into how effective it might be in terms of promoting long-term, deep learning" (Melhuish and Falloon, 2010, p.5). There is now widespread recognition that the arrival of new and emerging technologies (ETs), such as tablet devices, in education is often associated with hype (Ng'ambi and Bozaleck, 2013). Schools need to be aware of this and they may even require guidelines on how best to integrate them into teaching and learning.

This suggests that use of ETs among educators may require guidelines if they are to transform pedagogical practice, a point with which Bates and Sangrá (2011) and Ng'ambi et al (2012) concur after researching technology for transforming teaching and learning.

(Ng'ambi and Bozaleck, 2013, p. 532)

In an Irish context, Galvin (2010) also identifies the need for projects to move beyond a technology-driven or device-driven approach (common in the early stages of adoption of technology) to a pedagogically-led intervention; "...technology alone is a mode of delivery and not a pedagogy" (p. 80). Again, the literature urges schools to move from technology-deterministic approaches to consider how they want to transform teaching, learning and assessment (Kirkwood and Price, 2013; Dixon and Tierney, 2012; Melhuish and Falloon, 2010).

In a similar vein, in their study of provision of 1:1 initiatives across a number of EU countries, Balanskat and Garoia (2010) identify some critical factors for the implementation of laptop initiatives, including the following:

"Laptop computers are not technological tools, rather they are cognitive tools that are holistically integrated into the teaching and learning of [the] school" (Weston and Bain, 2010 cited in Balanskat and Garoia, 2010, p. 5).

They propose that the effectiveness of such initiatives would be increased when:

- schools are able to guarantee a community which autonomously establishes a set of rules and procedures, including support for professional development of teachers
- all members [of the community] (teachers, students, school leaders, families) are fully engaged in the design of the project – each member should be an active agent, generating feedback and contributing to bottom-up changes (Weston and Bain, 2010)
- innovative and appropriate models of pedagogy are constantly employed... (p.6).

Therefore the message appears to be that technologies, such as tablet devices, do not come pre-loaded with a particular pedagogical preference. By deploying these devices schools have to be aware of the 'hype' that often surrounds their use in education. They need to carefully redesign their teaching, learning and assessment practices in light of the new opportunities these devices can support. Finally, it is good practice for schools to clearly articulate how they see these devices changing the role of the teacher and the student. The creation of such a vision or plan needs to involve the entire school community and is a task that should be informed by pedagogical innovation.

Teachers and Changing Paradigms

Linking to issues of pedagogy, the range of challenges facing teachers in relation to tablet devices are well signposted in the literature.

Sharples (2007, cited in Melhuish and Falloon, 2010, p. 9) note "the shift in paradigms" for teachers in moving from the relative stability of the 'traditional' classroom "to more fluid environments in which the challenge is to create enough stability to allow learning to be guided" (Sharples, 2007).

Expectations of pedagogically innovative and effective use of devices by teachers emerge in the literature and research; however "few examples currently exist of how they [tablet devices] might be used as cognitive tools to solve complex problems, and to engage students in authentic and meaningful tasks" (Herrington, Mantei, Herrington, Olney and Ferry, 2008, p. 1 in Melhuish and Falloon, 2010).

Teachers need both pedagogical and technical knowledge and insight in order to maximise potential "…the construction and use of different remote environments requires skills and knowledge of the pedagogical and technical affordances of the iPad" (Melhuish and Falloon, 2010, p. 8 citing Laurillard).

Bannister (2012) also notes the significant challenges of teaching in a 1:1 environment, including:

- Unique hardware issues
- The complexity of the learning tasks
- The distracting characteristics of laptop instruction

She cites Naismith et al. (2004) in highlighting a paucity of theoretical frameworks upon which to ground educational practice; "These new capabilities inspire new practices which can lead to valuable outcomes, but, to date, application of theory to the use of these technologies for educational purposes is lacking" (p.9).

Mobile technologies have the potential to redefine the learning space beyond the classroom and the class group. In the Longfield study the authors note that "much use is [still] classroom based. However, there is evidence from both pupil interviews and questionnaires… that some, but not all students, are using their iPads in just this way." Students are more likely than their teachers to experiment in their use of "functions and Apps they feel meet their needs and learning styles" (Heinrich, 2012, p. 20).

Burden et al. (2012) note the positive response to the introduction of the iPads among the teachers in their study. Teachers' views of themselves and their pedagogy are changing. Teachers report that there is more collaboration between them and students – in effect they are often co-learners – the relationship becomes "a partnership between students and teachers who work together" in such a way that a learning community is strengthened (p.10).

Professional Development for Teachers

Professional development and support for teachers has been found to be a key element in the successful adoption and use of mobile devices. Clarke and Synaes note that "Teacher training and support was seen to be paramount to this process" (2012, p. 8). Schools had provided several training sessions for teachers before the introduction of the devices and teachers had taken their devices home to use during the holidays before the roll out of the programme. "At all schools this process of familiarisation and discovery appeared to enhance teaching style and the ability to use the Tablet in an innovative and creative way" (p.8).

Heinrich (2010) notes the importance of dissemination and communication among teachers of ideas and innovative practices and the sharing of information, for example, about effective and appropriate Apps.

> It will therefore be important for future development that the school is able to identify the best practice in the school and to disseminate this as part of their ... programme of continuing professional development. (p. 36)

The authors of the iPad Scotland report (Burden et al, 2012) are at variance with most of the literature in their view that "Professional development in the use of mobile computing devices appears to be a largely experiential, collaborative process and formal 'training' should only be offered if requested by the teacher" (p.13).

"For iPads to be used in educationally effective ways, there needs to be strategic and coherent supports, particularly regarding 'teachers' [need for] high quality professional development" (Melhuish and Falloon, 2012, p. 8, citing Mouza, 2008).

Galvin (2010) also notes the centrality and impact of teacher "training and upskilling" to the success of the CONNECT project. Significant improvements in confidence and skills for the majority of teachers using ICT have resulted from the programme of professional development. A peer-to-peer approach has been adopted whereby a core group of highly literate ICT teachers plan and deliver this programme to the entire staff. The author concludes however that the programme needs to progress to "sessions delivered on a subject-by-subject basis" (p.vi). "...A structured training programme that allows participants to work through pedagogical as well as technical issues is seen as the most valuable way forward" (p.90).

Management and leadership

Clarke and Svanaes (2012) found that in the sometimes difficult process of introducing tablet devices "it was the drive and determination of the school leaders that appeared to facilitate the change" (p.8).

At Longfield Academy the implementation was led at senior management level by an iLearning Group which "oversees the vision and takes a strategic overview of the iPad for learning" (Heinrich, 2012, p.12). The Principal identified the key lessons from the project as follows:

Develop a clear vision and strategy for your 1:1 scheme
Define your learning culture
Define and create your user experience and support model
Work with a traffic light and reporting system
Evaluate your existing position
Know how many staff and students already own a …device
Get everyone involved –don't let a perception grow that it is a 'done deal', even if it is!
Get devices in teachers' and learners' hand as soon as possible
Record and share your experiences

(cited in Heinrich, 2012, p. 50)

Implementing ICT-led Change in Schools

This literature review has shown that there is tremendous potential for tablet devices to 'transform' teaching, learning and assessment practices within Irish schools at present. Faster, cheaper devices along with the rollout of broadband nationally will undoubtedly support the adoption of these devices in schools. However, we know from past experiences that implementing ICT-led change in schools can be challenging (Cuban, 1986 and Lee and Winzenried, 2009) and that it often takes time for 'real' change to occur. This is an important consideration for schools that decide to 'integrate' tablet devices into existing school practice as it may take longer than they initially anticipated.

There are a number of ICT adoption models in education but one that appears particularly relevant to this study is the SAMR model. SAMR stands for Substitution, Augmentation, Modification and Redefinition. Designed by Dr Ruben Puentedura it aims to support teachers to design, develop and integrate learning technologies to support high levels of learning achievement.
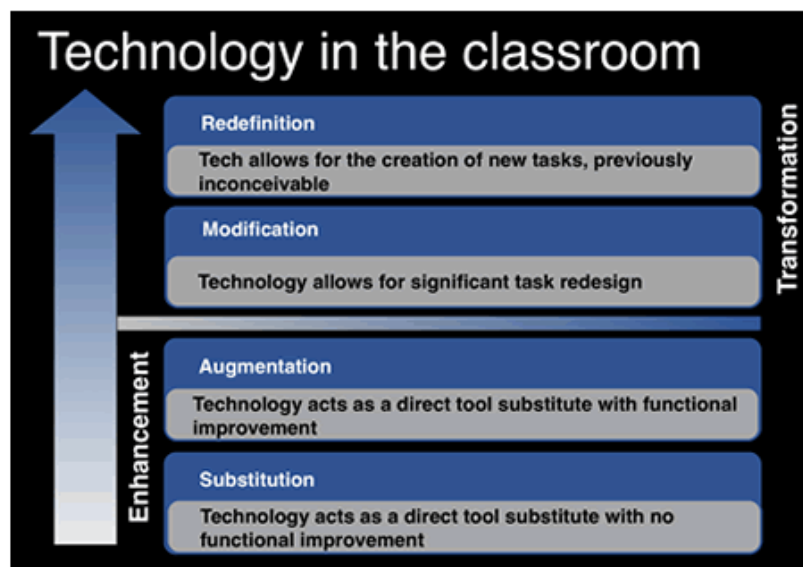

Figure 1, The SAMR Model (http://rde.nsw.edu.au/tpack-samr)

Furthermore, recent research by Sauers and McLeod (2010) found that it took time for the introduction of tablet devices to realise their potential and "that greater results were seen after year two and three than were seen after the initial year" (p. 5). Thus time is a factor that needs to be carefully considered when schools embark on introducing tablet devices.

We will return to this model at the end of the next section when we discuss the findings from the surveyed ACCS schools, as it has direct relevance there. We will map our findings to the various stages of SAMR to capture where schools are currently in relation to redefining education in their schools.

Conclusion

This literature review has captured the complexity associated with integrating tablet devices into Irish second-level schools. The emerging literature around tablets when combined with more established literature on the potential of ICT in education clearly shows that schools need to plan accordingly for any such programmes. Tablet devices undoubtedly have a place in education but each school needs to consider what implications that might have for teachers, learners and the extended school community.

Thus their introduction needs to be considered in the context of the 100MB broadband rollout for all second-level schools, the expansion of Cloud services for education and the proposed Junior Cycle Reforms. Tablet devices are here to stay and they will make their way into Irish schools in increasing numbers in the years to come either through school-led purchasing schemes or through bring Bring Your Own Device (BYOD) initiatives. The literature suggests that they can have a very positive impact on redefining teaching, learning and assessment for the learners in today's 21st century society. However, their integration into a school needs to be carefully considered if they are to realise the 'hype' that currently surrounds their use in education.

Therefore schools need to plan and the creation of an appropriate plan should involve the entire school community and should move well beyond the technical challenges such a deployment will involve. In particular, schools will need to define their vision for teaching, learning and assessmen. The vision should be so clear that students should be able to give examples of how they experience this vision in their daily school life (Microsoft Partners in Learning, 2010). The creation and implementation of such a vision may take time but it is imperative that schools begin such a process and assess their progress against it regularly.

Section 2 - Survey and Interview Findings

Introduction

This section of the report will provide a summary of the findings from a survey of all schools and selected in-depth interviews in a number of schools that have successfully deployed tablet devices in the past twelve months. This section will present the findings and these will be discussed briefly at the end of the section by mapping them to the SAMR model, which was presented in Section 1. The purpose of this section is to capture the current adoption of tablet programmes across the ACCS network and the challenges schools have faced in introducing such programmes.

Methodology

The methodology for this study involved a two-stage, mixed-methods approach.

- An initial survey was sent to all ACCS schools in March 2013 (see Appendix 1) to elicit baseline information on the use of 1:1 devices in the schools.
- This survey was followed by in-depth studies of schools with a 1:1 programme with a view to eliciting qualitative data on their experience of the 1:1 programme. This stage was also designed as an opportunity to explore and understand the experiences and perspectives of a range of stakeholders in the programmes: senior management, teachers, students and parents.
- During visits to the schools in May 2013, semi-structured interviews and focus group discussions were conducted with:
  - Senior management – a total sample of nine, including principals, deputy principals and IT co-ordinators.
  - Teachers – a total sample of 21.
  - Students – a total sample of 42.
  - Parents – a total sample of 8.

The interview/focus group schedule is presented in Appendix 2.

Survey Results from Schools with 1:1 Programmes

Table 1, Survey Responses from schools with a 1:1 programme

Number of survey respondents with 1:1 programme	Total number of students enrolled in these schools	Total number of teaching staff in these schools
5	3,850	285

The size of these schools spans a broad range; from student numbers of 420 to 1,220.

The programme was introduced in 2012 by four schools and in 2007 in the fifth.

What was the rationale for implementing a 1:1 programme in your school?

Average values on a scale of 1 to 5
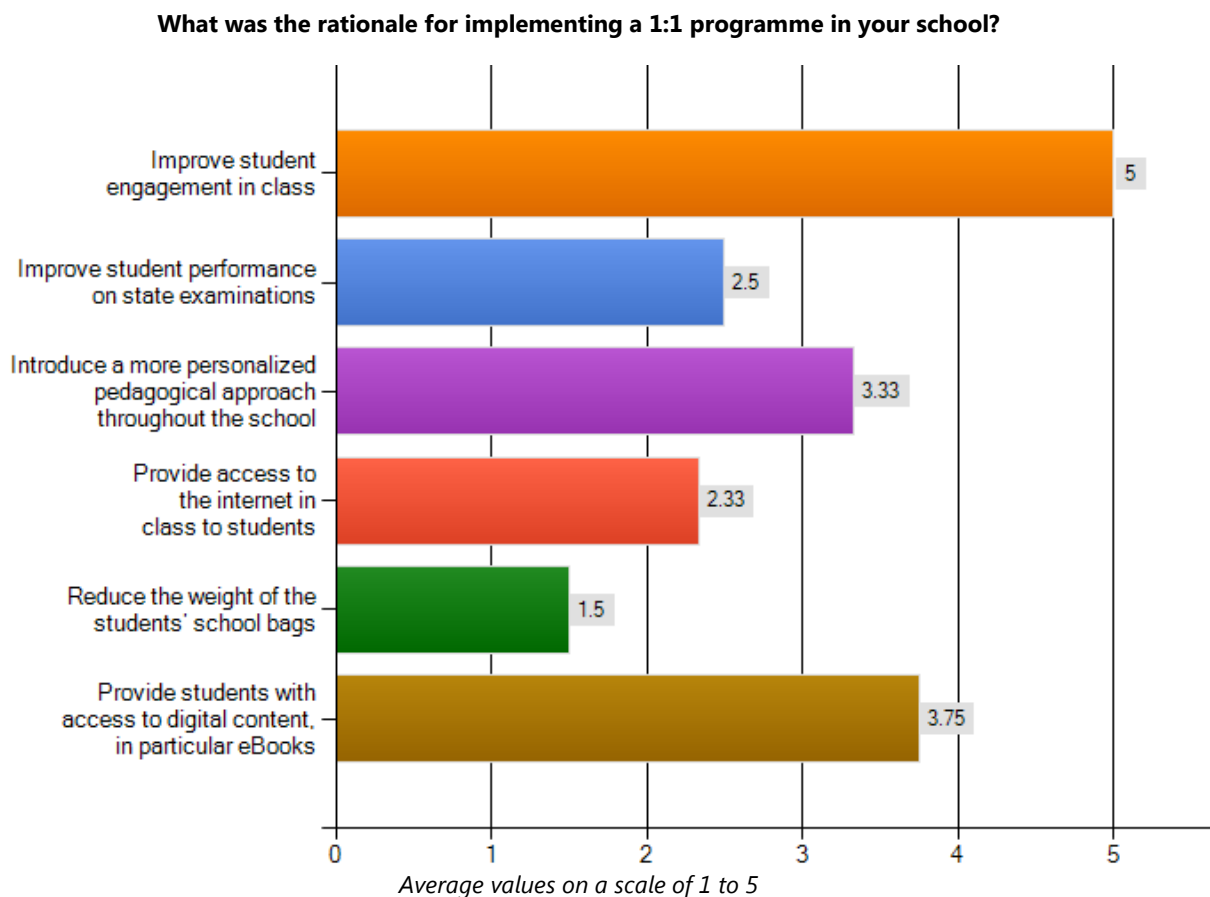
Figure 2, Rationale for implementing a 1:1 programme

The figure above illustrates that improving student engagement in class was the most salient reason for implementing the programme; providing access to digital content and introducing a more personalised pedagogical approach also ranked highly in the responses.

The responses also indicate an aspiration that the programme will assist in improving student performance in state examinations.

The more practical impact of reducing the weight of the school bag emerged as the least salient of the reasons for implementing the programme.

Programme Funding

The programme was funded in a variety of ways: in two schools the students purchased their own devices, one school received them as part of a funded project, another as a part of a prize and in another, half were purchased by the school and the other half were sponsored by third parties.
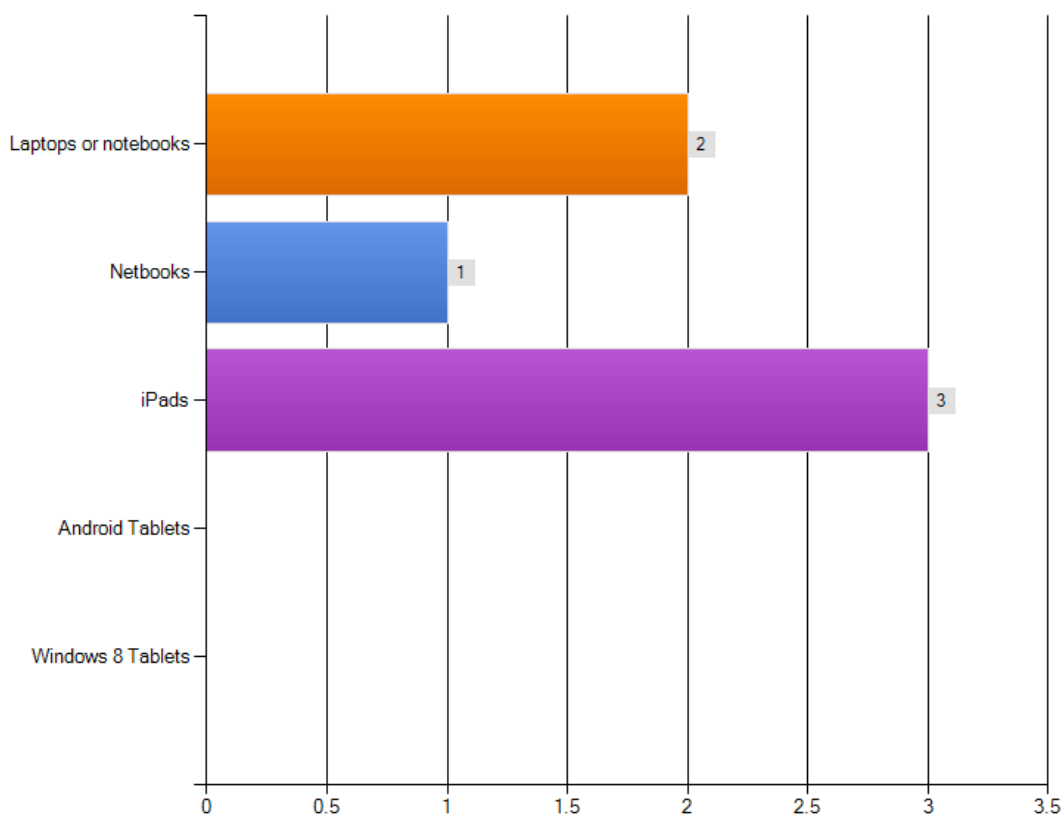
Figure 3, Type of devices being used

Table 2, Number of 1:1 devices

Device	Number
Laptops or notebooks	407
Netbooks	300
Tablets (incl. iPads)	434
Other (Fizzbooks)	133

Usage and deployment patterns

In one school the devices are being used in all class years since the introduction of the programme in 2007; in the others the programme has only recently been introduced and the devices are being used in 1st year classes, with plans to extend in the 2013-2014 school year.

The devices are used generally across the full range of subjects taught in the school.

In all schools the devices are available to the students for use at school and in the home.

Teacher use of devices

Four schools provided devices to all teachers; one purchased devices for shared teacher use.

How often do teachers use their devices in school?
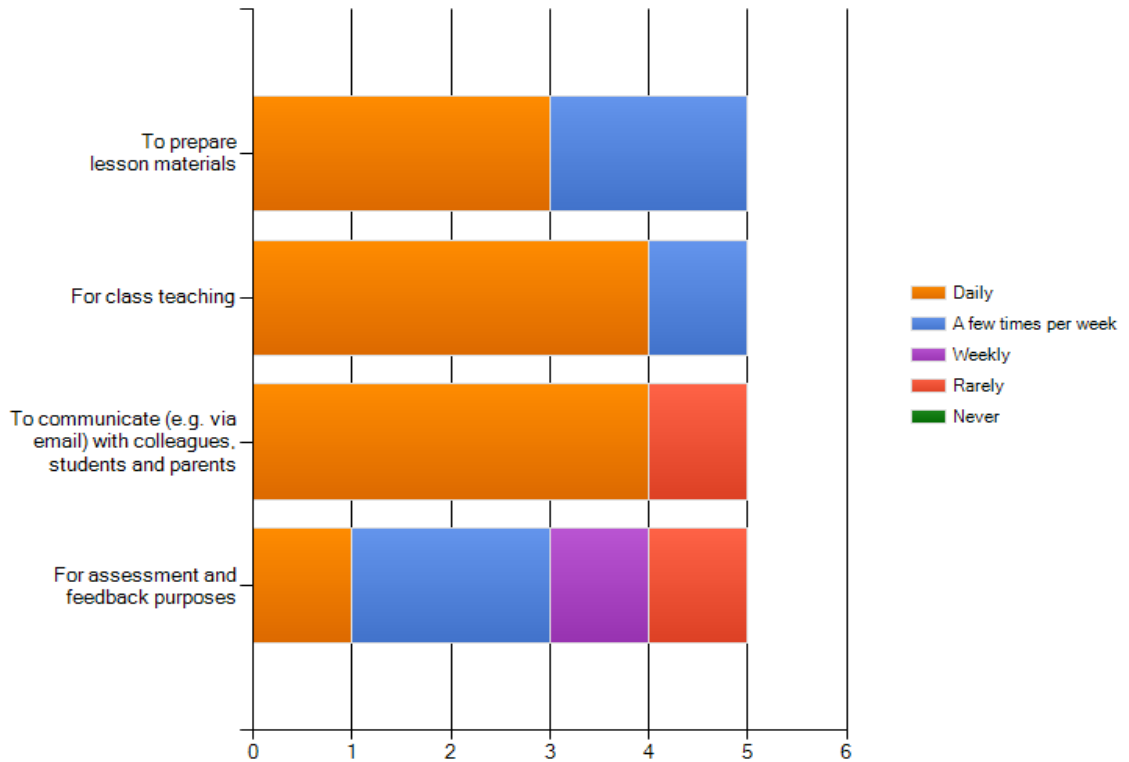
Figure 4, Frequency of use

The figure above indicates high levels of daily use of the devices among teachers for class teaching, for communicating with colleagues, students and parents and for lesson preparation. The lowest levels of use relate to assessment and feedback.

The main successes of the programme

While acknowledging that in most cases the programme only started in September 2012 and it is very early to identify the main benefits, the schools noted the following successes:

Helped the whole school community, including teachers, to have a better understanding of technology.

Students' digital literacy has improved among the cohort.

It has refreshed teaching, by making teachers more open to new ideas for teaching and learning.

It has promoted literacy and numeracy across the school.

The most obvious benefit to date is the reduction in the weight of the schoolbag.

Students are now using the iPad as a research tool when doing their homework and looking for educational Apps to improve their understanding.

It has made students more interested in learning. It has allowed for collaborative project work and faster access to information.

It has also facilitated more individualised and differentiated learning to take place in the classroom.

The main challenges encountered with the programme

Here are the comments captured from schools during the survey.

The most obvious benefit to date is the reduction in the weight of the schoolbag.

The main challenges were getting the staff on board. This was facilitated by providing an iPad for everyone and good support and training from our management company.

The cost to parents and overcoming their concerns and worries was also a challenge. But it is not an issue now or for next year's parents.

The quality of some Book Companies' ebooks are also an issue in that the ebook needs to be more than a PDF version of the book.

Finance, repairs, logistics, time to implement the project.

The cost to parents and overcoming their concerns and worries was also a challenge. But it is not an issue now or for next year's parents.

Working with three different publishers.

Mobile device management both within the school and at home, inadequate wireless network information.

The cost is prohibitive. We have a book rental scheme for textbooks but the licence for eBooks is not transferable.

Device not fast enough.

Wireless network

All the schools have a wireless network but the quality and extent of coverage varies from full coverage throughout the school to pockets of coverage in particular areas of the building.

The installation of the wireless infrastructure was funded by the DES ICT infrastructure grant and, in two cases, by school funds. Costs varied significantly; from €500 to €34,000.

Two schools reported that they had experienced no difficulties with the wireless network, as they have a 'managed system'[3]. The others indicated difficulties such as 'blind spots', the need for re-wiring to accommodate more access points and an insufficiently extensive network to cope with a greater number of devices.

Plans to roll out the 1:1 programme more broadly

The five schools that have an existing 1:1 programme indicated they planned to extend it going forward. Two of the schools are extending to include next year's 1st years and they are continuing with the current cohort as they progress to 2nd year. One school is also introducing a 'Bring Your Own Device' (BYOD) model in Transition Year. For others, the hoped-for expansion will depend on availability of funding.

Information that would be most helpful in implementing these plans

Schools indicated a need for more information on finance and funding mechanisms, recommendations around type of device to purchase, advice on wireless networks and on mobile device management.

Survey Results from Schools without 1:1 Programmes

Table 3: Survey responses from schools without a 1:1 programme

No of respondents without a 1:1 programme	Total number of students enrolled in these schools	Total number of teaching staff in these schools
26	14,843	1171

---

[3] The system in this case is remotely managed by the wireless service provider under an annual support agreement.

Wireless networks

At the time of the survey fifteen schools had wireless access – most of those only in some parts of the school, ranging from 10% of the area to 75%; nine had no wireless access at all.

> *In some parts of the school the coverage is weak - 75% coverage.*

> *Only in one room which had no wire connection to internet.*

> *In one area where there are 4 classrooms. Powerful coverage. Rest of school only caters for one computer per classroom.*

> *Currently have wireless in a few classrooms from a home use type device. Works well within a small range.*

> *Long term hopefully..... would consider system based on smartphones from cost perspective.....*

> *Some areas, but currently a limited availability for teachers only.*

> *Just some areas, staff room and surroundings, 10% of school.*

> *Technically throughout the school but with old buildings etc it is very patchy and unreliable in some areas. Not sufficient for the purposes.*

> *About 50% of the campus has wireless.*

> *We are one of the schools picked to receive high speed broadband.*

> *Full coverage in all areas.*

Eleven of the schools plan to install wireless networks: two of them installed it at Easter 2013 (after the survey), the others are planning installation within the next three years, in some cases with a caveat around the availability of funding.

Plans to deploy 1:1 devices in school

Twenty schools responded to this question. Three indicated definite plans to deploy 1:1 devices; three were definite about having no such plans; the others indicated that they would consider it in the longer term.

Some actual responses:

> *We are considering a trial of the devices with some of the SPTU classes in 2013/ 2014. This will depend on cost.*

> *Not at the moment though we do have a few SEN students who have been provided with laptops by the Dept.*

> *Possibly, when appropriate infrastructure and funding is put in place.*

> *Have not considered doing so as our broadband speed is very slow.*

> *We will wait and assess the benefits when the ty programmme is running more effectively. We would like to hear the opinion of the DES on the issue. Then we will plan. Some of this is media driven on the weight of the bags. Cost and logistics will force us to move cautiously.*

Information that would be most helpful in reaching a decision on the roll out of a 1:1 programme

There were 20 responses to this question; the responses indicate that schools want information on two broad categories relating to the use of 1:1 devices:

Costs and Technical issues

- Costs (including costs to parents) and funding models.
- Recommended suppliers.
- Guidelines on installing a wireless network.
- Information on maintenance, provision of on-demand technical support.
- How to ensure the safety of devices.

Teaching and learning issues

- Best device type as a learning tool.
- Information from schools which have experience of such a programme e.g. on modes of implementation, issues arising, evidence of take up by teachers and students, the challenges of BYOD.
- The time cost to the school (and Principal) in supporting the technology
- Research on the impact of devices on learning, information on educational trends in this area.
- Information on teacher training on appropriate use of devices as an educational tool.

- More material trí ghaeilge.

Actual responses:

The survey captured a wide range of responses from schools in relation to the types of information they would find most helpful. This ranged from additional information on the practical challenges schools have encountered to date to advice on designing appropriate learning activities for students. Here are the actual responses we captured:

The NCCA plans for technology in the examinations. We have three fully equipped computer rooms and every room has a teaching computer and data-projector. These are constantly in use so for us, the next step will depend on grants and curriculum development.

Advice on the most beneficial device as a learning tool which develops skills. Currently there does not seem to be any stand out product.

When could we have a high broadband speed?

Research in Ireland that demonstrates that pupils will learn better as a result. Many teachers are very sceptical about the benefits of iPads for every student.

Evidence that eBooks enhance the student learning experience above and beyond hard copies. Evaluative data on the tablets/eReaders available to schools. Educational trends in this area.

Guidelines on installing a wireless network. Average costs, recommended suppliers. Which type of student tablet is working best for schools? How are schools funding such devices? Who is responsible for maintenance of student devices?

Info on infrastructure, appropriate funding and teacher training on appropriate use of devices as an educational tool.

The experience of other schools. Information on available funding/subsidy scheme.

Information on how to ensure the devices are maintained i.e. costs and how damages are treated.

The technical difficulties and also any issues that other school found to be problematic.

Info sourced from the schools that have experience of 1:1 - warts and all!

> *Funding, how it's been implemented in other schools and evidence of take up with teachers and students from other schools with details on how it's being used.*

> *Details re. infrastructure grants, provision of devices, provision of on-demand technical support.*

> *How devices support the learning objectives in the classroom (and not the other way round!). The time cost to the school (and Principal) in supporting the technology.*

> *Feedback from other schools that have gone through the process. Costs to parents, Educational value.*

> *International experience. Financial cost to school. The challenges of BYOD information.*

Findings from interviews and focus groups

Teachers

The twenty-one teachers in the focus group discussions represented a broad range of subject areas in the schools: Languages, Science, History, Geography, SPHE, Art, Mathematics, and SEN.

In general, teachers saw the devices in a positive light but were also clear on the challenges and issues emerging for teaching and learning; for themselves and their students.

Benefits/ Positive Outcomes

A key and significant benefit noted strongly in all the schools was increased enthusiasm for and engagement in learning by the students, who are excited by the possibilities offered by the devices.

Students are becoming more independent in their approach to learning, for example in using the devices as tools for research, although there is much scope for development in this regard, with some teachers indicating that students are still expecting to be 'teacher led'.

The students are observed to be much more organised in terms of maintaining and easily accessing their notes, homework assignments and timetables. This results in smoother classroom functioning, fewer delays and less potential for 'confrontation' around lost notes, missing books etc.

The devices are being used for communication between students and teachers in a variety of situations, for example:

- Teachers are emailing resources and homework to students – this is particularly beneficial in cases of student absence.
- Students can use the devices to record homework, for example where an injury makes writing difficult.
- Teachers are beginning to use the devices to provide feedback to students on their work.

Teachers are using the devices for class preparation and research.

At a very practical level, the amount of photocopying by teachers has been reduced.

Challenges/Issues

A key issue relates to the comparison between ebooks and standard textbooks and differences in modes of use.

- Teachers noted the responses of some students to using the ebooks and their preference for books, with some having a set of books as well as the ebooks. (See also the section in this report on student responses.) In such cases, there is a double cost for parents – iPad plus books at home.
- The lack of interactivity in the ebooks is felt to be an issue, with teachers noting the difficulty students have in making notes, highlighting text etc. and some questioned their suitability for studying purposes, e.g. difficulties with reading on a screen for long periods.
- The use of e-books can be time consuming; it takes time for students to open the books and to reach the right page and there can be delays in loading the ebooks in class.
- Teachers expressed disappointment with the quality of some of the ebook content.

Some teachers were concerned by poor performance on written tests by students who had appeared to produce very good work using the devices and highlighted the drawbacks of a 'cut and paste' culture among students.

The lack of written evidence of student work was highlighted by several teachers and the challenge this poses in terms of monitoring performance. This is further compounded by the fact that students will be expected to produce written work in their state examinations.

Not all the students have broadband access in the home and this can be difficult in terms of organising/assigning work.

In some schools not all of the first year group have iPads. This dual system means that in some cases teachers have to provide two sets of homework – one for iPad students and one for those with books. This can lead to classroom management challenges.

At a technical level, the quality of wireless infrastructure within the school needs to be sufficient to support the devices.

Developing professional practice/communities of practice

The teachers in each school had received training in the use of the devices and all of those interviewed would like more CPD so as to more fully realise the potential of the devices. In particular they want subject-specific professional development and suggest a model of ongoing training which allows for experimentation, application in the classroom and follow-up discussion and questioning. They recommend that training be started well in advance of the introduction of the devices into the school. However, management and teachers were aware of the significant time investment that was required to ensure that teacher confidence and competence in using these tools was developed. Though significant time was initially devoted to training, much of this focused on becoming familiar with the devices and their functionality. While important, this area of CPD is not sufficient to ensure the type of real transformation as illustrated in the SAMR model in the previous section.

The importance of having staff members with specialised skills in ICT who can give advice and support was noted as being critical in deploying these devices.

Sharing ideas for practice and experiences of what works well is felt to be crucial, and in this regard, there is scope for increasing the potential of the 'community of practice' (see Lave and Wenger, 1991) by facilitating the exchange of information and ideas among teachers.

Teachers have started on such a process by, for example, identifying websites that are relevant for particular subject areas and grouping web resources together but they acknowledge that such collaboration could be increased and perhaps be more formalised and systematic.

They have also remarked on the way in which the students are 'teaching the teachers' by bringing in new ideas for use of the devices and information on Apps which could be used in class.

Classroom Management

Teachers identified challenges in terms of classroom management. Student use needs to be monitored because of the easy availability of games, email alerts and social networking while they are using the devices and effective monitoring can be difficult to achieve. One school is planning to block App downloads on the devices as a way of dealing with this issue.

There is variation in the type and extent of usage among teachers in all schools, with some teachers using them more frequently than others and in more innovative ways. In the main there was little indication that the devices are being extensively used to facilitate collaborative, group learning.

Use of the devices

The devices are felt to work particularly well in activities such as:

Filming and gathering content for classroom discussion

Languages – especially for pronunciation activities

There are varied responses to the use of ancillary devices, such as Apple TV, with some teachers finding it very useful and others not. It should be noted that devices such as Apple TV can facilitate whole-class or teacher-directed teaching, and this may well be a preferred teaching strategy for some teachers.

Some noted a preference for laptops over iPads as animations will not run on the iPad. This can be an issue in Maths where much of the content is Flash based.

Models of teaching and learning

Teachers were clear that their own role is still central and that the technology is a professional tool among others. Their practice is affected by factors such as:

- The need to ensure that students are prepared for exams – some teachers commented that exploration of innovative methods of teaching and learning using the devices was so time-consuming that they have returned to their "old ways of teaching" so as to ensure that the students are ready for the exams.
- Teacher confidence in the use of the technology
- Access to and knowledge of resources and the potential of the devices
- In some cases, teachers felt under pressure to use the devices because parents had spent money on them.
- Students had expected to use the device more in their everyday classroom activities. However, this did not always occur and there were varying usage levels across teachers and subject areas.

All the teachers felt that periodic reviews of the 1:1 device programme should be conducted so as to gather 'lessons learned'.

Tablet devices and teaching SEN students

Teachers report that SEN students want to use these devices and enjoy using them. They feel on the same level as other students with access to the iPad. However, they have difficulty navigating the ebooks and find this challenging and time consuming.

A key issue is the limited availability of suitable resources for children with Moderate and Mild Learning difficulties. There is a lack of appropriate reading material; some of the resources available are not age appropriate in terms of content although the reading level is suitable.

Teachers suggest that the iPad and a keyboard are more effective than a laptop for students with special needs. For example, students can use them to create audio

recordings – they can record their homework rather than writing it if this is difficult for them.

However, breakages can be an issue with students with special needs.

Some parents are not happy with devices being taken out of school for projects such as filming on school outings. Teachers felt that the value of this needs to be communicated to parents. This is also an issue with non-SEN students.

This illustrates the need to have a usage policy around the devices and clear 'rules of engagement' for teachers and parents.

Students

A total of 42 students (comprising approximately half boys and half girls) took part in focus group discussions.

What they like

There was a very strong response in relation to the benefit of lighter school bags, even though they still have hardback copies (and in some cases textbooks) and this adds to the weight.

They liked the fact that the ebooks were more interactive and more graphic than their textbooks. The ability to zoom in on a word, to use the device for learning languages and checking correct pronunciation also had considerable appeal; as had the general research capability facilitated by the devices. There were conflicting opinions on the suitability of the devices for Maths.

They enjoy using the camera on the iPad and would like to use this more often.

They like having easy access to audio and video clips on their device.

They liked a range of Apps including those for organising their notes and homework and spoke of being more organised and being able to find material more quickly and easily.

They reported liking the fact that teachers can communicate with them via email and, for example, send them homework. However, some do not have access to broadband in the home and this can pose problems at times.

In some schools teachers are using websites, such as SkillSpace, for posting material to help them revise for their tests.

Challenges

The students were both insightful and frank about the difficulties posed by the devices. The strongest response, common to all the groups, related to the distraction caused by ready access to Apps and games and the temptation to download, play them and check social media while in class. The students themselves requested and recommended some

form of control on this availability. This was their key recommendation to others considering introducing the devices.

They identified similar difficulties and drawbacks with ebooks as those reported by the teachers in relation to:

- Writing and highlighting text
- Loading books in class
- Finding the right page in the book
- Using the zoom feature on some books

Some have experienced sore eyes and headaches from using the devices for long periods.

Out of one group of 26, 17 prefer to study with books rather than on the device – this was a strong preference noted across all the groups.

Use of the devices

They would like to see more teachers using the devices and compare the style and frequency of use across the different subject areas.

In general, students see these devices as both a home and school device and want to have the opportunity to load Apps and access them at home. In this way they see it having a dual purpose: to support learning in school and at home while also acting as a leisure device at home. To date, some families and schools have found this dual role challenging.

They report little use of them for group learning activities within school.

Approximately half of the students report that they would miss the devices if they became unavailable.

Senior Management

The Senior Management team in each school took part in focus group discussions; School Principals, Deputy Principals and IT Co-ordinators participated.

Rationale for introduction of 1:1 initiative

The responses were consistent with the survey in terms of management rationale for the introduction of the devices: student engagement with learning, the weight of the school bag, a desire to be up-to-date with educational developments and to provide the best learning outcomes for their students.

They researched experiences elsewhere before going ahead with their own plans.

Programme and funding models

The details of programme and funding models varied but all were in the first year of implementation and were rolled out in 1st year classes. Schools had different support and deployment models, two schools went with a managed service provided by a third party IT company. The other school that took on this role found that it was extremely time intensive.

Costs

On average students paid between 650 and 750 euros, depending on their subject choice to buy an iPad complete with their ebooks. The schools were conscious of the cost and invited the local Credit Union to attend the inaugural meeting on the programme. Typically the Credit Union designed a package where families were expected to pay between 4 and 5 euros per week.

Control and monitoring of student use

Control and monitoring of student use of the devices is a challenge experienced by all the schools. In response, one school has decided to block access to Apps in the second year of the programme. In this case students will only have school approved Apps on their devices.

This new policy is bringing its own challenges and some parents feel this is too restrictive. The management plan to communicate further with the parents around this. Clearly the device can perform multiple roles (such as a leisure device and a learning device) yet schools want to ensure it is primarily used for learning in schools. If students have their devices loaded with gaming Apps and other material this can distract them in class or during homework, hence the need for restrictions.

Involving parents

All are conscious of the need for parental support of the initiative and are active in communicating with and in providing training in ICT for parents.

CPD for Teachers

Responses from the Senior Management teams on the topic of CPD for teachers mirrored closely those of the teachers themselves. They too identified the need for subject-specific professional development, for opportunities to exchange skills and ideas, and the related demands on teacher time were all noted. They also acknowledged the scope for

developing a practice of teaching, learning and assessment which more fully utilises the potential of the devices but commented on the existing workload of teachers.

Resources

They noted the need for more Apps in support of the curriculum.

Access to broadband

They are conscious of the difficulties posed by the lack of broadband access for some students in their homes and the varying quality of access within the schools. All schools were aware of the need to provide industry standard wireless connectivity and the challenges this can provide in terms of the size of the school and the associated cost.

Lessons learned and key advice

They are all conscious of being in an 'experimental' and learning stage with their initiatives and are keen to share experiences with others similarly involved. They have reflected on the lessons learned from the first year of implementation and have taken action on those aspects of the programmes which need to be adjusted/amended.

Two of the schools plan to implement a 'Bring Your Own Device' scheme for the 2013-14 school year.

In some schools, meetings with parents and the ordering of books are taking place earlier than last year – a lesson learned. They all note the importance of clarifying with parents the costs, the commitment and the changes involved in the initiative.

They recommend that schools be alert to the cost of the ebooks and the impact on book rental schemes.

They recommend that such initiatives be part of a whole-school vision of teaching and learning and an exploration of the range of possibilities presented by the devices. Dialogue within the school is crucial in this regard and in facilitating teacher support for the initiative.

Parents

A total of eight parents (seven mothers and one father) took part in focus group discussions.

Benefits/ Positive Outcomes

In general the parents were very positive in relation to the iPad programmes and noted the enthusiasm of the students for using the devices, while recognising that their value as a learning tool is still being explored and has not been fully realised.

The most strongly noted benefit was the reduction in the weight of the school bag.

The initiatives have taught students to be more responsible – they have to charge the device, take care of it and remember to bring it to school.

The devices provide ready access to information with everything in one place and in particular they support visual learners and language learning.

Teacher use of email to communicate with students was welcomed.

Students can no longer report that they forgot their book or their homework; with everything now stored in the Cloud this eliminates such excuses.

One parent with a number of children already in the school noted that the transition to second-level was easier for their child this year as they had all their materials in one place.

Parents' own understanding and use of devices is increasing.

Issues, concerns and challenges

Costs

For some parents the cost of the device initiative is a concern – in some cases, initial uncertainty about the full costs did not encourage confidence among the parents. In addition, if students want textbooks as well as the devices, this presents a significant cost demand on parents. Schools did provide opportunities for discussion with banks and Credit Unions at initial information meetings on the introduction of the programme.

Some parents are buying the device through the school but not from the school and would prefer to buy from the school directly and have their agreement with the school.

Introduction to the programme

All acknowledged the benefit of information meetings organised by the schools. However the timing of these was not ideal and parents felt that they needed more time or 'advance warning' before the initiative was launched.

The parents noted that there were some initial teething problems in setting up the programme. This is something other schools should plan for; schools need to be aware that significant planning needs to take place well in advance of implementing the initiative. We will outline some of these issues in the next section.

Some issues with ebooks

Parents voiced concerns around:

- Lack of clarity around the possibility of siblings sharing books
- Lack of consistency from the publishers in the messages being conveyed to parents at information meetings
- The cost of ebooks

Potential for increased usage

The parents are aware that there is variation in the patterns of usage among teachers and for some this is frustrating. Some are also disappointed with the levels of interactivity in the use of the devices. Many parents had hoped the multimedia functionality within the device would be used more, while in reality students are still mainly engaged in less active learning activities, such as reading.

Training and support for students

Parents also raised the issue of students requiring training and support in the use of ICT in general and the devices in particular. They suggested the following:

- An induction course on how to use the iPad
- Timetabled lessons in ICT

Support for parents and monitoring student usage

Parents also need training and opportunities to become familiar with the devices and their potential. This would assist them in monitoring and understanding their children's use of the devices, for example in relation to homework tasks and access to Apps and social networks.

The timing of this training should be pre-summer holidays for parents of the incoming year group if possible and some on-going training so as to address emerging issues and questions.

The biggest challenge noted by all parents is the issue of controlling use of the devices. There is a need for rules around the use of the devices in the home, and many acknowledge the various difficulties involved in this. There is need for advice and exchange of experiences and strategies in this regard as this is a new challenge for parents. They felt parents needed to be better prepared for their role in monitoring homework and learning progression in this new era.

A home or school device?

In general they see it as a school device that moves between home and school. Writing is still a key skill and there is some concern that students may miss out on developing their writing skills – the parents see the devices being used in tandem with copies.

In some cases parents felt that the arrival of the device had impacted negatively on book reading outside of the curriculum.

The devices appear to be 'attached to' the students all the time.

Sore eyes and headaches

As in the student feedback, parents reported instances of sore eyes and headaches among their children after prolonged periods using the devices.

Concluding comments from parents

Initially parents had some concerns about theft and bullying by some who do not have access to the devices. No such issues materialised.

Parents comment that the value of the programmes will become clearer with the exams and their questions about the type and level of learning may be answered. This resonates with the comments by some teachers around the pressure to be seen to deliver in terms of exam success.

They would welcome a review of the programme on an on-going basis.

Parents understand that they, their children and the entire school community are part of a programme in its early stages, with the benefits and pitfalls inevitably involved in innovation and they acknowledge the work and commitment of the management and teachers.

Conclusion

The schools that have introduced tablet devices have done so during the last academic year, September 2012 to June 2013. They are still at a very early stage in these programmes and already they have learnt and shared a tremendous amount of knowledge with their colleagues in other schools. Section 2 illustrates that the introduction of the tablets has had a positive impact in the schools, particularly in terms of student engagement and motivation. Teachers too have found that the devices have re-invigorated their teaching and helped them to reassess how they design their learning environments. Teachers are still coming to terms with the presence of these devices in their classrooms and have highlighted the need for additional subject-department CPD.

From reviewing the evidence gathered in Section 2 it appears that most schools are at the *Substitution Stage* in the SAMR model and this is to be expected considering they have just completed one year. The teachers recognise that they are still at an early stage in terms of 'transforming' their own teaching, learning and assessment practices. However the arrival of the tablet devices has almost acted like a Trojan horse and their presence has led many teachers to question their current practices and how they might move to more student-centred approaches in Year 2. All schools commented on the need for professional development that moved beyond the device and focused more on their subject and how they could redesign learning. In one case the school is already reviewing the layout of classrooms so that they better support a more interactive and collaborative learning environment.

To date a number of schools have led the experimentation in terms of deploying tablet devices in their schools. Their experimentation is paving the way for others and they have worked closely with technology companies, publishers and broadband providers to address some of the issues captured in this section. Undoubtedly there is now an urgent need to provide additional supports to all schools in relation to the deployment of tablet devices and in particular how they can redesign student-learning experiences. Such a transformation takes time and requires the provision of support for teachers, management and parents. There is clearly a need for schools to share their experiences internally and externally so this transformation can happen in a timely manner. The following section, Section 3, will outline some steps schools can engage in when implementing a one-to-one tablet programme.

Section 3 - Practical Guidelines for Schools
Implementing a one-to-one programme in second-level schools

Introduction

In this section we outline a series of practical steps and resources for schools that are considering the implementation of one-to-one tablet programmes. These guidelines are informed by the literature review, the evidence from the school visits and from our experience in working with schools on similar initiatives. Schools intending to introduce such programmes will need to take a holistic approach and move beyond asking "What technology do we need?" to "What information do we need?" and "What relationships do we need?" (November, 2013). Schools therefore need to move beyond a focus on the device to be used to articulating their vision for learning in the school.

In this section we will outline a four-step process whereby schools **Plan, Prepare, Implement and Evaluate** their programme. Such a model is already in place in the State of Victoria in Australia (Department of Education and Early Childhood Development, 2011) and it resonates strongly with the approach recommended by the Department of Education and Skill's eLearning Handbook (NCTE, 2009). The process can be applied if a school is implementing a tablet device, laptop or smartphone initiative and whether the device is provided by the school or students bring their own device (BYOD) to school.

In each sub-section we provide some background ideas and questions that schools might consider and a short list of suggested external resources that schools could use in completing this process. This process should be aligned to other school planning activities, such as School Self Evaluation (SSE), and not treated as a standalone 'IT' project.

Step 1: Vision and Planning – Transforming Learning

21st Century Learning

Schools should start by considering their vision for teaching, learning and assessment in today's society. In the not-too-distant future every student will have access to a digital device, just as every student has a pen and a notebook today. But just as a "better pencil will not lead to improved learning, "better technology" might not either" (November, 2013). Alan November suggests that we should view this as a learning problem rather than a technology problem and ask the question "how do we design learning for today's students in our second level schools?"

By focusing on learning, schools can take a more holistic approach to this issue and move beyond the question of "what device should I select?" Schools can consider the "entire ecology of learning" (November, 2013) and focus on issues such as how to assess learning, how to organise the school day, potential short courses and the role of parents and the wider community. However, the most important task is to "reconsider pedagogy and weigh such options as flipped learning, self-directed learning, online learning and peer

instruction" (November, 2013). Thus the key starting point for a school is to focus on the key initiatives dominating discussion in second-level schools today. These include the following:

- Junior Cycle Reform
- School Self Evaluation (SSE)
- National Strategy to Improve Literacy and Numeracy

Schools are already working towards implementing change around these initiatives and the integration of tablet devices should be central to discussions rather than peripheral. The focus should be on how schools transform learning using digital technology rather than simply substituting older technology and routines with tablet devices. However, in line with the SAMR model, it should be noted that many schools may need to start at the substitution stage while they constructively work to move towards the Augmentation, Modification and Redefinition Stages (Puentedura, 2010).

Therefore schools should begin by reviewing existing practice and asking the following questions:

What is our school vision for learning in the 21st century?

What is the vision of each subject department for learning in the 21st century?

Much of the discussion will involve teachers and administrators but there is also a need to involve students, parents and potentially the local community. The purpose of such consultation is to build support for the deployment of a one-to-one programme within the school. Experience has shown that parents and the local community often need to be informed as to why such an initiative is being undertaken. Presenting evidence on why it is essential to redesign education in today's society (Hallissy et al., 2013) can result in greater buy-in from parents and the local community. In the course of providing a rationale for the programme, schools can also address the practical issues such as cost and can engage in conversations with current and future parents regarding ways to reduce the costs over time. For instance, a number of schools are already engaging with their future students while in Sixth Class to alert them of the need to have a tablet in First Year.

> **Key Points**
>
> - Consult the NCTE e-Learning Handbook
> - Form a School Committee to lead the Plan
> - Start with a Vision you are comfortable with and that is achievable

Experimentation

It is now well recognised that there is a need to 'experiment' with emerging technologies, such as tablet devices, in schools (Ng'ambi and Bozaleck, 2013). We are still very much in a learning phase around the role of tablet devices in Irish second-level schools and therefore

schools should begin to experiment around what it is possible to achieve. A good place to begin such experimentation is in 1st Year or in Transition Year (TY). Schools can design 'new' learning experiences where students have access to learning content in advance of class and then engage in collaborative learning activities during formal class time. Such a notion is often referred to as a flipped classroom. They can use the Cloud to further explore the notion of collaboration, using virtual spaces by extending learning beyond the walls of the classroom.

Many schools are also 'experimenting' with devices in an effort to ascertain what tablet best fits their subject department. Some schools are approaching suppliers to 'trial' a series of devices so that teachers can explore the features of the devices and test their battery life and suitability for deployment in a school setting. Schools are involving students in these experiments and capturing their views on the features of the devices and more importantly how they are being used to transform learning. Schools may wish to experiment with devices other than tablets, and this might include laptops and smart phones. In designing and implementing such experimentation, schools should constantly reflect on the impact it is having on the quality of student learning. Ultimately the goal is to improve student learning and therefore the device and how it is used needs to support this.

New Possibilities

Providing digital devices to students and teachers opens up new possibilities for schools. When these devices are combined with secure robust Internet connections then schools have the opportunity to redesign learning and access a wide range of benefits.

Some of these benefits may include:

- Moving beyond the 'traditional' textbook or ebook by providing access to a wealth of learning resources online and in the Cloud
    - Videos, blogs, websites
    - Educational Apps
- Extending the walls of the classroom
- Supporting virtual collaboration between teacher and students using Cloud services
- Storing student learning artefacts in the Cloud so that they are accessible from home and school
- Empowering students to create their own learning resources

In order to create a vision and to plan accordingly teachers require examples of what teaching, learning and assessment could look like using these devices. They need to know what is possible and to discuss the possibilities with colleagues and other educational professionals.

In advance of using the tablet device and the Cloud in their own teaching they need to become competent and confident in using it for their own professional productivity. For instance sending and receiving email via a Cloud service, such as Microsoft or Google mail, and collaborating with colleagues on a document in the Cloud. In this way staff will experience the benefits first-hand.

Redesigning Learning

In constructing a school learning vision staff should consider the following questions:

- What is the role of the teacher?

- What is the role of the student?

- What kind of learning experiences do we want to create?

- What kinds of resources does our subject department possess to support this model of learning?

- What internal resources do we have to promote and implement such a model of learning?

- What additional supports do we require?

- How might tablet devices transform learning in our subject?

- What could we do differently using these devices?

Key Points

- Engage in an informed discussion around redesigning learning
- Encourage subject departments to engage in such discussions
- Identify one or two areas where staff can 'experiment' with the tablets or similar devices to 'transform' how they currently teach
- Link such decisions to the overall school learning plan

Tools to Help You

The NCTE e-Learning Handbook (2009) is a comprehensive resource that provides a structure for schools to engage in planning for the use of ICT.

Available for download at:
www.ncte.ie
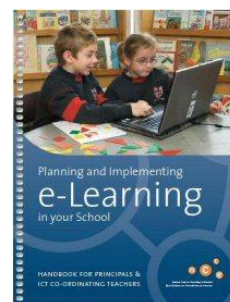
The 21 Steps to 1-to-1 Success is an excellent resource that has links to additional resources schools can access to assist them in creating their vision for redesigning learning.

Available for download at:
http://www.ipadsforeducation.vic.edu.au/userfiles/files/ipads_for_learning_21Steps.pdf

Redesigning Education, published by Microsoft Ireland, provides a comprehensive overview of what differentiates teaching and learning in the 21st century and includes links to and examples of how schools can redesign education.

Available for download at:
http://www.teachnet.ie/Blog/Lists/Posts/Attachments/478/MSLearningPaperMay13_1_1B3354D7.pdf
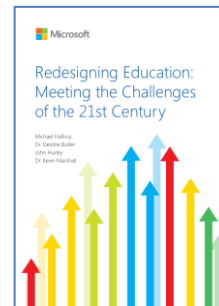
The *ITL Planning Resource* provides schools with a planning template and resources to enable them compose a vision and an implementation plan. The resources were developed by Microsoft and the Stanford Research Institute (Microsoft Partners in Learning, 2010).

Available for download at:
www.is-toolkit.com

Step 2: Preparing for Change – The Technological Infrastructure

The availability of a high-speed broadband connection is essential if schools are to realise the full potential of tablet devices.

Broadband

Currently the DES is rolling out 100 MB broadband to all second-level schools and this will be completed for all schools by September 2014. H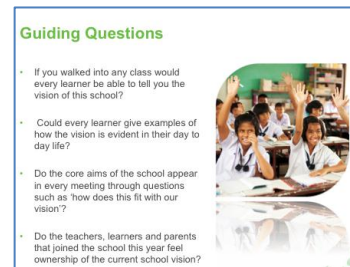owever, the connection on its own will not transform teaching, learning and assessment. In fact the arrival of the broadband is only the first in a series of steps a school will need to undertake to maximise the benefits of their connection. Schools that have not received their broadband should ensure that they prepare for the arrival of the 100MB connection by ensuring they have a presence in the Cloud and that they have reviewed their wireless connectivity within the school.

A Presence in the Cloud

Many schools are currently moving services, such as email, to the Cloud (i.e. services, such as email, school intranet, and file storage, are hosted on third-party servers for your students and staff). The two most popular Cloud services in schools today are Google Apps and Microsoft Office 365, which are both free to education.

> **Here are some key questions to ask?**
>
> - What level of wireless coverage do we have in the school?
> - Does our school have 100 MB or higher broadband connectivity?
> - Has the school a presence in the Cloud?
> - What devices do teachers and students have to access the Cloud?

For more information check out the following:

Butterman, E. and Patton, C. (2013). *Demystifying Cloud*. [Online]. Available at: http://www.scholastic.com/browse/article.jsp?id=3755252. [Last accessed June 2013].

Morrison, N. (2013). *Technology in schools: saving money with cloud, open source and consortia*. [Online]. Available at: http://www.guardian.co.uk/teacher-network/teacher-blog/2013/feb/21/technology-cost-savings-school-cloud-open-source. [Last accessed June 2013].

By deploying a Cloud-based solution a school can enable teacher and students:

- To access their school email remotely via their tablet or smartphone
- To access their educational content from inside and outside the school
- To collaborate with one another and their peers using shared online spaces

In addition many schools are now looking at ensuring that their Cloud services are connected to other student data systems, such as ePortal or a school Virtual Learning Environment (VLE). Students can now access these services remotely by using the same username and password, thus giving them single sign-on.

Wireless

When schools deploy multiple tablet devices in a school setting they need to ensure that their wireless infrastructure is fit for purpose. The Department of Education and Skills is finalising a set of Revised Technical Guidance Documents for ICT in Schools. This document will focus on the provision of wireless services in schools and will include guidelines on the introduction and use of student devices. This is the first time such a document will be published by the DES and it will be a welcome resource for schools.

Schools, unlike homes and other settings, place high demands on wireless networks. Consider that a class or multiple classes may wish to access the wireless network at the same time; you will require an enterprise [4]solution that can deliver a reliable service in a high-density environment. A good place to start is to visit other schools that have invested in upgrading their wireless network and discuss what was involved.

> **Things to remember:**
>
> - A school is the most demanding WiFi environment in terms of density of users and movement of users around the building
> - Only enterprise quality equipment will deliver acceptable wireless service in school
> - Use only experienced installers who are wireless specialists
> - In planning your wireless rollout consider that your users (teachers and students) will have multiple devices accessing the wireless in the future.
> - Considering that you will have multiple devices per user in the future (this will be a minimum of two) identify reference school sites that are currently supporting your maximum number of planned users.
> - Get independent advice on your deployment as this will save you time and money in the future

---

4 An enterprise solution deploys business standard technology appropriate for a large scale ICT project, as opposed to deploying equipment designed for domestic use.

For further information check out the following:

Cisco. (2013). *Australian Educators Deploy Robust Wireless Network*. [Online]. Available at:
http://www.cisco.com/en/US/prod/collateral/wireless/c36_694199_00_aedrwn_cs_6.pdf.
[Last accessed June 2013].

Intel. (2013). *Going Wireless: Network as Mobile as the Students Who Use Them*. [Online]. Available
at:
http://www.intel.com/cd/corporate/education/emea/eng/ireland/elem_sec/tools_resources
/learntec/167289.htm. [Last accessed June 2013].

Devices

The selection of a tablet device is a key decision once you have addressed issues such as a vision for teaching, learning and assessment.

> Schools have three main choices when it comes to tablet devices. They are: Apple iPad, Windows 8 devices and the Android devices.

Early research in the UK around the use of the first tablet devices in schools identified the following criteria as being important in selecting a device (Sheehy et al., 2005):

- Cost
- Boot-up Speed – the time it takes for the device to switch on
- Robustness
- Software and content appropriate for student age level
- Use of stylus or pen

Though tablet devices have developed considerably, many of the issues listed above are still relevant today. Schools need to consider the environment in which the devices will be used and address the following key questions:

> **Teaching and learning with the device**
> - What device best supports our vision for learning?
> - Can teachers and students use the device to consume and create digital content?
> - What is the level and quality of digital Content and Apps available for the device? Specifically review the quality and range of:
>   - eBooks
>   - Apps
>   - Do you have access to browser-based resources?
> - In terms of learning design can it support individual and group collaboration?
> - Is there support and professional development available on using the selected tablet in an education setting?

- Can the devices be protected with heavy-duty cases?

Management and technical support for the device
- Can the school avail of a managed service where an outside company can source, provision and maintain the devices on behalf of the school? Is the support service fast and reliable? Note that ideally a school should have a number of spare devices for use by students or teachers.
- Are software updates and App installations covered under the managed service contract?
- Is there outsourced technical support for the devices and the network?
- Does the managed service provide device management?
  - They can assign a device to particular networks
  - They can manage device functionality – e.g. turning off cameras, wireless etc.
- Does the managed service provide appropriate security filtering for the devices when on the school network?
- All devices should have insurance and be clear on the warranty conditions.
- What is the procedure for dealing with devices when they are in need of repair? For example the parent/student can go direct to the support service provider without involving school staff directly. This could be facilitated by scheduling the service provided on site at regular intervals.

By addressing these issues the school will be in a position to take full advantage of the mobile devices and can then concentrate on designing learning activities that focus on the active engagement of their students.

Step 3: Implementation

As stated earlier, it is best to start small and to introduce the tablet devices into the school in a phased and targeted way. Having devised a vision and a plan, schools should then identify how and where they will start 'experimenting' with the devices. This will vary from school to school but such experimentation should take place with appropriate student groups.

Ultimately if we are to use tablet devices to merely 'substitute' for existing technologies, such as books, then schools need to design their teaching, learning and assessment practices. In an Irish context, the Junior Cycle Reform initiative appears to provide the opportunity for such an approach. Parents need to know what this landscape might look like in terms of how the roles of the teacher and the student might change. Most parents have a view of education that places the onus on the teacher to 'deliver' the curriculum while the proposed reforms give students a much more central role at the heart of their own learning. This is a significant change for many parents and one that may need

explanation in the context of rolling out a tablet programme to students at Junior Cycle Level.

A key finding from the research in schools was the need to inform parents and keep them updated on why the initiative is being undertaken. Parents were aware that the schools currently deploying tablets were experimenting and that they were pioneers in terms of 'new' practices.

The implementation of such change will require schools to regularly connect with parents so that they understand these changes and the impact they are having on student motivation, engagement and improved learning experiences.

An Example of how tablets might be used - Students as Tutorial Designers

Alan November in his recent book, *Who owns the Learning: Preparing Students for Success in the Digital Age* (2012) recounts a wonderful story of a student who engages in deep learning during and after school. This learning is facilitated by the use of a tablet device alongside innovative teaching and learning practices on the part of the class teacher. In this section we will share November's example along with one from an Irish second-level classroom.

Mathtrain.TV Example

Though tablets can be used as content consumption devices they also have the potential to create and publish student content. In the case of Mathtrain a student used her tablet along with a range of Apps to develop a tutorial that showed how she solved a particular Mathematics problem. In his example students worked individually to create their tutorials and then posted them on the Mathtrain.TV website where classmates and others from all around the world are able to view and use the tutorials.

The creation of the tutorial took a number of hours, in contrast to normal Maths homework which typically lasted only a few minutes. The student recalled that she enjoyed spending her time creating the tutorial because it "mattered" and secondly that "in order to design a good tutorial you really have to learn the math". Thus by using her tablet she and her classmates were able to create and publish their tutorials using easy-to-use tools. In this case the teacher didn't grade the tutorials but students were motivated by the process and the opportunity to showcase their work. Alan November noted that "as author Daniel Pink (2009) explains in Drive (2009), the more we grade creative work, the less of it students will do." Thus we need to think of new ways to recognise the effort students put into their learning other than by awarding grades. This approach again appears to align well with the Junior Cycle reform approach to assessment and teacher monitoring.

In this case, the students were designing the tutorials for their peers. When the students encountered a challenge in designing their tutorial they typically interacted with a classmate or their teacher. In this way they learned from one another and they took responsibility for their own learning. By engaging in such learning activities they developed their Key Skills and also deepened their content knowledge of concepts in Mathematics.

Irish Example, My Study Mate

Some Irish students are engaging in similar approaches to share their learning resources or tutorials with their peers. These can be created across the curriculum using a variety of digital tools. One such example is My Study Mate which was developed initially by teachers and students in Ratoath College, Co Meath.

Students have used digital tools to create their own tutorials across a range of subjects and shared these online. The resources are primarily student videos but the model could be adapted for students to submit podcasts and animations on topics they are learning about in school.

Though many of these resources were not created on a tablet device the availability of such technology could assist students in creating and publishing their tutorials online. By having access to a tablet device the

students have the options to create resources that incorporate a wide range of media such as text, audio and video. They could also work on their tutorials, both in and out of school, and they don't require specialised equipment. In this way they can engage in deep learning activities while also developing their Key Skills. Using tablets in this way opens up a vista of exciting opportunities for teachers and students in the context of Junior Cycle Reform.

For schools interested in implementing such changes we urge them to begin at a subject department level where teams of teachers can design new approaches together. For example, the English Team may decide they will focus on poetry and design a number of new learning activities that allow students to work in teams and to create 'student tutorials' on a topic of their chosing. Students could work together and on their own to create and publish these tutorials for their peers. In this way the tablet facilitates their learning and allows them to compile the various assets they might require, such as text, image or movies, for their tutorial. In addition to deepening their knowledge of poetry, the students would also develop the Key Skills which are recognised as being so essential in today's 21st century society.

Step 4: Evaluation and Review

As with all initiatives, it is vital that they are evaluated and reviewed at regular intervals. In the research for this report, all schools reported that they are constantly monitoring the use of tablet devices, particularly in relation to their technical performance. Schools reported that they are now interested in extending their evaluations to include the following questions:

- How are the devices being used to redefine teaching and learning?
- How often do students use the devices?
- How do teachers use the devices both in lesson preparation and in class?
- Are teachers and students happy with the quality and quantity of resources available?
- Is the monitoring of appropriate use of the devices in school effective?
- Are relevant school policies kept up-to-date?

There is a need to capture data around these issues on an ongoing basis. The school can survey staff and students using online polling software and this information can be combined with other sources of data to monitor progress and to identify potential challenges for all involved.

The consultation/evaluation process should, where possible, involve the entire school community. We have included copies of the semi-structured interviews used in this study as appendices and these may be useful in assisting schools to design their own questionnaires or polls for teachers and students. Though schools may work with outside organisations in deploying tablet devices and associated technology they will need to own this process themselves; monitoring what impact the technology is having in the school is essential to managing the change process. As has been noted earlier, the deployment of

the 'right tablet' will not ensure that these changes will take place. The people who can ensure that are the staff and the wider school community.

Such change often takes time to achieve. Schools should proceed at a pace that is appropriate for them and the regular monitoring of the programme will assist them in this regard. Unfortunately there is no 'off-the-shelf' solution available to schools in implementing a one-to-one programme and thus there is a need to explore and to experiment. However, as more and more schools try out different approaches the body of professional knowledge around their deployment will expand and this should help all schools transform their practice. In the short term such knowledge is still limited and thus there is a need for schools to capture what is working and not working locally before sharing this with colleagues across the system.

Having gathered the data, schools should review their plans and make any changes as required. In this way, the plan is kept relevant and alive and not something that gathers dust on a shelf. Finally, as outlined throughout, the plan should take cognisance of the wider demands on teachers and should focus on teaching, learning and assessment issues. Schools will thus ensure that they are considering the use of tablet devices in the context of improving student learning, which ultimately is what concerns teachers and schools.

Bibliography

Bannister, D. (2012). Exploring the use of 1:1 devices in schools, *School for Education Futures Annual Research Conference* University of Wolverhampton.

Baugh, D. (2013). *iPads improving learning – what the research tells us*. [Online]. Available at: http://www.digitalcreator.org/dvined/?p=1452. [Last accessed June 2013].

Burden, K., Hopkins, P., Male, T., Martin, S. and Trala, C. (2012). *iPad research in schools*. Hull: University of Hull.

Butterman, E. and Patton, C. (2013). *Demystifying Cloud*. [Online]. Available at: http://www.scholastic.com/browse/article.jsp?id=3755252. [Last accessed June 2013].

Catholic Education Diocese of Parramatta. (2013). *Learning and Teaching with iPads*. [Online]. Available at: http://learningwithipads.blogspot.ie/. [Last accessed June 2013].

Cisco. (2013). *Australian Educators Deploy Robust Wireless Network*. [Online]. Available at: http://www.cisco.com/en/US/prod/collateral/wireless/c36_694199_00_aedrwn_cs_6.pdf. [Last accessed June 2013].

Clarke, B. and Svanaes, S. (2012). *One-to-one Tablets in Secondary Schools: An Evaluation Study - Stage 1: 2011- 2012*. London: Family Kids and Youth.

Cuban, L. (1986). *Teachers and Machines: The Classroom use of Technology since 1920*. New York, NY: Teachers College Press.

Department of Education and Early Childhood Development (2011). *21 Steps to 1-to-1 Succes Handbook for planning, preparing implementing and evaluating programs*. Melbourne: State of Victoria.

Department of Education and Early Childhood Development. (2013). *iPads for Education*. [Online]. Available at: http://www.ipadsforeducation.vic.edu.au/. [Last accessed June 2013].

Devaney, L. (2013). *Seven steps to success with mobile learning*. [Online]. Available at: http://www.eschoolnews.com/2013/03/11/seven-steps-to-success-with-mobile-learning/?ast=103&astc=9838. [Last accessed June 2013].

Dixon, B. and Tierney, S. (2012). *Bring your device to school*. Seattle: Microsoft Corporation.

European Schoolnet. (2013). *Acer-European Schoolnet Tablet Pilot*. [Online]. Available at: http://1to1.eun.org/web/acer/tablet-pilot. [Last accessed June 2013].

European Schoolnet and University of Liege (2013). *Survey of Schools: ICT in Education*. Brussels, Be: European Commission DG Communications Networks, Content and Technology.

Goodwin, K. (2012). *Use of Tablet Technology in the Classroom: NSW Curriculum and Learning*

Innovation Centre. Strathfield NSW: NSW Curriculum and Learning Innovation Centre.

Heinrich, P. (2012). *The iPad as a tool for education - A study of the introduction of iPads at Longfield Academy Kent*. Nottingham: NAACE and supported by 9ine Consulting Ltd.

Intel. (2013). *Going Wireless: Network as Mobile as the Students Who Use Them*. [Online]. Available at: http://www.intel.com/cd/corporate/education/emea/eng/ireland/elem_sec/tools_resources/learntec/167289.htm. [Last accessed June 2013].

Johnson, L., Adams , B., Cummins, S., Estrada V., M., Freeman, A. and Ludgate, H. (2013). *NMC Horizon Report > 2013 K-12 Education Edition*. Austin, Texas: The New Media Consortium.

Kaufman, M. (2013). *iPads in Schools*. [Online]. Available at: http://www.ipadinschools.com/.

Kirkwood, A. and Price, L. (2013). 'Missing: evidence of a scholarly approach to teaching and learning with technology in higher education'. *Teaching in Higher Education,* 18 (3)*,* 327-337.

Lane, J. (2013). *TPACK iPad Project In Schools (TIPS)*. [Online]. Available at: http://tips2012.edublogs.org/.

Lave, J. and Wenger, E. (1991). *Situated Learning. Legitimate peripheral participation*. Cambridge: University of Cambridge Press.

Lee, M. and Winzenried, A. (2009). *Use of Instructional Technology in Schools: Lessons to be Learned*. Victoria, Australia: Acer Press.

Ludwig, L. and Mayrberger, K. (2012). *Next Generation Learning? Learning with Tablets as an example for the implementation of digital media in schools*. Paper presented at the Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2012. Chesapeake, VA.

Melhuish, K. and Falloon, G. (2010). 'Looking to the future: M-learning with the iPad'. *Computers in New Zealand Schools: Learning, Leading, Technology,* 22 (3)*,* 1-16.

Microsoft Partners in Learning. (2010). *Microsoft Innovative Schools Toolkit*. [Online]. Available at: www.is-toolkit.com. [Last accessed October 2013].

Morrison, N. (2013). *Technology in schools: saving money with cloud, open source and consortia*. [Online]. Available at: http://www.guardian.co.uk/teacher-network/teacher-blog/2013/feb/21/technology-cost-savings-school-cloud-open-source. [Last accessed June 2013].

Naismith, L., Lonsdale, P., Vavoula, G. and Sharples, M. (2004*) Literature Review in Mobile Technologies and Learning*. REPORT 11: FUTURELAB SERIES, Bristol: Futurelab.

National Centre for Technology in Education (NCTE). (2009). *Planning and Implementing e-*

Learning in your School: Handbook for principals and ICT-Co-ordinating Teachers. Dublin: Department of Education and Science.

National Teacher Alliance. (2013). *Tablet School News and Resources*. [Online]. Available at: http://www.nationalteachersalliance.org/dialogue/category/teacher-insight-on-implementing-tablets-in-the-classroom. [Last accessed June 2013].

Ng'ambi, D. and Bozaleck , V. (2013). 'Editorial: Emerging technologies and changing learning/teaching practices'. *British Journal of Educational Technology,* 44 (4), 531-535.

November, A. (2013). *Don't plan for technology; plan for learning*. [Online]. Available at: http://www.eschoolnews.com/2013/04/16/dont-plan-for-technology-plan-for-learning/?ast=103&astc=9838.

Puentedura, R. (2010). *SAMR: Guiding Development*. [Online]. Available at: http://www.hippasus.com/rrpweblog/archives/2012/01/19/SAMR_GuidingDevelopment.pdf. [Last accessed October 2013].

Queensland Government. (2013). *The SAMR model: engage in deep learning and authentic contexts*. [Online]. Available at: https://classroomconnections.eq.edu.au/topics/Pages/2013/issue-7/samr-learning-technologies.aspx. [Last accessed June 2013].

Quillen, I. (June 15, 2011). *Educators Evaluate Learning Benefits of iPad*. [Online]. Available at: http://www.edweek.org/dd/articles/2011/06/15/03mobile.h04.html. [Last accessed June 2013].

Sauers, N. J. and McLeod, S. (2011). *What does the research say about school one-to-one computing initiatives?* [Online]. Available at: http://www.natickps.org/CASTLEBrief01_LaptopPrograms.pdf.

School Technology Branch (2012). *Bring Your Own Device: A Guide for Schools*. Alberta: Alberta Government.

Sheehy, K., Kukulska-Hulme, A., Twining, P., Evans, D., Cook, D. and Jelfs, A. (2005). *Tablet PCs in schools: A review of literature and selected projects*. Coventry: BECTA.

Student Learning Division (2011). *Getting started: Classroom ideas for learning with the iPad. A Resource booklet for schools*. East Melbourne, Au: State of Victorial (Department of Education and Early Childhood Development).

Tablets for Schools. (2013). *Tablets for Schools Holds First Nexus 7 Workshop: Key Outcomes -* [Online]. Available at: http://www.tabletsforschools.co.uk/tablets-for-schools-holds-first-nexus-7-workshop-key-outcomes/#sthash.nVIdMI9A.dpuf. [Last accessed June 2013].

Thomas, K. (2013). *A classroom for the 21st century: where are the best places for learning?* [Online]. Available at: http://www.guardian.co.uk/teacher-network/2013/may/14/best-places-for-learning-21st-century-classroom. [Last accessed June 2013].

Weston, M. E. and Bain, A. (2010). 'The End of Techno-Critique: The Naked Truth about 1:1 Laptop Initiatives and Educational Change'. *The Journal of Technology, Learning, and Assessment,* 9 (6), 1-26.

Wilson, I. (2013). *iPad in Education Blog*. [Online]. Available at: http://www.ipadineducation.co.uk/iPad_in_Education/Welcome.html.

Yelland, N. and Gilbert, C. (2011). *iPlay, iLearn, iGrow*. [Online]. Available at: http://www.ipadsforeducation.vic.edu.au/userfiles/files/IBM%20Report%20iPlay%2C%20iLearn%20%26%20iGrow.pdf. [Last accessed June 21 2013].

Appendix 1

Use of 1:1 Computing Devices in ACCS Schools

PILOT SURVEY

This questionnaire is designed to capture the current and future deployment of 1:1 computing devices across the ACCS network. When we use the term 1:1 computing we mean the following:

1:1 indicates the ratio of items per user, i.e. one netbook or laptop or notebook or tablet per learner. It refers to the current trend of low-cost computer devices ranging from mobiles and handhelds to laptops or tablets, which have gained ground in educational settings. Typically the device is connected to the Internet and owned by the learner.

The term 1:1 computing typically includes the following **devices** (Please note that we will use the term devices throughout the survey to refer to the technologies listed below)

> ***Laptops or notebooks*** are personal computers designed for mobile use, integrating most of the typical components of a desktop computer.
>
> ***Netbooks*** (sometimes also called mini notebooks or ultra portables) are laptops that are small, light-weight, economical, energy-efficient and especially suited for wireless communication and Internet access.
>
> ***Tablet PC*** refers to a slate- or tablet- shaped mobile computer device, equipped with a touchscreen or stylus.

This survey is designed to capture the current and possible future deployment of these devices in schools. We would be delighted if you could take some time from your busy schedule to complete this questionnaire which will inform our main study on the deployment of 1:1 computing in ACCS schools.

██

1. School Name   _____
2. Number of students in your school? ____
3. Number of teaching staff? _____

██

4. Do you currently have a 1:1 computing programme for students in your school?
   Yes or No (Please Circle)
   > If the answer is no, skip to **Question 17** below.

   > If **yes** please continue to answer the following questions.

5. When were 1:1 devices first introduced for students in your school?

6. How has the programme been funded? (Please tick Yes or No)

Funding Model	Yes	No	Comment (Please elaborate on the funding model if appropriate)
School purchased the devices			
Students purchased devices themselves			
Devices were sponsored by a third party.			
Other			

7. What devices are being used in your school?

Device	Yes	No	Number
Laptops or notebooks			
Netbooks			
Tablets			
Other			

8. How are the devices being used in your school?

Devices	Teachers	Students	Other (please specify)
Laptops or notebooks			
Netbooks			
Tablets			
Other			

9. What year groups are using the devices?

	Laptop/Notebook	Netbook	Tablet	Other
1st Year				
2nd Year				
3rd Year				
Transistion Year				
5th Year				
6th Year				

10. In what subject areas are the devices being used in school?

	Do you teach this subject in your school?	Do you use any of these devices?		
		Laptop/Notebook	Netbook	Tablet
Irish				
English				
Maths				
Art, Craft, Design				
CSPE				
French				
History				
Italian				
Materials Technology Wood				
Physical				

Education				
Spanish				
Technology				
Business Studies				
Geography				
Home Economics				
Latin and Ancient Greek				
Music				
Religious Education				
SPHE				
Classical Studies				
ESS				
German				
Metalwork				
Science				
Technical Graphics				
Other				

11. How are these devices being deployed among the students?

Mode of deployment	Yes	No
Do you have a class set in a trolley that moves around the school?		
Are devices allocated to individual students for use across all class periods and only during school time?		
Do students have their own individual devices that they use both inside and outside of school?		

12. Has the school provided devices to teachers?

	To all teachers	To no teachers	Some teachers (please specify the cohort and the number of teachers)
Has the school provided devices to teachers?			

13. How often do teachers use their devices in school?

Usage	Daily	A few times per week	Weekly	Rarely	Never
To prepare lesson materials					
For class teaching					
To communicate (e.g. via email) with colleagues, students and parents					
For assessment and feedback purposes					
Other uses					

14. What was the rationale for implementing a 1:1 programme in your school?

(Please indicate on a scale between 1 and 5 the signifance of this factor in your decision, where a 1 denotes the highest level of significance and the 5 is the lowest). You may use the same weighting for several of the reasons listed.

Was it to:

Reasons	Yes	No	Significance
Improve student engagement in class			
Improve student performance on state examinations			
Introduce a more personalised pedagogical approach throughout the school			
To provide access to the internet in class to students			
Reduce the weight of the students' school bags			
Provide students with access to digital content, in particular eBooks			
Other (Please expand)			

15. What have been the main successes of this programme for the school?

16. What have been the main challenges faced by the school?

17. Do you have wireless throughout the entire school or is it just in some areas ? (If **yes** describe the current wireless coverage and answer questions 17 to 23. If not please please go to **Question 24**)

18. If you have wireless in your school, what make is the equipment you purchased?

19. How was the installation of the wireless infrastructure funded in your school?

Grant

Fundraising

Other

20. How much did it cost to install the wireless network?

21. Have you encountered any difficulties with the wireless network in your School?

22. Are there plans to roll-out the 1:1 programme more broadly? **Yes or No**

(Please expand if such plans do exist?)

23. What information would be most helpful to you in implementing these plans?

24. Do you plan to deploy 1:1 computing devices in your school?

25. Do you plan to install a wireless network in your school? Yes or No
26. If yes when would you hope to install it?

27. What information would be most helpful to you in reaching a decision on the rollout of a 1:1 programme in your school?

Appendix 2

Semi-structured interview overview and question schedule

1. Group Interview - School Management

Using a semi-structured interview capture the rationale for implementing the programme and to gain a deeper understanding of the benefits and challenges school management have witnessed to date.

2. *Group Interview - Teachers*

Interview a group of teachers to hear how the 1:1 programme is impacting on their practice and on student learning. Again the purpose here is to capture the benefits and challenges teachers have experienced with a view to helping all schools that embark on similar programmes in the future.

3. Group Interview – Students

Interview a group of students that use tablet devices as part of their daily school life. We are keen to capture how this experience has impacted on their learning and to share this with other schools.

4. Group Interview - Parents

Interview a group of parents whose children are using tablet devices daily. The purpose of this interview is to gather their views on how the initiative has impacted their children by gathering the benefits and challenges they have experienced.

The topics we would like to gather data on are as follows:

- How the devices are used in the school
- The impact they have had on the role of the teacher and the student
- The availability of resources to support student learning
- Professional supports for teachers
- Benefits that each group has experienced
- Challenges the school has encountered

Senior Management Group Interview

Background to the Initiative

Why did the school go down this road? What were the motivating reasons?

Has it met your expectations? If not, why not?

Any changes planned to help achieve the initial goals in Year 2?

Any unexpected outcomes in relation to the introduction of the devices in the school?

Implementation Questions

Finance – how is it being financed? How is this working? Any planned changes?

Teacher CPD – how has this been addressed to date?

- What has worked well?
- What areas would the school like additional support in?

Content – is there sufficient JC relevant digital content to support the students and their teachers available for the iPad?

- What content comes preloaded on the device?
- What other types of content are available for the JC curriculum and the iPad?
- What is missing in terms of content for the JC at the moment?
- What would the school like to see more of?
- Any comments on managing this for other schools.

Teaching, Learning and Assessment

How are the devices being used by teachers and students?

Has the school developed a vision for the use of the iPads in the school?

Any observable impact on teaching, learning and assessment strategies across the cohort of students?

Where would school management like to see the programme go next in terms of its impact on teaching, learning and assessment?

Technical

Has the school encountered any technical issues with using the iPads in Year One?

- Hardware issues
- Theft
- Breakages

How are devices managed? House-keeping rules for students.

The Devices

- How have the devices been configured? (Have they been pre-loaded with Apps etc.?)
- What level of access has been provided to the students? (Can they install Apps themselves etc.?)
- Has the school encountered any inappropriate use of the devices?
- Does the school have an Acceptable Use Policy and did they have to amend it in light of this programme?
- Do they monitor student usage and access?
- In relation to controls and monitoring are there any services or supports they would like to see made available to schools?
- Support contract for the devices – how are the supported? How is this working out?

Wireless and Infrastructure

- What level of broadband is available in the school?
- Has the school a wireless network throughout the school?
- How robust is the network in the school – how might it be enhanced?
- Any issues with security on the network?
- What advice or support would they have liked to have had in relation to the use of broadband and wireless throughout the school when they began the project?
- Level of service you are receiving from hardware and infrastructure companies
    - o What is working well?
    - o What is lacking and you would like to see provided to schools?

Future Plans – where to next?

What plans are in place to extend the 1:1 programme for September 2013?

What are the changes planned for the next phase?

Identify some key pieces of advice that they would like to communicate to other schools.

Teacher Group Interview

Interview a group of teachers to hear how the 1:1 programme is impacting on their practice and on student learning. Again the purpose here is to capture the benefits and challenges teachers have experienced with a view to helping all schools that embark on similar programmes in the future.

Teaching, Learning and Assessment

How are the devices being used by teachers and students in the school?

What impacts have been observed as a result of the programme?

How do teachers use the iPads in their teaching?

- Some examples of how they are being used
- Have levels of collaboration/student-teacher interaction increased? Any experiences of using the devices in group/team work?

What impact, if any, have they had on classroom management routines?

Digital Resources

What type of digital resources do teachers typically use?

Are teachers happy with the range of resources they have access to?

Any gaps or resources they feel should be available for the iPad and JC?

Professional Development

How confident and competent do teachers feel about using the devices?

What CPD have teachers received?

What supports would they like to help them enhance their existing use of the devices?

Technical Issues

Have they encountered any technical issues with the devices?

Any challenges with:

- Wireless
- Storage of student files
- Battery life
- Breakages/theft or devices being stolen

Control and monitoring within the classroom

Do teachers monitor student use in class?

Have there been any issues around inappropriate use of the devices?

Final Word

What would they do differently?

Identify some key pieces of advice that they would like to communicate with your peers.

Student Group Interview

Interview a group of students that use tablet devices as part of their daily school life. We are keen to capture how this experience has impacted on their learning and to share this with other schools.

Classroom Usage

How do they use the devices during a typical school day?

What is different about learning with an iPad?

- Pros and Cons

Do they find they are more suited to certain subjects than others?

What types of activities do they like doing most with the iPad?

- Ebooks, Project-work etc.

Are there sufficient JC curriculum resources and tools (both free and otherwise) available for the iPad?

What are their favourite educational apps on the iPad?

Have they created their own Apps – what might a killer app for students?

What are the challenges they face in using the device in school?

How would they like to see the devices used in school?

What types of content would they like to see made available for the devices?

Any tips on how other students might protect their devices?

- Avoid breakages
- Viruses
- Avoiding theft

Out of School Use

How do they use them at home?

- Homework
- Personal Use

Broadband – do they need broadband to use the devices at home?

Any words for advice for other schools going down this route?

Parents Group Interview

Interview a group of parents whose children are using tablet devices daily. The purpose of this interview is to gather their views on how the initiative has impacted their children by gathering the benefits and challenges they have experienced.

Background to the Initiative

How involved were you as a parent in the new initiative? Did you feel that you had enough information / explanation?

Was your initial reaction positive or negative? If so, why? Has it now changed and why?

Looking back at the experience, what would you recommend to a school starting down this road?

Do parents have similar devices themselves and how confident are they in using them?

Out of School Use

How does your child use the device at home?

- Homework
- Personal Use

Broadband – do they need broadband to use the devices at home?

How good is your broadband? What are you getting? Has your broadband speed ever affected your child using the device for school work?

Control and monitoring

- Do you need to monitor the amount of usage?

Do you have any additional internet protections in place at home? Have any of these restricted your child using the device for school work?

What is your biggest concern in this area? Is that solely with regard to the device or internet access in general?

Technical Issues

Have there been any technical issues that have affected your child's use of the device?

Financial

How are the devices financed?

What is their view on the financial outlay and were other alternatives considered?

Any comments on the cost of the devices (outlay and on-going costs)

Final Word

Any words of advice for other parents in a school going down this route?

Notes

Notes