Taking the Tablets: engaging the professional community in systemic change impacting on the pupils, the teachers and school policy

Professor Christina Preston, *MirandaNet Fellowship*
Dr Sarah Younie*, MirandaNet Fellowship,*
Director Education Futures Centre, De Montfort University

Engaging the professional community

Ever since the MirandaNet Fellowship (1) was founded in 1992, this professional e-community has been expecting a revolution in teaching and learning because of the impact of digital technologies in schools. Over the years we have grown from fifteen teachers in England who saw themselves as thought leaders in education innovation to more than one thousand and two hundred members in eighty countries. Our online and face-to-face debates and our members' publications on our website indicate that the exponential increase in the use of technology is a global phenomenon.

Our hopes for a revolution on teaching and learning strengthened in 1997 when the UK government introduced the National Learning Grid: the first internet service for education in the world. However, we are enthusiasts for change. Generally speaking, unlike the workplace that has been transformed by technology, most classrooms have continued to look much the same for the last 100 years. Most pointedly Younie and Leask (2013) comment on how the integration of technology has been hampered in education by the lack of knowledge by decision makers – both policy makers and school leaders - about the opportunities opened up for new pedagogical approaches with technology.

But also in 2013, Fullan, who has been working on methods for systemic change for almost 50 years, was sure that a tipping point had been reached in education innovation. He blogged on his website that he could feel real change happening at last, and not before time in his view.

> There is a grand convergence spontaneously erupting. I think it is the natural dynamic of push and pull. The push, to put it directly, is a combination of the boredom and alienation of students and teachers. Students won't wait, teachers can't wait (2).

In the same year as he used social media to comment forcefully about the impact of technologies on schools he describes in a more scholarly style in *Stratosphere (2013)* about the fortuitous convergence he senses between the three forces of technology, pedagogy and knowledge about how to change systems. He believes these three elements now have the power to transform education.

Fullan's comments represent the powerful combination of experience, knowledge, practice and gut feeling that are at the core of professional educators' daily experience. In order to engage the community in his ideas he blogs about his passion as well as giving the matter in hand scholarly consideration.

In the MirandaNet 'community of practice' (Lave and Wenger 1991) there are policy makers, scholars and practitioners who all contribute to debates, conferences and publications about topics related to innovation from their different perspectives. This kind of community helps to share knowledge and experience between the policy makers so theorists and

the practitioners so that the best is drawn from each camp. Bad reading
This approach helps to strengthen the links between technology, pedagogy and knowledge in members' schools.

Lave and Wenger point out that learning from each other began with the medieval guilds and has always been a successful way of sharing experience mainly face to face. The MirandaNet Fellowship is free to join for those educators who are keen to learn from face to face. But the reach has been compounded because members can engage in online communication with like-minded professionals as well. Traditional social interaction is now strengthened further by creating contexts for informal dynamic knowledge creation in collaborative contexts as the participants move from textual debate in a conventional 'listserv' to video conferencing, microblogging contributions, collaborative digital concept maps and group responses to government consultation (Haythornthwaite, 2007: Preston, 2008). Too long

In this chapter we use the topic of tablets in teaching and learning to show how professionals in a community of practice like MirandaNet can learn and share ideas about innovation in schools by choosing the modes of learning that suit them and their situation at any time in their professional career. Members rarely leave MirandaNet because they can keep abreast of current knowledge that still suits when they change their role and fits into the time they can commit to learning.

So, as an example of how a community of practice can work today, we show how a member might learn about the role of tablets in systemic change in social networking, online practitioner debates, through members' publications, in conference and through action research projects underpinned by the iCatalyst programme. These are principles that any potential professional community could adapt to any curriculum topic or leadership topic now that technologies exist to sustain a group that cannot easily meet regularly face to face.

Practitioner debates
Members explored the issues surrounding the introduction of tablets in schools in a mirandalink debate called *Tablets good: smartphones bad!* What gave rise to the debate was that fact that the UK government and the OFSTED inspectorate had announced a review (3) of the use of tablets and smartphones because of the suspicion that they are a key cause of disruption and indiscipline in the classroom. The new UK behaviour czar, Tom Bennett (4) had been asked to look into this possibility in more depth.

In this context, practitioner Drew Buddie, an ICT teacher and MirandaNet Fellow, explained that he had been interviewed about this topic by a Times Education Supplement journal article (5). He maintained that significant differences exist between the affordances of SmartPhones and tablets. Whereas he is broadly in favour of the educational value of tablets when they are well managed, he also said, "Mobile phones should absolutely not be allowed in the classroom because

there is far too much opportunity for distraction". His authoritative view is based on his classroom experience in England where many pupils have many access routes to the internet.

Other international members pointed out that banning phones in their countries in schools could be detrimental to learning as they are often used as tablets when tablets themselves cannot be afforded: Pakistan and Gambia were represented here. Although half of the world's population have access to mobile phones, many will have no other access to digital technologies. Others pointed out that many of the disadvantaged even in rich nations only have Smart phones. Another key point that was made by discussants was that Smart phones could work for learning as well as any other device where teachers had adequate control over their classes and the school culture supported independent learning.

Other members explained how it was the personal ownership of tablets that was making a key change in attitudes just as Fullan implied. Over the last twenty years keeping the school networks and computer rooms functioning had absorbed staff energy, consumed money and put control in the hands of the network manager. In contrast, MirandaNet Fellows were now observing in many contexts how a step change in practice because personal tablets and smart phones put powerful and affordable tools in teachers' personal control, 24/7. Now that this technology is smoother, faster and more intuitive, its uses in everyday life have stimulated a much wider professional understanding about how this technology might be used in the classroom and at home. The technology has been demystified - usage is now the norm – great strides have been made in technical reliability and software is more intuitively designed.

In these circumstances some discussants concluded that the personal ownership of any mobile device, defined as tablets, Smartphones, iPods and others, helps teachers to develop an intuitive and internal understanding of how these powerful tools might translate into the learning context. The majority view was that well-equipped teachers cannot fail to improve learning using their first hand knowledge of these devices.

However, some pointed out that evidence from research indicates that the change is not in the technology itself but in a much wider professional understanding about how technology might be used. One member drew attention to a specific publication by Pickering, Daly and Pachler (2007) that draws attention to new learning strategies emerging from use of mobile devices focusing on three key themes: shared practice, collaborative continuing professional development and scholarly reflection. Valuable research from Australia about the use of Smart phones in schools was also cited (Hartnell-Young, E. & Heym, N. 2008: Hartnell-Young, E. & Heym, N. 2008).

An incidental result of this debate was the report from one member who had complained to OFSTED about their apparent banning of Smartphones only to find that this was the result of a misunderstanding:

Regarding the article in TES and the comments from the Ofsted spokesperson. I can confirm that it was indeed a genuine Ofsted press officer who supplied the comment, but unfortunately she and the TES reporter were at cross-purposes. "We understood we were being asked about Ofsted's position on pupils bringing mobile devices, laptops and tablets to school for purposes other than learning. Hence, the statement provided referred to the disruptive effect that tablets and mobile phones can have when they are used inappropriately by pupils – for instance to play games or to check social media. It was not meant as a comment on the use of tablets and other IT devices in a classroom context, to help pupils learn as part of a properly planned curriculum. We regret any confusion this has caused. I have since explained the misunderstanding to TES. Their reporter is not to blame for it" (6,7).

Professionals can gain valuable and current knowledge from the social media and from closed debating systems like MirandaNet even if they do not have time available for more detailed studies. Some MirandaNet members, however, choose to submit an article for peer review because they learn from this form of writing. Incidentally when published they gain a Fellowship.

Publishing articles and books

The only selection criteria for articles about education innovation for the MirandaNet Journal is that they must be interesting to other members. There are no strict academic criteria. The peer reviewers also offer help to those who are not practised in writing or whose first language is not English. Members submit a variety of opinion pieces or case studies offering new insights into education innovation. Masters and Doctorate students publish articles about their work in progress and as a result often make contact with others members interested in the same field. Historians of Computers in Education can also trace themes across more than thirty years of submissions.

In this section we have selected the case study that David Fuller submitted about tablets that was based on his work as an adviser with Tablet Academy (8) who run workshops for teachers and schools. Tablet Academy, who are brand agnostic, are a MirandaNet associate and as a result Christina Preston first observed one of their workshops. ?so?

The value of ownership of mobile devices was immediately obvious in the teachers' positive attitudes and high levels of competence. The workshop was in preparation for the new school year when all the staff and pupils of this small primary school in the north of England would be given personal tablets. Although they already had some personal tablets in school, each teacher was already using a device and/or smartphone for their personal and professional use. In most cases they could not now envisage their lives without this device so adopting tablets in school seemed logical to them; there was no reluctance. Such personal familiarity with the technology would not have been the case five years ago.

For the head teacher a professional development day was an effective way of engaging all the staff in the planning and the vision as well as technical competence. Each teacher was supplied with a selection of android tablets although most of what was discovered about the Cloud would also apply to Apple devices. The android devices could be used with a mouse, a keyboard, or as a touchscreen with finger or stylus, depending on what was most appropriate. Handwriting on the screen was instantly and accurately recognized and turned into computer text. These tablets were loaded with a new integrated package called Microsoft Office 365 that provides a good example of how versatile tablets can be when they are linked through the Cloud. This particular package includes Yammer (protected social networking including microblogging), OneNote (Digital notebooks), OneDrive (unlimited Cloud storage) and Lync which is now Skype for business and education and other more familiar Office applications including Word, Excel and Powerpoint. Office 365 online comes as free to schools, if they already have a licence for Office. Feedback is facilitated because there is a space for the teachers to comment on the work of individual pupils and communicate with them. In addition, there is a collaborative area where discussion and problem solving can take place. The wi-fi connection made seamless interaction between all the packages reliable anywhere, anytime and the package can be used on any platform. A search function covered them all. Incidentally the data are held on servers in Europe, which is important in the regulation of data management in UK schools.

This integrated package was new to the teachers who shared ideas about how to use them creatively to advance learning knowing that the students would be safe. As they worked the teachers suggested: targeted content libraries created by the teachers; different digital exercise books for each subject that can be marked digitally; creating books; quicker feedback to students; setting up powerful searching using tags; tagging videos; tagging to a pin board; split screen working; mixed media learning resources especially for presentations; immediate translation; making notes without affecting the original document; Skyping with experts across the world; and, emailing homework to parents. Someone asked, would this be the end of parent evenings? Would we just Skype them by appointment? There was even a hands free function for the camera so that sticky fingers did not smear the screen. However, the teachers also agreed that even if paper might be the best option for the task in hand at least they now have the choice.

But when a school first takes delivery of tablets teachers need support in relating what they can do to classroom practice even if they have had an initial workshop. David Fuller, the Tablet Academy adviser, therefore, published an article (2014) about the use of tablets at an academy chain on the South Coast, Brighton when they had completed their one day workshop training. When tablets were first purchased, David worked closely with the teachers to translate the potential of a tablet into classroom practice. To do this he also harnessed the students' empathy with this technology - a valuable source of insight for teachers. David advocates allowing students to experiment, share and, most importantly, to reflect on the potential the technology offers the pupils. For example he

describes students writing their own books saying that the way in which the tablets facilitate the sharing of data seamlessly and with ease provided students with an instant opportunity to peer review other student's work.

> *"For the final section of the lesson, they passed on their book to a colleague who completed audio or video feedback on what they thought about their book for the author. This proved really useful encouragement for the SEN children who attended the session. Although this was important for SEN students, in reality this was one of the positive aspects in using tablets for students of all ages. The key point being using the Cloud makes sharing easier than with using the established techniques for PCs and laptops".*

The data from students and staff (Years 5-8) from 180 schools collected in training sessions pinpointed the features that schools who were about to buy tablets should consider: how long they last on battery power; their ease of use and touch displays where keyboards were also not required because they are easier for the students to use including exploring different types of apps/software quickly and with no barriers to their understanding. (check)

This kind of full staff involvement in the introduction of tablets helps to ensure that the investment will be worthwhile. Sadly there is plenty of evidence where schools, regions and even whole countries have bought tablets before agreeing how the teachers will be engaged and what the devices will be used for MirandaNet reviews members' books. Recently there have been three published by practitioners covering the topic of tablets in innovation because knowledge and experience is now being built up about how to plan and implement such projects.

In *The ultimate guide to ICT across the curriculum*, Jon Audain (2014*),* provides a chapter about mobile devices in which he foresees the ways in which the deployment of mobile devices will impact on the design of learning spaces. He also warns that pupils with these devices at home will be bringing expertise to the classroom that teachers will need to take into account. He lists the new elements in pedagogical strategies that teachers need to be acquainted with where tablets are concerned: 1:1 computing; Bring Your Own Device (BYOD) and Bring Your Own Technology (BYOT); Cloud Computing; and Flipped Learning.

In their book *Learning with Mobile and HandHeld Technologies,* MirandaNet member Galloway with colleagues John and McTaggart (2015) aim to give some insight into the reality of mobile learning *in situ* and they quote the most reliable UK research evidence and new studies that are under way. In addition the background to the projects in the case studies is supplied within a timeline that captures the ways in which ownership of devices has grown and changed and some valuable insights into the costs and the commercial interests. An interesting prediction is that:

developing countries may soon forge ahead, as free from much of our past techno-baggage, they may be able to take a fresher approach to the potential of devices to promote deeper learning.

MirandaNet Fellow, Mal Lee and his colleague, Martin Levins, are most confident about the role of tablets in a revolution in teaching and learning (2012). They see BYOD and BYOT programmes as a tsunami coming across the horizon and subsuming entire school communities in Australia, the US and UK. The question for them is not if, but when. In their book, they aim to explain the implications of these developments in the use of tablets as they see them. Senior leaders in schools will find valuable practical advice about setting up and sustaining tablet projects as well as the justifications for doing so. However, are they right to suggest that the forces impelling the introduction of such technologies and the potential educational, social development, economic, technological and political opportunities opened up by these developments will soon fundamentally change the nature of schooling, technologies of teaching and learning teaching, home-school relations and the resourcing of schools?

Shared practitioner studies and books are an important means of understanding the range of contexts and cultures in which tablets can be deployed. Yet in the UK the prognosis about the landscape of continuing professional development (CPD) is not encouraging. Fragmentation is increasing not diminishing since the last government study was written (Pachler, Preston, Cuthell, Allen and Pinheiro Torres 2011). Since the political party changed and austerity took hold in 2009 research into CPD nationally cannot be funded. More CPD is being undertaken by the schools themselves who have limited access to outside support for CPD at Masters level when established theory is also applied to the topic in hand.

Combining theory and practice

Three tablet studies

In 2012 MirandaNet Fellows were invited to apply to join a study of tablets at Masters level that would help them to assess the progress of their project and decide on the next steps over a year period. In this case, three MirandaNet Fellows who were bringing tablets into their schools volunteered to be co-researchers and share the data from programmes that they were managing. By collecting data and analysing the results they expected to improve and refine the methods they had employed to make the investment worthwhile. These three co-researchers took this on because they felt, like Pickering, Daly and Pachler (2007), that educating teachers in the use of tablets was only the first stage if their schools were serious about managing change and embedding good practice.

The CPD process
This study of tables drew on the basic principles of the MirandaNet iCatalyst programme based on action research methodology (9) that can

be used to assess the value of any innovation in learning. The programme, undertaken individually or as a group activity at certificate, diploma or masters level, (10) draws on Schön's definition of 'action research' as a process for stimulating change that is owned by the teachers themselves. Schön revolutionised traditional ideas about professional learning 1987 when he published: *The reflective practitioner - how professionals think in action:*

> *I begin with the assumption that competent practitioners usually know more than they can say. They exhibit a kind of knowing in practice, most of which is tacit...Indeed practitioners themselves often reveal a capacity for reflection on their intuitive knowing in the midst of action and sometimes use this capacity to cope with the unique, uncertain and conflicted situations of practice (p. 8-9)*

This quotation emphasises the complexity of learning how to practise and the value of tacit knowledge, understanding, conflict and lack of certainty that go beyond what can be expressed in conventional academic prose. These ideas were developed in England by educational researchers like Elliott (1991) and Hargreaves (2000) who saw the potential for educational change. Pickering, Daly and Pachler (2007) indicate that these new learning strategies are being refined by the development of new designs for professional learning that focus on three key themes: shared practice, collaborative continuing professional development (CPD) and scholarly reflection.

In terms of tablets one of the most comprehensive scholarly books dealing with the theory as well as the practice of mobile learning in formal and informal education is *Mobile Learning: Structures, Agency, Practices* (Pachler, Bachmair, Cook and Kress, 2010). The London Mobile Learning Group (LMLG) (10) to which these authors belong realised very early on what kinds of changes would occur once learners had access to their own devices in daily life and the potential of these devices as a means of education. While the editor, Gunther Kress, ensures an emphasis on multimodality, the authors chart the rapid emergence of new forms of mass communication and their potential for gathering, shaping, and analysing information, studying their transformative capability and learning potential in the contexts of school and socio-cultural change. The focus is on a range of equipment: mobile/cell phones, PDAs, and to a lesser extent gaming devices and music players. But the balance is well judged. The authors explore the integration of the technology into education, without objectifying the devices or technology itself. This approach is reinforced by the discussion of theoretical and conceptual models, an analytical framework for understanding the issues, recommendations for specialized resources, and practical examples of mobile learning in formal as well as informal educational settings, particularly with at-risk students.

In fact Pachler, Bachmair, Cook and Kress see a focus on devices as only the first stage of mobile learning. The second is concentration on learning outside the

classroom. The third stage is on the mobility of the learner in mixed reality learning, context-sensitive learning and ambient learning. Their aim is to provide compelling arguments, theoretically and practically, for the inclusion of cell/mobile phones in the curriculum. Educators need to keep all these elements in mind when new technologies are introduced. Yet the prognosis about the landscape of continuing professional development (CPD) in the UK is not encouraging as fragmentation is increasing not diminishing since the last study was written (Pachler, Preston, Cuthell, Allen and Pinheiro Torres 2011).

Theory underpinning advanced studies
One way that teachers can judge the progress of their tablets project is to analyse the results from the perspective of the three categories of mobile learning offered by Pachler, Bachmair, Cook and Kress (2010) The first is a focus on devices as only the first stage of mobile learning. The second is concentration on learning outside the classroom. The third stage is on the mobility of the learner in mixed reality learning, context-sensitive learning and ambient learning.

A second way is to analyse results of tablet from the perspective of Guskey's levels. This approach to analysing the impact of tablets had been built up in several studies about the role of digital technologies in the change process that MirandaNet Fellows have published globally. Their focus on professional development in digital technologies began with the government-funded programme in England and Wales intended to engage teachers in innovation and pedagogy that lasted from 1998-2003 (Preston 2004). This report was based on the evidence from two large commercial companies who were training providers, so in 2009 Davis, Preston, and I. Sahin (a/b) re-examined the statistics from the perspective of the small local trainers who had had more success in effecting systemic change.

In this report the statistics were reanalysed using Guskey's levels (2002) to evaluate this national programme of professional development. In the tablets study described here Fellows again designed the data collection tools around Guskey's levels who believed that the quality of professional development is influenced by a variety of factors: content characteristics, process variables, and context characteristics:

- **Content Characteristics Variables** include the new knowledge, skills, and understanding that are the foundation of any professional development experience or activity;
- **Process Variables** include the types and forms of professional development activities and the way those activities are planned, organised, carried out, and followed up;
- **Context Characteristics Variables** include the organisation system, or culture in which professional development takes place, where the new understandings will be implemented and whether policy had been impacted.

Methods across three studies
In 2012 MirandaNet Research Fellows used the three stages of mobile learning and the Guskey levels to evaluate the impact of tablets in three secondary schools: in a deprived sea side town; in a rich London suburb; and, in an advantaged rural town. In each school a MirandaNet Fellow had led a project introducing tablets into their school and was keen to evaluate how this had progressed and how they should move on. They were also interested in seeing how much the different contexts they worked in affected their success. Each Fellow already had a Masters in Information and Communications Technology (ICT) that contributed to their sophisticated understanding of theory and practice.

The data collection tools that were developed for the *Taking the Tablets* project invited the participants to reflect on where they had been, where they were and where they were going based on the three stages of mobile learning and Guskey's levels.

The three action researchers set up interviews to record the full implementation programme and the vision from the perspective of the senior managers, the ICT coordinator, key staff, the action researcher and the pupils in order to write a report on the project for internal use that identified the key issues from the Guskey perspective. Focus groups were also set up to elicit the student response.

Study one: a deprived seaside town

This mixed secondary state school with 700 pupils was in an area of deprivation in a coastal town. The new state of the art building was completed in 2009 after a 2005 fire. During the four years much of the communication and learning had been undertaken online and as a result a specialism in technology could be well resourced. The 2012 OFSTED inspection reflected good conduct, but judged the school 'requires improvement' because of the achievement, leadership and management grades. Literacy was another key area for improvement. (check wording)
The overall ICT infrastructure and resources were of a high standard and the vision was to use technology in innovative and exciting ways despite financial constraints. The student to computer ratio was 3:1 and there were three network staff support for 5 PC suites. Interactive whiteboards and computers were in each room and some subject departments had sets of devices as well. The intranet was widely used inside and outside school for administration and personal planning. However, there were wifi access problems in the new building because of the concrete walls. Every room was wifi enabled, but the costs of a complete service were impeding full installation for another year.

Overview of the activity
The senior management team had been working towards independent learning over five years with early work focusing on effective use of the Virtual Learning Environment (VLE) from outside school by staff and pupils: student planners and mail to parents are existing services. Bring your own Device (BYOD) and Bring your Own Technology (BYOT) seemed to be the obvious next step. Pupils usually

brought smart phones or tablets into school that were mainly Android because this was the parental choice. Currently some were using their parents' hotspots in school until full school wifi was secured. What was significant was that the number of staff with devices was growing. Humanities, Maths, Music, Design and Technology now had sets of wifi enabled devices that could be used to supplement BYOD/BYOT for those who do not have their own device.

The vision to develop independent learning over five years was led by a senior manager. His doctorate in technology and learning was based on researching school practice in this school and others and he kept updated through membership of informal online teaching communities and online courses. His academic leanings and sensitive approach to change were important in ensuring that the project will eventually impact on teaching and learning and will be embedded effectively in staff administration and contact with parents as well. The requirement for autonomy in learning became urgent after the original school was burnt down. For many months the students had to learn from home by accessing the Virtual Learning Environment that has been used in a sophisticated way forced by need. It become clear in the last two years that a BYOT/BYOD policy might be a key driver in further embedding independent learning in the school.

Although devices are now being widely used, mainly Smartphones, they are still officially banned in the school policies. Some teachers still discourage their use because of their own lack of training and uncertainty about the benefits. In contrast, pupils' journals show that for some the device is a constant source of information and interaction although teachers are not always aware how pervasive they are, or why. Pupils who use them in class admit that they are not always on task - reading emails and accessing Facebook are cited in this context. Pupils in this deprived catchment area also have concerns that their peers are very conscious of the comparative costs of devices and describe the discomfort not only of those pupils who have no device but those who have a less expensive, 'less cool' device.

A key report on Smartphones, *How mobile phones help learning in secondary schools* (Hartnell-Young & Heym 2008) that was followed up by two articles on the topic (Hartnell-Young, E. 2008: Hartnell-Young, Heym & Rose 2008), still offers some valuable recommendations which are the need to shift the focus of policy away from the devices themselves to consider the frequently-reported reasons that mobile phones are banned: fear of distraction in class, cheating, inappropriate recording of students and teachers, and publication on sites like YouTube. The researchers indicate that solutions must be found to each of these, in policies that address:
- ownership of computing equipment and access to network connections,
- tools to support curriculum and its personalisation,
- appropriate behaviour in school and other contexts,
- privacy and security of data, including photographs and video clips.

Some suggestions are made about strategies that might help schools that do not want to indulge in an overall ban but pursue a more nuanced approach:

Registration and other administration tasks made easier

- Identify and support champions: volunteer teachers who are prepared to take some risks,
- Involve those who have responsibility for curriculum, student management, and technical support to plan and work through responses to the issues raised in this report,
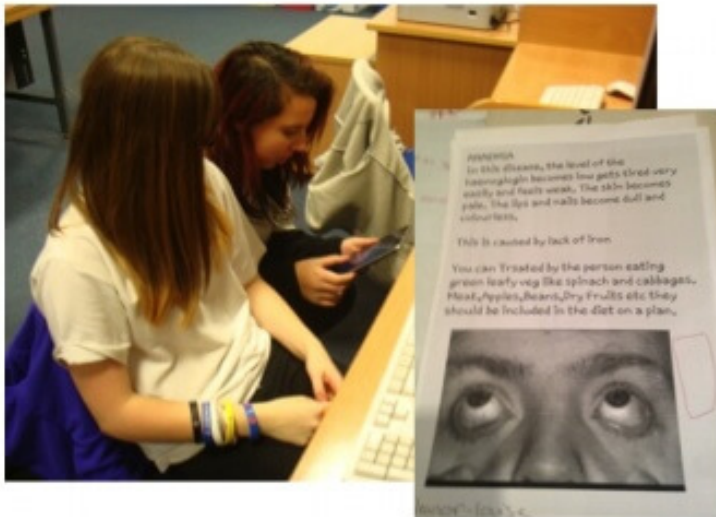- Initiate discussions about using mobile phones for learning (perhaps using student voice work) and survey current ownership, device capability and the ways mobile phones are already being used in the school,
- Provide hands-on, small-scale opportunities for teachers to try out appropriate uses for mobile phones.
- Encourage teachers to design activities that make the learning purpose clear and to anticipate management issues at the classroom level (such as rules, etiquette),
- Inform parents of the learning purposes for mobile phones, and involve them in establishing appropriate ownership, management and ethical arrangements,
- Anticipate and address technical issues ranging from battery charging to network access and security, data protection, etc.,
- Develop new school policies that shift the focus of policy attention away from the device to the uses, security and behavioural issues that are the real concern.

These strategies could be valuable for the introduction of any kind of learning and teaching technology.

At school one, the BYOT/BYOD research pilot that ran alongside expanded use of the devices in the school was carefully planned to provide evidence to drive the new teaching and learning framework being prepared.

A growing number of staff with tablets have also been using them to experiment with administrative task like taking registers, planning lessons on the bus and improving their immediate access to statistics on specific pupils. Pilots have been conducted in departments who expressed a specific need for a BYOT/BYOD intervention in the expectation that some of these experiments will attract the interest of staff who have not yet committed to the use of devices in their classrooms. One classroom activity was research on the internet in science to make a poster about anaemia.

Pupils researching on the internet to make a poster
about anaemia in a science lesson

Discussion of the findings
The three schools focused the discussions about the findings on the lessons they had learnt and wanted to pass onto others.
The organiser in school one felt that working slowly and inclusively in pilot mode had insured high expectation of success in full implementation over the next year. Some key points arose in discussion for inclusion in the emerging policies. The first was that research into ownership was seen as essential in planning the pilot and also in engaging staff, pupils and parents. Ownership of devices at 38% was lower than expected and has slowed up progress. Provision had to be developed for students and staff who cannot fund their own device.
It was agreed that wifi was essential throughout the school if take-up of BYOD/BYOT is to be improved. An affordable solution had now been found but the absence of overall wifi in the pilot was a barrier to change. It was agreed that the SLT needs to trial more thoroughly key online administrative and teaching software as poor performance dampened enthusiasm for the pilot amongst staff and pupils. It was also matter of concern that currently some staff still ban the use of devices in their classrooms despite changing policy.
According to the pupils more staff need their own devices and specific training in order to ensure a new teaching and learning policy is embedded. Pupils have offered to teach the teachers informally. Pupils using their own hotspots where wifi is not available raised concerns about how the school will control what websites pupils are accessing.

Conclusions on impact
In the three Guskey areas that the well-planned pilot was focusing on some outcomes were achieved.

Firstly **in terms of organisation and policy** the school is now in the process of finalising an updated policy for the use of mobile devices in school. Based on teachers' and pupils' observations in the pilot a teaching and learning framework that supports the use of devices is emerging, but currently this is quite limited.

Staff plan to widen involvement and share insights in order to ensure the richness of this document. The timescale envisaged is about another year. Secondly progress has been made, particularly through the base line survey, in ensuring that **all members of the school community** were aware of the benefits and issues relating to BYOT/BYOD, although it is the enthusiasts at this point who are making progress in developing a code of conduct to be discussed with the community as the next stage. Pupils and parents will be included in this process.

The third aim, to provide hard evidence of the **impacts of BYOT/BYOD on teaching and learning,** is not well advanced yet although the details of this study provide a vehicle for further discussion and research. The pupils and the teachers can provide convincing anecdotal evidence that changes in performance, engagement, motivation and behaviours have taken place. More systematic action research now needs to take place to confirm that BYOT/BYOT can impact on learning outcomes as well. This will provide detail for the teaching and learning framework that is being developed for staff. Pilot staff are already enthusiastic about the major impact on their lesson preparation time because they can use the tablets in transit: administrative tasks like registration are easier; ease of use in classrooms because of significant time-savings over the use of PCs.

Study two: a leafy London suburb

This selective fee-paying mixed London school with 1200 pupils from 4 to 18 accepts SEN children and offers scholarships. In a beautiful forest setting the historic school offers a broad curriculum in Sport, Music, Drama and Visual Arts as well as extra curricula activities enabling both breadth and depth of opportunity
The ratio of staff to pcs is 1:1 and for students to pcs 1:2 with good technical support; 8 computer suites and computers and IWBs in each classroom; Apple tv and large screens in main halls and meeting rooms (Figure Two). The intranet is widely used by staff and students. Wifi now available to staff and sixth form will soon be available to all. A new Digital Learning Centre is planned to be the corner stone of a knowledge community by 2013/2014 and the technology is all Apple. Currently 6th Form facilities upgraded to include collaboration desks/shareable screens and charging stations in a collaboration area. 32 staff applied for a discount on iPads and workshops. 123 staff have laptops from school and, in effect, enjoy 1:1 computing if they wish.

Overview of the activity
The Senior Leadership team(SLT) decided to implement BYOD/BYOT cautiously in the sixth form, with low impact and attendant risk as part of the move to the new Digital Learning Centre in 2013/14 – a hybrid educator-librarian for transmedia development is now required to work with the architect. Meanwhile a strategic BYOD/BYOT planning process with SLT was based on a survey of devices owned by parents and pupils and other research. Voluntary involvement for pupils and teachers was agreed in the first stage especially as the market for

devices is in flux. The Network Support team investigated wireless access and security options in other settings.

Collaborative working desks with iPad connections and Apple tv in the 6th form centre, meeting rooms and assembly halls

The pilot was intended to find a way of introducing more independent learning in preparation for greater freedom in tertiary education. The SLT also wanted to explore other potential teaching and learning opportunities, constraints and challenges. An ICT strategist with a Masters in Business Administration specialising in the systemic integration of social and technical processes in organisations is employed to run the wider project with the director of teaching and learning.

In the pilot of BYOD/BYOT 32 staff have trialled sets of discounted iPads in the attached primary school, in Modern Foreign Languages, Music, Computer Science and Geography. Observation and informal workshop sessions suggest staff see advantages in administration, personal organisation and lesson preparation, but learning and teaching advantages are not as apparent yet. Pupils report in journals easier internet research, better opportunities for collaboration on projects and excellent facilities for viewing each others' work in progress. Knowledge is growing because the pupils and the teachers have been sharing ideas for software relevant to learning, particularly Apps for education.

Discussion

The project was deliberately been started slowly in the Sixth form because the risks to be avoided from the organisational point of view were seen to be that: a sudden influx of new devices might be too challenging for teachers; too sudden introduction of devices might place strain on networks. In addition theft and loss of devices might occur and appropriate user codes be abused lower down in the school.

The financial advantage can be gauged from a Computer Science example. The department can now afford for each student to work on their choice of computer language using a free or very low cost app. In contrast, a licence for each language for the school network would be about £1,500 so only one could be offered.

A key lesson from the pilot was that all teachers must be acquainted with the Code of Conduct that pupils must sign if working online. The Fellows also found that while pupils were comfortable using personal devices in the other aspects of their lives, they appeared to struggle a little with integrating this into school/learning. On the other hand the very flexible environments were important in making it easy and workable to have and manage their own devices in and between classrooms. It also became clear that increased public communication with pupils and parents in the second stage ensured their enthusiasm.

In addition, most of the recommendations related to the encouragement and training of the teachers so that they could support pupils effectively in using technology under their guidance. The pupil focus-group agreed that some teachers in the pilot were not aware that time-wasting activities were happening. More teachers need appropriate strategies to deal with these behaviours including getting control early and moving around the classroom. The pupil focus group also thought that there should be more acknowledgment at the start of the next stage of tech-savvy pupils who are keen to be a resource for staff and pupils. Overall it was agreed that training in technicalities should be balanced in the next stage by more formal training about classroom management and pedagogical advantage. Some teachers wanted to start action research on the pedagogical value of the devices that are still to be discovered.

Impact findings
In terms of Guskey's levels the impact on pupils has been greater below the sixth form where they lobbied to be involved. The journals and concept maps submitted indicate a depth, sophistication and level of use of devices that many teachers would find surprising. Personal organisation and research was a major benefit, but distraction in class was a concern of the pupils who were digital leaders.

From the point of view of staff the barriers or obstacles that are being addressed are: teachers' fears of lack of control or impact on discipline. In this context the teachers wanted to be permitted to decide at any time whether devices are to be used in class, or not. The organiser was also avoiding teachers feeling overwhelmed. For this reason BYOD was initially limited to 6th form and there is still no enforced curriculum use.

In terms of impact on classroom practice two teachers mentioned particular impacts. A MFL teacher was disturbed by inappropriate exchanges from students abroad in a class project. Another teacher with a Masters in digital technologies and learning who updates his knowledge by belonging to an online teachers' community, has been examining his own classroom practice in detail using iPads.

He thinks that the potential impact of BYOD/BYOT in facilitating collaborative learning could be as great as the expected impact on independent learning. **In policy terms** this teacher ultimately supports a shift to Flipped Classrooms and suggests an action research programme for staff might increase the opportunities to rethink the school's teaching and learning policies. Current assessment is a major barrier to bringing in independent learning, however, in an academically orientated school because experimentation might affect results in the short term.

Study three: a prosperous rural town

This well-resourced 11-16 mixed academy of 1,500 pupils and 120 teachers specializes in mathematics, ICT, modern foreign languages and sports. In a privileged South East England rural catchment area there are fewer problem pupils than the national average. Gaining high performing specialist school status in 2009 the school also specialises in special educational needs and gifted and talented education. This school benefits from a well-staffed and well-run Digital Resources Centre including a technician and three dedicated teaching staff. The school is well resourced with 650 machines and devices. Most classrooms have a computer and display equipment supplied by a continuing equipment refreshment program. A sophisticated combination of in-site and off-site network support ensures network reliability. In addition a high-density wifi Meraki Cloud managed network spreads across most of the school site. As a result of a careful product selection procedure with staff and governors the school has purchased approximately 110 iPad 2 devices for the Pilot. These devices make up two class sets of 32 and also a pilot staff group of over 32 teachers.

Overview of activity
The project benefits from the oversight of a Senior Leadership Team (SLT) strategist, Director of E-Learning, who is outstanding in computing knowledge, in relating systemic change to pedagogical gain and a talent for communication to staff and pupils. He updates his Masters in Knowledge and Learning Technology by belonging to online professional communities. As a result of his power to make decisions about the infrastructure in the school the BYOD/BYOT project that he has set up has been designed to be one element in the SLT plan to use technology to meet the challenges of the 21st century. Those piloting new uses of digital technologies are striving not only to improve motivation but also to establish independent learning and a sense of ownership of the learning agenda. Underpinning these aims are infrastructure decisions like moving to the Cloud using Google solutions are designed to reduce the volume of printing and replace with digital copy or e-learning materials as well as improving work flows. This strategy leverages 5Gb of free personal storage space for each teacher and pupil. The choice of Apple as a strategic partner in mobile devices reflects the prodigious Apps development and the support of the company for education – as well as an element of 'cool' that motivates staff and pupils. The availability of free content in iTunes App store is another benefit: staff authors are already publishing their curriculum e-books as well. The 32 staff iPads have a suite of Apps preloaded that includes curriculum support and a product that permits the

use of SIMS on mobile devices including marking class registers and logging behaviour on the go. Sophisticated plans for 1:1 computing devices and universal wifi access that include support for disadvantaged families have already been introduced to parents and staff to inform their purchasing decisions and to avoid a plethora of incompatible devices arriving in school after Christmas.

Discussion
The staff agreed that action research undertaken by the teachers is essential if a project that promotes change is to succeed. The viability of the plan was researched over a year and a half by investigating research papers, videos, forum discussions supplier demos, exhibition show products, the E-learning foundation, technology conferences and visits to schools where similar programs have been implemented.

The iPads pilot fits into a long-term strategy to put more responsibility in the hand of the pupils for learning. Ownership of the iPad has meant that each teacher also experiences more ownership over changing practice from the classroom perspective.

Organisers of similar projects were warned not to underestimate the emergence of technical issues as the project progresses and allow time to sort these out and orientate the technical team to be able to work with new technology in new ways. Advice emerged to communicate sympathetically with parents and staff members who are concerned about league tables and academic rigour. The current assessment environment does not encourage the changes in teaching and learning that are pursued in this project.

Debating about the wider and broader aims of education within the staff was encouraged because at some point the whole staff will want to consider whether they are willing to adjust the theoretical underpinning that informs their professional life and adjust school policies on teaching and learning.

Impact findings
The organiser felt there had been **impact on the school/organisation** because the results of the first pilot was going to be used to make agreed alterations to policies on teaching and learning, appropriate use and e-safety policy.

From the staff there had been no open complaints about the pilot overall although usual concerns were been expressed about students forgetting or losing the device. The 32 staff with the first iPads were including pedagogy in their deliberations about the value of these devices. So far motivating reluctant learners, facilitating promoting pride in presentation and encouraging creativity were emerging as outcomes. A well-organised trials plan was communicated in an engaging way to parents who were invited to discuss the results with their children. Subjects where interesting practice was emerging were: PE, Information and Communications Technology and Geography. In History a comic strip designer and book creator apps 'engaged the students' creativity whilst keeping them focused on the content of the curriculum. This helped students who are visual learners to remember key terms and concepts more readily.' The

development of videos about enzymes in Science was also motivating for ESN pupils.

SEN pupils and students with behavioural problems responded particularly well to the use of iPads as a personal tool.

Science: Using the iPad to make a video about the action of enzymes using paper props was motivating for Special Needs students

Teachers viewed positively the move to use these tools in personal administrative tasks: for example registration and email on the move; note taking; and, resource collection. Data was still being collected on the impact on the students because there were requests to extend the project to Year 10 because of parental and student pressure.

> *"SEN pupils and students with behavioural problems have responded particularly well to the use of iPads as a personal tool".*

Pupil reporters for the school news stream found the job easier and pupils in the focus group welcomed opportunities to help the teachers.

Conclusions across three studies

Using Guskey's levels the project leaders looked at what kind of impact the project had had and at what level embedding had taken place in the organisation, also (check) amongst the staff and amongst the pupils in their own school as has been recorded already. In presenting the results to each other and to conference groups it was clear to the project organisers that the results varied widely because of the different contexts and different cohorts and different time scales. In addition different technologies had been used. All the projects were also still in progress but some were more advanced than others.

The first reports on the data had no word limit and remained internal to the school. However, it was important to summarise the three sets of findings in an

accessible way so that some conclusions could be drawn about tablets across the three schools. As a result the analysis that was shared was confined to two pages under these headings as above: overview of the school; description of ICT infrastructure and resources, overall infrastructure and resources; specific technologies; overview of project; impact on the organization, the staff and the pupils; key lessons learnt; recommendations for the future.

Firstly the researcher looked for evidence across the three schools of **the three stages of mobile learning** offered by Pachler, Bachmair, Cook and Kress (2010). All the tablet users had moved beyond **the first stage of training** to using the devices independently. Although in the first seaside school only a few teachers were involved in using the tablets and ownership of tablets in the school was still low. Some staff were still unhappy about Smart phones being used in school although this was a deprived area where many of the families could not afford to provide a tablet. At the London school the group of staff who were now trained and equipped were using the tablets in planned curriculum projects for the sixth form and there was already pressure from younger pupils and their parents to extend the project.

The second stage, concentration on learning outside the classroom, had already been achieved in the first school at the seaside because the pupils had been forced to learn outside their classrooms whilst the new school was rebuilt after the fire. In fact, the presence of any kind of device had been a lifeline in difficult circumstances.

The third stage was the mobility of the learner in mixed reality learning, context-sensitive learning and ambient learning. The schools had not expressed their pedagogical aims as Pachler, Bachmair, Cook and Kress defined them but they had intentions that would change the traditional classroom information transmission model. School one was aiming at independent learning from the start and school two envisaged Flipped Learning as the pedagogy they were aiming at. In this mode of learning pupils would investigate topics outside school and share their conclusions in the classroom. This was only in evidence of the third stage in the rural school where pupils were encouraged to use their iPads to take videos outside the school. The tablet project was most advanced in this school so the fact that they had reached this third stage was predictable.

In the second analysis the MirandaNet Fellows looked at the data from the Guskey perspective looking for impact on students, on staff and on policy..

They found that there are three important implications that stem from this model for evaluating professional development programs. First, each of the Guskey levels is important: embedding at institutional, staff and student level. The information gathered at each level provides vital data for improving the quality of professional development programmes as well as planning the project. Second, tracking effectiveness at one level does not explain impact at the next level.

The Fellows engaged in this project may in the next stages also take up the advice from the US National Adult Education Pro (2014) that emerged recently, which suggests that schools might plan "backwards" starting where they want to end and then working back to the strategies to achieve their goals. This is expressed in a series of five considerations:

- The first consideration should be the student learning outcomes that you want to achieve.
- Then it would be determined what instructional practices and policies would most effectively and efficiently produce those outcomes.
- Next, you would want to consider what aspects of organization support need to be in place for those practices and policies to be implemented.
- Then, decide what knowledge and skills the participating professionals must have to implement the prescribed practices and policies.
- Finally, one would consider what set of experiences would enable participants to acquire the needed knowledge and skills.

Teachers and pupils identified some of the next key questions to be investigated:
- How does the use of personal hotspots by pupils affect responsible use in the school?
- What are the methods for engaging and motivating reluctant teachers to consider changes in their practice?
- What level of on-going support is needed: teacher pedagogical support, technical, student skills etc.
- What should be the balance between informal and formal CPD for teachers?
- How much should the teachers know about pedagogical theory in this area?
- What theories of project management are applicable in this school?

In terms of methodology, summarising and analysing each of the three projects was the most difficult activity for the action researchers because of the intense concentration involved. But comparing results was also difficult because the projects had been planned and started before the three stages and the Guskey levels had been explained. Nevertheless the researcher felt that a knowledge of underlying theory does help with a whole school understanding of what the introduction of digital technologies is trying to achieve. Results were useful for reports to OFSTED, to governors and in applying for pupil premium funds.

As a result of this tablets project, MirandaNet Fellows have refined the existing research tools so that iCatalyst participants will have more sophisticated framework for evaluations of CPD in the future. In the future schools would begin by building into strategy the three mobile learning stages and the Guskey levels thus ensuring that the project is embedded at organisational, staff and pupil level so that impact can be more easily traced. One change has been that in later studies parents have also been encouraged to join a focus group.

All credit to these three schools who have shared their results in order to contribute some ideas to schools who are embarking on introducing tablets. This sharing is indeed a gift to the professional community.

The researchers felt that the best result for the project leaders was the chance to talk with other experts on the strategies they had used in conference and online. MirandaNet promotes this kind of intellectual exchange in various events as well as the mirandalink online debating system. Professor Mike Sharples, is an international expert on the pedagogies that have developed from mobile learning opportunities (2012, 2013, 2014, 2015). In the mirandalink debate about tablets, he summed up the overall consensus that schools have a responsibility to harness the power of mobile devices for learning.

> *This is just one small way to help students 'navigate life' and develop valued and transferable skills. The key is not to let devices rule in school, but to put them into their proper place alongside the other equipment for learning, and to encourage responsible and safe use.*

Not a revolution then but thoughtful changes in practice designed to prepare pupils for the future learning.

References

Audain, J. (2014) *The Ultimate Guide to Using ICT Across the Curriculum For Primary Teachers: Web, widgets, whiteboards and beyond!* Bloomsbury http://www.bloomsbury.com/uk/the-ultimate-guide-to-using-ict-across-the-curriculum-for-primary-teachers-9781441144003/

Davis, N., C. Preston, and I. Sahin (2009a). I*CT teacher training: evidence for multilevel evaluation from a national initiative.*British Journal of Education Technology (BJET). Volume 40. Issue 1 (January 2009) (Published Online: Feb 5 2008 12:00AM): 135–148.DOI: 10.1111/j.1467-8535.2007.00808.x

Davis, N. E., C. Preston and I. Sahin (2009b). *Training teachers to use new technologies impacts multiple ecologies: Evidence from a national initiative'.* British Educational Research Journal (BJET). Volume 40. Issue 5 (September 2009).

Elliott (1991) Action Research for Educational change, Open University Press. Milton Keynes and Philadelphia.

Fullan, M (2012) *Stratosphere*: *Integrating Technology, Pedagogy, and Change Knowledge* Pearson http://www.pearson.com.au/products/D-G-Fullan-Michael/Stratosphere-Integrating-Technology-Pedagogy-and-Change-Knowledge/9780132483148?R=9780132483148

Fuller, D. (2014) *Pop Up Classroom - Meeting things simple with tablets* MirandaNet journal http://www.mirandanet.org.uk/casestudies/313 (check)

Galloway J., M. John and M. McTaggart (2015) *Learning with Mobile and Handheld Technologies.* Routledge.

Guskey, T.R. (2002). Does it make a difference? Evaluating professional development. Educational Leadership, 59(6), 45-51.

Hargreaves, D. (2000) Teacher Training as a research-based profession: possibilities and prospects. Leading Professional Development in Education

Open University Reader Edited by Elizabeth Bird, John Butcher, Bob Moon. Routledge, London

Hartnell-Young, E. & Heym, N. (2008). How mobile phones help learning in secondary schools. Coventry: British Educational Communications and Technology Agency (Becta). Can be downloaded from http://mirandanet.ac.uk/knowledgehub/publications/publications/

Hartnell-Young, E. (2008). Mobile phones for learning in mainstream schooling: resistance and change. Proceedings of mLearn 2008, Ironbridge, UK, October. Pp 160-167. Can be downloaded from http://mirandanet.ac.uk/knowledgehub/publications/publications/

Hartnell-Young, E., Heym, N. & Rose, A. (2008). Defying a cultural taboo: using mobile phones for learning in secondary schools. BERA annual conference, Edinburgh, September. Can be downloaded from http://mirandanet.ac.uk/knowledgehub/publications/publications/

Haythornthwaite, C. (2007) 'New International Theories and Models Of and For Online Learning.' Chicago IL, USA, First Monday. http://firstmonday.org/

National Adult Education Pro (2014) *Evaluation Tables based on Guskey* www.naepdc.org/Quality%20Framework/Five%20Levels.doc

Mal Lee and Martin Levins (2012) *Bring Your Own Technology: The BYOT guide for schools and families* Australian Council for Educational Research Press https://shop.acer.edu.au/acer-shop/product/A5291BK/136

Pachler, P, N. B. Bachmair and J. Cook. Ed. G. Kress (2010). *Mobile Learning: Structures, Agency, Practices.* New York, Springer http://www.springer.com/us/book/9781441905840

Pachler, N, C. Preston, J. Cuthell, A. Allen and Pinheiro Torres (2011) *The ICT CPD Landscape in England* Becta download here. This report contains a section about teachers who are reluctant to use learning technologies in classrooms that you can download here.

Preston, C. (2008). Braided Learning: an emerging practice observed in e-communities of practice. Special Issue: Online Learning Communities in Context. International Journal of Web Based Communities Inderscience Publishers. Guest Editors: Ove Jobring and Piet Kommers (4. 2). www.inderscience.com

Pickering, J. (2007). *Teachers' professional development: not whether or what but how.* New Designs for Teachers' Professional Learning. (eds) J. Pickering, C. Daly and N. Pachler. London, Bedford Way Papers.

Preston, C. (2004). *Learning to use ICT in Classrooms: teachers' and trainers' perspectives: an evaluation of the English NOF ICT teacher training programme (1999-2003). S*ummary, full evaluation report and emergent trends for teacher educators and staff-trainers. London, funded by the Teacher Training Agency www.mirandanet.ac.uk/tta.

Sharples, M. Ed. (2012, 2013, 2014, 2015) *Innovating Pedagogy.* Open University. Coventry http://www.open.ac.uk/blogs/innovating/

Younie, S. and M. Leask (2013) *Teaching with technologies: the essential guide*, Open University Press

Notes
1. The Mirandanet Fellowship is a community of practice that is free to join: mirandanet.ac.uk Most of the contents of the Knowledge Hub is accessible by non-members except some draft papers and the mirandalink archive.

General members' publications are here:
http://mirandanet.ac.uk/knowledgehub/publications/publications/
Reviews of books by MirandaNet members are here:
http://mirandanet.ac.uk/knowledgehub/book-reviews/
Consultation submissions are here:
http://mirandanet.ac.uk/knowledgehub/white-papers/

2. Michael Fullan: Motion Leadership http://www.michaelfullan.ca/
3. **Impact of smartphones on behaviour in lessons to be reviewed**
   https://www.gov.uk/government/news/impact-of-smartphones-on-behaviour-in-lessons-to-be-reviewed
4. http://www.theguardian.com/education/2015/jun/20/tom-bennett-school-behaviour-tsar-class-discipline
5. https://www.tes.com/news/school-news/breaking-news/ofsted-warns-against-extremely-disruptive-tablets-school
6. https://cogitateit.wordpress.com/2015/12/16/disruptive-technology-part-2/
7. Mirandalink debates can be accessed by members:
   http://mirandanet.ac.uk/join/joining-the-fellowship/
8. MirandaNet associates, Tablet Academy, run course for schools about using tablets creatively in schools. http://www.tablet-academy.com/
9. MirandaNet action research notes can be found here
   http://www.mirandanet.org.uk/researchexchange/events-2/research-themes/action-research-the-main-principles/
10. Details about the iCatalyst action research programme can be found here:
    http://mirandanet.ac.uk/icatalyst/professional-development-approach/
11. London Mobile Learning Group http://www.londonmobilelearning.net/