



Mobile Intercultural Cooperative Learning



A Micool Project Cross-European Case Study On The Classroom Use of Tablet Technologies

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Erasmus+



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Chapter One

Introduction

An increasing number of European countries have identified mobile computing devices, particularly Tablets as a focal point of their national strategies for education (Horizon Report, 2014). These multifunctional “always connected devices” allow simple tools and applications to be easily integrated into classroom activities with no need for involvement of IT support (Horizon Report, 2011). The increasing popularity of tablets in society generally has sparked much interest in their educational potential and research work has illustrated numerous benefits including their potential to enhance learning (Burden et al., 2012); their contribution to the development of teamwork and self-directed learning (Ciampa 2014); their motivational attributes (Clarke and Svanes 2012); their use as an assessment tool (Clarke and Luckin, 2013); and their role in advancing C21st teaching and learning (Melhuish and Falloon, 2010).

While such studies documenting tablet use have been conducted world-wide most of these have been conducted in specific local or national contexts. This case study is different in that it is a multi-faceted study that offers a Cross-European perspective on tablet use in schools. It was produced as part of the Micool (Mobile Intercultural Cooperative Learning) Project’s Intellectual Output three commitments. Micool (www.micool.org) was a two-year project that commenced in September 2015. Its main aim was to provide in-service training and resources for teachers in mobile technology pedagogy and examine the ways in which innovative mobile devices, when introduced into schools, can enhance digital integration in teaching and learning. Seven partners from Ireland, Germany, Poland, Portugal, Switzerland and Montenegro participated in the project. The project consortium comprised teachers working in elementary and secondary education as well as 3rd level teacher educators and trainers from different countries. The partners complemented each other with their individual expertise and teaching experience in different educational sectors, different national education systems and educational research. The project participants came together to share their expertise on the use of ICT in schools and

to upskill teachers on the use of mobile technologies such as iPads to modernize teaching and learning for the C21st.

This study aimed to document and examine best practice examples of mobile technologies in schools and provide insight into the potential of mobile devices to change classroom learning and teaching in the C21st, based mainly, though not exclusively, on the experiences of the Micool Partner schools. The data contained in this report was captured using a case study methodology. A case study methodology was chosen because of the opportunity it provides to explore a single entity or phenomenon known as “the case” (Yin, 1994; Merriam, 1988) bounded by time and activity (a program event, process, institution or social group) through in-depth detailed data collection methods utilising “thick description” (Denzin, 1989). By its very nature thick description illuminates the context under study and allows the reader to enter into the environment and life of a culture as portrayed in the thoughts of the people who live there.

The main data gathering tool in this study was a series of individual qualitative interviews conducted with teachers, and focus group interviews conducted with students in Portugal, Poland, Germany and Ireland. Both teacher and student interviews were conducted using a structured interview format divided into key sections encompassing “Pedagogical Benefits”, “Lesson Planning”, “Interactivity”, “Infrastructure” (including participants’ perspectives on tablet devices compared to other school technologies), “Teacher Training/Professional Development”, and “How Tablets were affecting Change”.

To protect the anonymity of the participants a pseudo-name for each school will be used in the report and teachers will be referred to as “Teacher A, B, C, or 1, 2, 3”, etc. Student focus groups will be labelled “Student Focus Groups 1 to X”. All interviews were audio recorded, fully transcribed and thematically analysed using the structured categories listed above to group the study’s key findings together. Based on following this protocol a number of key thematic findings emerged, the most important of which will be discussed in the following chapters.

Chapter Two

Model One – School Owned Tablet Devices

Introduction

This chapter will present the findings from two of the Micool Partner schools, a primary school in Poland and a second level school in Portugal. In both cases the schools purchased a set of iPads in order to help it fulfil its Micool Project commitments. The iPads in these instances were the property of the individual schools, and were used exclusively by teachers with their students, using a booking system which allowed teachers to use the iPads on an as needs basis. As the iPads were owned by the schools pupils only had access to them during school hours and therefore they were not available to them for home use after school. Both of these schools are examples of a shared Tablet Resource Model where schools purchase a 'class set' (Burdent et al., 2012) of devices that can be shared across classes for a blocked time period each week in accordance with the needs and interests of individual teachers.

Portugal - Background and Context

Sancta Maria is a public school located in a remote rural area in central Portugal. The school attracts students from villages and rural communities located within a 30 km radius. It is a mixed gender school, as is the norm in Portugal. There is not much industry in the area and therefore the majority of students come from families that are not well off, but who nonetheless place a high value on education because of the possibilities it affords their children to make a better life for themselves. The region was particularly affected by the era of austerity as a result of the worldwide financial and economic collapse in 2008/2009 with many families forced to emigrate either abroad or to the main urban centres to seek out a living. The effects of this can be clearly seen in Sancta Maria's school numbers which over the last eight years have dropped by almost 35% from over 1,000 students to approximately 650 students today.

As part of its commitment to the Micool Project the school purchased 22 second hand iPads. These were purchased during the first year of the project, effectively meaning that the school had been using them for 12 months prior to the conduct of the case study. Although the school caters for students from Kindergarten to upper secondary (ages 3-18), with a unit also dedicated to students with special needs, this case study will focus on the use of iPads in secondary school classes as this is where they were mainly used. From the individual research interviews conducted with teachers including the school principal (n=7) and interviews with students, whose ages ranged from 16-18, comprising 6 focus groups (=18), there was a general consensus that school iPads were used mainly to support subjects involving second Language Learning, Geography, Philosophy, Portuguese and ICT.

Pedagogy and Classroom Use

Case study interviews with teachers and students highlighted the predominant role that assessment plays in the Portuguese education system. Time and time again participants referred to the importance of testing and preparation for exams as being crucially important. Both teachers and students indicated that students were being constantly tested on a weekly basis in practically every subject to test their content knowledge and preparedness for state examinations. Therefore, much of the dialogue and discussion about the use of iPads in learning was framed in terms of their usefulness for testing and examination preparation purposes.

Given this scenario it is hardly surprising that apps linked to assessment and feedback such as “Kahoot”, “Socrative” and “Padlet” were identified as the apps most widely in all classes when using tablets. These apps were liked by both teachers and students as they helped to ease the intensity of lessons, and made for livelier and more energetic classrooms by breaking up the monotony of the ‘teach-content-test’ approach. They also introduced an element of fun into classrooms which made learning much more dynamic. This in turn led to greater motivation and interest in learning as these observations indicate:

“The benefits are more motivation and interest. When using iPads they are interested in what they are doing. And because they are having fun at the same time school is not as boring as they all think...you know being in class and having

to listen to the teacher again and again. So they are more motivated and I think that makes it more effective.”

Teacher C

“They create a different dynamic in the class.... We can chat and we can talk with other when using the iPads so we can joke and have fun while learning in class which makes us more relaxed and more concerned about what we are going... We learn faster that way while having fun

Student Focus Group 6

The dynamism and fun elements that tablets introduced into learning appeared to be related to the opportunities they opened up for group work. This was particularly the case when it came to using the devices for researching and completing projects. With iPads available to them in classrooms teachers were more inclined to encourage students to work in groups to either conduct research or work on projects. This was seen as expanding their horizons and helping them to move beyond a reliance on textbook and teacher knowledge, thereby encouraging them to become more independent learners:

“I think when you have the iPad that instead of the teacher having to explain everything you can say “look you’re going to do research on this now” and I find this fosters groups work and opens up possibilities for them to work together rather than individually. And it’s good because it moves them beyond the textbook as textbooks are very superficial compared to the research they can do with Google.”

Teacher F

“I think it brings anew dynamic to the classroom. It totally does. You’re not only focused on the board and what the teacher is saying, You have a whole new experience and knowing you’re working with the iPads, you’re expanding your horizons, searching for new things and enlarging your knowledge. I believe it’s very good.”

Student Focus Group 2

As students became more accustomed to using iPad to support classroom learning activities teachers also noted that they became less reliant on them and were becoming more independent learners. This was viewed very positively especially for those students aspiring to go to university. Another added benefit of

this development is that it allowed teachers to devote more time in class to less academically able students, hence facilitating differentiation. One teacher noted how the iPad suited kinesthetic learners in particular while another teacher commented on how the iPad had helped her to use “*more diversified methods so that the work the students do is now more independent and not so teacher-based*”. She went on to explain how the iPad facilitated both the academically advanced student and the academically challenged students simultaneously. Using second language learning as an example she explained how she could now support struggling students to complete tasks while setting additional tasks for more able students

“Imagine we’re doing an exercise on Padlet like I was using in class today where students were required to write and upload pictures about a daily routine. Some students struggle with this and needed my help while the brighter students finished it quickly. So I could just say to them ‘Okay now you can practice your English using Duolingo’ and as they all have an account they just switch over to it. So that kept them busy while the others were still concluding. That without the iPads would have been impossible. These good students would have stayed there looking at the ceiling or talking to each other and disturbing the class.”

Teacher A

Given the importance of second language learning, particularly English in the Portuguese Education system, it is hardly surprising that both teachers and students reported that the iPads were used quite extensively in this field. The most widely used app in this domain was “Phraesal Verb Machine” which was used for learning grammar rules and syntax with some students reporting the occasional use of “Duolingo”. Unusually students did not report ever using the iPads in-built recording facilities to practice and listen back to their pronunciation. Nor did they ever try to use this facility on their own smartphones while at home to help reinforce their spoken English or German language learning.

However one teacher observed that as she became more experienced with iPads she began to move away from using these specific language learning apps as she felt they were overly drill and practice focused, with too much emphasis on individualistic learning. To counteract this she moved towards using more collaborative learning apps like “Padlet” where students could work in groups and

cooperate while learning vocabulary and completing assessments. This was a welcome development as one of her students observed:

“I really like the Padlet because we can search, we can write down our ideas and then share it with the rest of the class instead of just doing those games like phrasal verb which is a really simple game. So I think the Padlet is the one that we’ve been using a lot recently, and that’s the one we like the most.”

Student Focus Group 4

ICT Integration, Infrastructure and Training

From the research interviews conducted with teachers it is clear that using tablets has assisted the process of ICT integration in the school. Much of this can be attributed to the affordances of the iPad itself as features such as size, mobility, quick start-up time, the availability of learning apps and instant internet access, contributed to its appeal as a classroom teaching and learning device. Compared to previous school based technologies most teachers believed that the iPad was a more intuitive tool and therefore easier to use. Teachers also reported that they had hardly used the schools dedicated computer labs at all since the iPads arrived, although it should be noted that they also reported that they had used the computer room infrequently anyway prior to acquiring tablets. This was due to the fact as one teacher said that the *“computers are old, very slow and some of them don’t even work”*. But even if this was not the case most teachers indicated a preference for investing in more iPads for the school rather than computers. As one teacher observed:

“This year I haven’t gone to the computer room yet and we are now in March. I prefer iPads because I can use them in my room without having to go to a specific computer room. My lessons now are more interactive because in the classroom I can talk and see what they are doing while in the computer room I tend to sit at my desk looking at what they are doing but not interacting with them. With the tablets it’s different because you are walking and talking and interacting more”.

Teacher C

Although existing computers were deemed to be old and slow there was a general consensus that as a school they were quite lucky as a member of the administrative

staff had an interest in technology and acted as an ad-hoc, on-site expert in maintaining the computers and school network. Alongside the IT teacher he helped to keep the school computers, which consisted of a computer (or laptop) and data projector in every class, the two main computer labs (rooms) and school library computers, operational. However if the school had not had this expertise on site their school computers would have ceased to function a long time ago. Due to the cutbacks experienced during the austerity era the school had been unable to update any of its computers which were now more than 10 years old and the only infrastructural investment it had made in that period was in its Wi-Fi system which was quite good, with one teaching pointing to the schools progressive attitude in making its Wi-Fi available to students as well, unlike in her child's own school where student were blocked from accessing the school Wi-Fi.

However many teachers expressed disappointment about the lack of support at government level for school technology when it came to upgrading machines or providing funding for a dedicated technical support person in schools. This lack of support from the Ministry for Education was best encapsulated by one teacher who queried why if the Ministry could support all other areas of school life such as canteen staff, security staff, cleaners and office staff, why not School IT? *"How is it possible, this teacher said, to keep an IT system working with nobody employed to keep it going? I think it's not possible."*

It is probably due to the investment that Sancta Maria had made in its Wi-Fi and broadband infrastructure that teachers reported experiencing few, if any, technical difficulties with the iPads. The only issue raised related to battery issues if the devices had not been put back on charge once a class had finished using them. The bulk of technical and administrative tasks associated with tablets such as purchasing apps, updating and storage management were performed by the two teachers who represented the school on the Micool Project. They also ran the booking and timetabling system whereby teachers could book iPads online via the school Moodle VLE platform each week for class work, and this system was reported to be working well.

When the school initially became involved in the Micool Project and subsequently purchased its iPads the Principal and the project's teacher representatives hosted an information session for staff to demonstrate the iPads capabilities. All teachers were encouraged to take the devices home with them for a number of weeks or over school holiday periods to work with them in their own time and space with the two Micool teachers making themselves available for informal training and support for anyone who requested it. It was very much a softly, softly approach and willingness to become involved was very much on a voluntary basis. There was a general consensus that this was the best approach as teachers did not feel under pressure and could come on board to try out the technology and explore its capabilities in a more relaxed way. By the time this research was conducted the school had been using its iPads for a full 12 months stretching over two academic years and seven teachers could be classified as regular iPad users with a number of other teachers using them on an occasional basis. Plans were also underway to deliver significant training to all remaining members of staff on a whole school basis before the end of June 2017 with a view to increasing the number of regular iPad users in the following academic year.

The Winds of Change

One of the main motivating factor behind Sancta Maria's involvement in the Micool project was a recognition of the importance of digital technology in the lives of young people and that schools needed to change to reflect this. Although located in remote area, the school has always had an outward orientation and had been involved in other European projects before, but this was the first time it had become involved in a technology project. Reflecting on the school's desire to be involved with Micool, the school Principal spoke about how new technology was changing teachers' roles and students expectations. With so much information now available on the internet, teachers were no longer the main source of information for students. In this respect one teacher noted how she had started to use resources from American websites because she found that most of her students had already visited many of the Portuguese websites *"and already know the answers to the questions I use in class because they have already seen it online"*. The challenge this posed was perhaps

best summed up by another teacher who noted how the traditional classroom approach no longer engaged students as in the past:

I have been looking for many years for a solution for some of the problems that I have experienced in the classroom, namely with the motivation of students. I think that traditional teaching is not enough if we are to captivate the students and keep their attention, which is actually necessary for them to learn. I have always tried to diversify my methods and the iPads seem to be a very nice solution since the students are very attracted by this kind of technology.

Teacher A

According to the school principal the solution to this problem required a change in how schools and teachers think and operate – meaning that schools could no longer simply deliver information to students but instead had to become more involved in assisting students to become independent learners; this meant equipping them with the necessary learning skills to access the vast reservoir of information on the web and judiciously using it. Inevitably this would require a change in how teachers planned their lessons and thought about their approach to teaching. On a positive note the teachers who were regularly using iPads to support their teaching reported that using the tablets had impacted how they planned for and thought about teaching their respective subjects:

“Yes having the iPad does change how I think about teaching my subject because now instead of just delivering content, I can challenge my students to go looking for the content themselves and then we can come back later and discuss it together.”

Teacher E

“Actually it has diversified methods... I think the work they do now is more how can I put it...independent. Not individual. But they work more on their own and it's not so teacher-based. Do you understand?”

Teacher A

“It has changed how I teach because I now understand that when I am working with students, it's not that I am the teacher and they are the students. It's more about working with them, allowing them to help me, and not just me explaining things. I feel the students like it more when we work like this. So I try to meet them.”

Teacher C

While these observations and reflections are indicative of important underlying shifts in teacher thinking and methodologies among teachers interviewed, it cannot be claimed that this is a widespread development yet. In fact both students and teachers pointed to some very powerful cultural norms and practices inhibiting a number of teachers from embracing changes that new technologies like iPads can bring. Students for example, expressed the view that they would like to see more of their teachers using tablets but felt that some teachers had very traditional views about teaching and learning and that this acted as an impediment to greater usage. This was further compounded by the fact that they lacked the necessary skills to feel competent using such devices

‘I think some teachers are not ready. They don’t know know..I mean they aren’t used to computers, they are more used to text and so they are old school and more traditional... It’s the way they learned and they want to teach like that, more or less.’

Student Focus Group 6

“It’s seen as a toy and they don’t know how to manage it. It’s hard for them because they learned in a traditional way and they don’t have much knowledge about technology and they prefer the board and the books. They don’t know how to teach with technology. So they are sort of old fashioned. They need to feel the paper and the amount of things you have to study.”

Student Focus Group 2

When asked if they had ever tried encouraging these reluctant teachers to use the iPads by offering their expert knowledge in the technology to help these teachers out, the students firmly answered that this is not something they had ever considered. Long held traditional views about what constitutes teaching and the fear of students knowing more about technology was also cited by teachers themselves as a reason why some of their colleagues were not yet using the iPad

“Students helping teachers? We never thought about that. I think the reason some teachers avoid using tablets is because they don’t want to show that their abilities with technologies are so low. There’s the problem.”

Teacher D

Peer observations of teachers using iPads in class as a way of helping reluctant users to become more familiar with the devices did not appear to be an option because as one teacher explained *“that’s a big difficult issues because most*

teachers don't want anybody else inside their classrooms. They are very strongly against that."

Aside from long held cultural beliefs about teaching norms and practices other systemic and structural issues also affected the extent to which tablets were utilised by teachers. The research interviews with teachers revealed how the exam driven nature of the Portuguese system meant that teachers felt under constant pressure to assess and test out students' knowledge and abilities. Although teachers wanted to use new technologies and devices like iPads to make learning more enjoyable and interactive, the traditional examination system that was paper based and knowledge driven, meant that they had to prepare students in traditional ways to be ready for such exams. Parental pressure was also a factor as in the end of the day teachers were judged by how well their students passed their school exams in order to secure university places.

"In Portugal we have a huge problem I think because we are a very exam based system. Very often I could do more things but I need more time but I have to deal with all the topics on my curriculum because if I don't and if something comes up on the exams that I haven't covered I will have parents on my back saying "you didn't cover this, they didn't practice any of this . Then I cannot tell them, "oh I was trying out new methods with the iPads". This doesn't work. It's a huge problem and you need your grades to get to university because otherwise you won't get a nice place to study".

Teacher A

Finally the economic crisis of 2008 followed by years of austerity also influenced the extent to which some teachers engaged with iPads. Stringent cuts in teachers' salaries alongside an increase in teaching contact hours from 22 hours pre-austerity to 27 hours post austerity, less annual leave, plus a cessation in incentives for career progression whereby teachers who undertook professional development courses in areas such as new technology etc. could be promoted to more senior levels, had demotivated teachers. Consequently many were now more reluctant to welcome and embrace new developments and invest time in trying out new opportunities such as using tablets in teaching. In addition, because school numbers had fallen by 35% since the recession, the school had not been able to recruit new teachers over that ten year period. Consequently a state of stasis had set in with

most teachers now in the 40-60 age group, with a significant number approaching retirement. This made change and the introduction of new teaching methods and new technologies difficult to implement.

Poland - Background and Context

Święty Odkupiciel is a private school located in Warsaw. It is a fee paying school catering for the children of professionals and business people. It is a mixed gender school, as is the norm in Poland. There are 300 pupils in the school and a typical class size is 18 which is lower than the national average. Święty Odkupiciel is a primary school and caters for children aged 6–14.

During the first year of the Micool Project one of the teachers representing the Polish partnership moved to this school. At this time the school did not have iPads but as a result of her influence the school decided to introduce iPads and purchased a kit of 20 iPads for school use in April 2016, three months after the teacher joined the school. The interviews for this case study were conducted at the end of the academic school year 2016/2017, at a time when teachers had been using iPads for a period of 10 months. The focus of this case study is language teachers and their students. The teachers (n=3) were interviewed individually while students (n=17) were interviewed in focus groups comprising two to four participants. Students ranged in age from 10 to 13 years and represented four separate classes in the 5th and 6th grades.

Pedagogy and Classroom Use

Given the younger age group of the students participating in Święty Odkupiciel, it is not surprising that the research interviews revealed quite a relaxed approach to iPad usage in the classroom. Both teachers and students spoke enthusiastically about the role that iPads played in supporting students creative skills, in creating more 'noisy' classrooms as well as the level of freedom to move around both inside and outside the classroom when working with iPads.

The subject areas that students identified as the ones where iPads were used most frequently were English, German, Maths, Polish, and to a lesser extent Mathematics. One teacher also identified 'Ethics' although this was not mentioned by students

themselves. According to students the most used apps were “iMovie”, “Keynote”, “Story Maker”, a variety of “Math” learning apps, and quiz apps such as “Kahoot” and “Quizlet Lite”. Among interviewed teachers “iMovie” and “Keynote” were identified as the apps they mainly used. The range of apps utilised suggest quite a balanced approach to how tablets were being used as teachers seemed to be using both creative apps and content based apps to support classroom teaching and learning. The most cited benefits of iPad use were more motivated and engaged students, more enjoyable lessons, greater creativity and freedom:

“I think because iPads seem to be a natural tool for young people it has the motivational factor, because it motivates them. It’s more interesting to work with an iPad than a sheet of paper and another thing is that they can choose activities they like and they can also bring quite a lot of creativity to ordinary activities because it’s up to them what they choose... so I think iPads give a lot of freedom.”

Teacher A

For students this freedom was best characterised by the opportunity that iPads provided for breaking the monotony of book work which many found quite boring by comparison:

“I think it helps my learning because it’s better than books and I think the iPads have helped me learn in school because when you are going to school with paper books you always think, ‘Oh no, Today we are going to make something with books. No!’ And when you are going to school with iPads there you know that we are going to be playing with Quizlet or iMovie for lessons..... and because you get to have fun you learn more.”

Student Focus Group 5

Like their Portuguese counterparts, teachers welcomed the opportunity that iPad provided for student collaboration and project work. In this respect, the use of iMovie in particular was noted for the role which it played in encouraging teamwork. Citing a Berlin Wall project that her class had worked on, one teacher observed how students she tasked with conducting research on the subject, then decided themselves to extend that exercise further by making their own film on the topic. In this respect she believed that iPad usage was helping her students to become more independent learners:

“It’s more interesting for the students when they work with iPads on projects.... They are more independent of the teacher and they have more possibilities.... They could research the information themselves, search vocabulary, make their own dialogue and make their film without the teachers’ help. This gives them more possibilities to take responsibility of their learning processes and they are more involved in learning and they are more creative. They could realise their own ideas and the role of the teacher is always less.”

Teacher C

Another teacher observed how using iMovie provided more interesting ways of learning new vocabulary when studying foreign languages as students were encouraged to study topics and use sets of expressions creatively. Making films provided an ideal vehicle through which students could make up their own dialogue using these expressions and role play various scenarios. Describing such activities as being akin to ‘theatre’ the teacher noted how much fun and enjoyment it brought to her class. This fun and enjoyment aspect was also mentioned by students who believed that iMovie supported group work and provided a more interesting way of acquiring new words while also motivating them to perform better:

“The iPad makes lessons more interesting and it helps us to learn more new words, because when we make a film, you are wanting to do something to be the best in the class so you want to find more new words so that you know more words than before”

Student Focus Group 2

“In German we are using tablets a lot for filming and our teacher gives us tasks, for example we must do a film about something. So we work in groups and that makes it easier I think because you have another person working with you and you can ask that person about something.”

Student Focus Group 3

The ease with which iPads could be used to accommodate different learning styles and support learners of different abilities as well as those with disabilities was particularly welcomed by teachers. Intrinsic features of the iPad such as its accessibility tools which can read text for example, made the device ‘*a perfect tool for students who are blind*’ in the eyes of one teacher. For another teacher who was teaching a mixed ability class, the iPad enabled her to manage her class much more

efficiently as she could devote more time to working with children struggling with language learning, while more able students could work independently in groups on different tasks using the iPad. In her mind this level of differentiation would have been “*impossible without the iPad*”. She went on to explain how the iPad allowed her to tailor her classes, materials and resources to individual students in a way that was not possible before:

“I can tailor my classes, not on my lessons, not only to a particular form or particular group, but in a way that allows me to reach the individual student. I have groups of up to nine or ten people and so the day before I can send different materials online to each student, and then they can access them and work on them at their own pace, using materials that are suited to their needs and to their language skills. That’s the difference, in a regular class without iPads I wouldn’t be able to provide tailor made lessons”.

Teacher A

The use of the iPad in assisting differentiation also brought with it other benefits such as a greater understanding and tolerance of learners with different abilities, as it provided opportunities for more capable students to act as mentors to fellow students, as this teacher explained:

“I use iPads a lot for group work as I find they can help students with different abilities. With group work you can have students of different abilities work together and so they learn from each other in the sense that the weak student can learn from the good ones. But the good ones can learn too. They can teach the other one which is always good, and so learn how to be tolerant. So just having the opportunity to help each other out is perfect and I have numerous examples of such cooperation.”

Teacher B

ICT Integration, Infrastructure and Training

The IT Infrastructure at Święty Odkupiciel was described by most participants as outdated and in need of modernisation. Most classrooms have Interactive Whiteboards which were reported as being mainly used as “screens”, which means they are under-utilised compared to their capabilities. All classrooms were equipped with a teacher computer and data projector with some classrooms also having an Apple TV. While the school had a computer room equipped with 20 computers and an IT teacher doing one’s best to keep the computers running with the occasional

help of an external IT provider, both students and teachers reported rarely using the facility as it is mainly used for IT classes. On the few occasions when teachers used it, they reported that because the computers were so slow it was a frustrating and time wasting exercise, especially as they were working within the constraints of class time periods of 45 minutes. The speed with which they could be up and running with iPads in their own classrooms without having the logistics of travelling to a computer room made using tablets a far more efficient, effective and enjoyable experience:

“We have a computer room that I don’t use, first of all because it’s mainly for IT classes. And secondly, the process of logging in and logging out takes such a long time and as the class is only 45 minutes I can’t waste time on such procedures. Now that everybody has their own iPad it takes just a few seconds to reach the materials that are necessary for the lessons. But it’s not just about the iPads, it’s also about the question of wiring and access to the internet, which in our school can sometimes be challenging. But definitely the teaching and learning experience using iPads is much more involving than computers but I would ask the school authorities to invest in a good internet connection as well.”

Teacher A

While iPads can be used quite well in offline mode utilising pre-downloaded apps and traditional office productivity tools such as “Word”, “Pages”, “Powerpoint”, “Keynote” etc., clearly schools derive maximum benefit from such devices when they can be used online as well, particularly when conducting research for project based work and using the internet. In such scenarios access to a good Wi-Fi infrastructure which can support many devices being used simultaneously in different classes across a school is essential. Currently this is not a major issue for Świąty Odkupiciel as only two classes use the tablets simultaneously at any one time. However if the school decided to scale up its iPad usage in the future, the question of Wi-Fi connectivity and internet access would clearly need to be addressed.

“The biggest problem for me was when the Wi-Fi didn’t work. To use iPad you really need a good Wi-Fi connection. And it’s important that one person takes responsibility for the technical support of iPad.”

Teacher C

This latter point in terms of iPad management is particularly pertinent. Under current arrangements the 20 iPad are split into two kits of 10, supporting simultaneous

usage by two classes at a time. For the most part, apart from language learning where classes are capped at ten, a device is effectively shared by two students. However, apart from assisting with Internet passwords, the IT teacher is not involved with managing the iPads. This means that the teachers themselves are responsible for putting them on charge each day in the two bulk charging units once they have finished their classes, and for downloading apps onto them. A timetabling system indicating the availability of each iPad kit is issued every two weeks so that teachers can sign up to use them with their classes. Of the 50 teachers in the school, 15 are described as regular users, which at 30%, after 10 months of usage, represents good progress. However should that number increase over time, as inevitably it will, this will lead to a need to purchase more iPads and to deploy a more sophisticated and streamlined management and maintenance system to support school tablet devices. Clearly this is a policy issues which school leadership will need to address in order to support the school's move in this direction.

In terms of supporting ICT integration the adoption of iPads was viewed positively by teachers who used them regularly in Świąty Odkupiciel. The convenience of the devices, especially in terms of their portability and the freedom they gave students to move around and support creative activities, provided opportunities to learn in many different ways, with teachers expressing surprise at both the effort invested, and the quality of work produced by their students. Since introducing iPads teachers reported that their lessons were more interesting for both students and themselves which encouraged them to use iPads more and more in their classrooms. Commenting on how the introduction of iPads *"has made my life in the classroom much easier"* one teacher reported that the iPad had helped ICT integration due to its intuitive nature and ease of use, which made it appear such a *"natural"* tool to use. Another colleague explained it thus:

"I believe the iPad has helped integration a lot and I'm doing my best to integrate technology more and more into my teaching....I'm doing my best to introduce technology to things where it's quite boring for kids to study such as traditional grammar exercises. I'm getting more and more convinced that the old ways of learning grammar are pretty useless for such activities, so I'm doing my best to find different ways with iPads to teach them to communicate (in a different language) and think more effectively."

Teacher B

An important reason why iPads were viewed as assisting ICT integration can be attributed to the level of training provided. While introductory technical training, followed by some more advanced training in the use of “I-Tunes U” was provided by the vendor from whom the devices were purchased, the role which the Micool Project teacher played was also crucial. Having attended two separate week long training events provided by project partners iMedia, in Switzerland and Infocus Training, in Ireland, she acted as an on-site “go-to expert” and advisor particularly when it came to iPad pedagogy. From there, and as teachers became more familiar with tablets, professional development evolved in a more informal manner as teachers began to organise their own workshops where they trained each other through sharing ideas and tips and best practices.

“I like our model, because we try whenever we have time as teachers to share best practices, best apps and I think this works really well. I would be very happy to continue this next year because I can trust my colleagues. And it’s great that we can do it in school without having to go anywhere. While it’s great too to have external training from different specialists and people who are experienced, I think the training we have been giving each other is most effective and much more successful than that provided by Apple specialists”.

Teacher C

The Winds of Change

The extent to which access to mobile devices was affecting change was discernible in the responses teachers gave to questions in relation to changing classroom practices, changes in approach to lesson planning and changes in how they thought about their teaching methodologies since they commenced using tablets. The extent of that change was probably best summarised by one teacher with this analogy - *“I think the difference between traditional methodology and the methodology with iPads is like the difference between horse carriage and a very good car now, for example a Mercedes.”*

There was a shared view among teachers interviewed that there was a pressing need for change in Polish education generally as *“most of our schools are still based on a C19th/early C20th philosophy of education which is very traditional and teacher oriented”*. This orientation was viewed as ill-suited to the needs of students today

and the contemporary needs of modern society. While acknowledging that many Polish teachers, including some of their own colleagues, were very set in their ways and in need of a mind-set change, the teachers who were using tablets regularly could see how this use was changing them and their conception of their roles.

As they began distributing more materials online to their students in advance of class, they were clearly adopting a 'flipped learning' approach to teaching. The ways in which they spoke about how the use of iPads changed the dynamics of the learning "space" because children were now free to physically move beyond the confines of the classroom, as well as the freedom that students now had to choose activities they liked, provide an interesting insight into how the dynamics of the traditional classroom were changing. As one teacher observed *"participation in the classroom simply takes a different form. Because they are working on iPads you won't see raised hands nor will you see the traditional active student because they will be active in a different way working on their iPads"*.

Of particular interest in this regard is the extent to which teachers were willing to embrace new technology rather than shy away from it, as they themselves were keen to demonstrate to their students that they too were *"as skilled as using new technology as them"*. And if they happened to experience technical difficulties, well so what?; that wasn't viewed as a problem as they were willing to enlist the help of their students if required:

"Definitely I have developed. Because I want to show my students that I'm as skilled at using new technology as them. And I also want to encourage them to expand their skills, so I try to be a partner...because I'm developing with my students. I'm learning too of course, I need to learn new apps. I need to see the connections and of course I can always ask students and I don't have a problem with that".

Teacher A

Comments like this are refreshing to hear as so often teachers avoid using technology due to the fear of appearing to know less than their students in this domain and how this could potentially undermine a teachers' authority. But as this example shows, such fears are largely unfounded especially when teachers develop

a partnership approach to classroom learning and teaching. When teachers are willing to change through the adoption of new technologies and other initiatives for the betterment of students, students appreciate it and for the most part will respond positively to their teachers' efforts. Adopting a relaxed approach to knowing that in some areas like technology students often know more than the teacher at a technical level, does not undermine a teachers' pedagogical knowledge.

This was acknowledged by students themselves who, when asked if offered the opportunity to do most of their learning online giving how much technology they now had available at home, they answered with a resounding "No". This was partly due to their distrust of their own ability to stay focused or to 'cheat' without the watchful eye of a teacher and probably more importantly - trust in a teachers' ability to explain difficult concepts at that point in time when students are struggling. As one student noted:

"I think it's a bad idea because if you don't understand something this teacher [sic the online computer] cannot explain it to you. So it's not the same because in school a teacher for example can draw you something or write it out for you, and online you can't do this because you don't have a real teacher".

Student Focus Group 5

In this respect, students by their own acknowledgement and despite greater access to technology still feel the need for the guiding hand of a 'human' teacher. The challenge therefore is how to strike the right balance between the teachers' role and the pedagogical possibilities that new technologies like iPads open up. Undoubtedly striking this balance requires an openness to change, in particular when it comes to adopting new methodological approaches to facilitate a more 'blended' approach to teaching and learning. This in turn impacts how teachers think about, organise and plan classroom activities when devices like iPads are available. Evidence from Święty Odkupiciel suggests that this process is well underway as teachers provided very concrete examples about how using iPad changed not just their approach to teaching but also how they "thought" about their teaching which impacted how they now planned their lessons. One teacher explained how her lesson plans before the iPads were very detailed and content focused, whereas now she emphasised more the lessons' aims and objectives with just an outline plan. This then created space

for students creativity to emerge as they now had a greater say in determining and shaping the lesson content by using the iPads to create classroom materials. Perhaps though the impact of iPads on changing teachers' traditional modus operandi was best summed up by one teacher as follows:

"I would say that my own teaching and learning has changed, in the sense of my philosophy of teaching as it's now more student centered and less about the teacher..the teacher is almost invisible. I now believe that the teacher should just show the way, that the teacher is just a little helper and not a kind of God who knows the truth...So it hasn't just developed my teaching practices - my whole philosophy to teaching and learning has changed since using the iPad"

Teacher B

Summary

This chapter has examined and summarised the pedagogic use of iPads in two Micool project partner schools. It has provided an insight into the many benefits that mobile technologies has brought to the teaching and learning environment and the variety of uses in terms of assessment, second language learning and student creativity that using tablets has brought to the participants. It has shed light on the challenges surrounding the existing IT infrastructure in schools, which in many cases is no longer fit for purpose, and the crucial importance of a robust school Wi-Fi system when using mobile devices. The importance of teacher professional development has also been highlighted. Furthermore, despite the fact that both schools operated within the confines of a rigid, traditional education system, the opportunity to use mobile devices has opened up possibilities for change as teachers began to adopt new methods and fresh approaches to classroom teaching and learning.

Chapter Three

Model Two – Tablet Loan Programmes

Introduction

This chapter will present the findings from two of the Micool Project Partners who operated a loan system whereby iPad kits containing up to 10 devices were loaned out to schools. This system that was operated by the Irish and German partners was very similar to the Shared Tablet Resource model described in the previous case study, except that schools only had access to the devices for a short period of time lasting anywhere from 3 to 12 weeks. Because the decision to avail of and use borrowed iPad kits was usually taken by an enthusiastic teacher rather than being driven by school policy, this chapter will only present the findings that emerged from teachers' pedagogic classroom use of the devices.

Ireland - Background and Context

During the 2016/2017 academic year two Irish Primary schools availed of the opportunity to trial and use a kit of 10 iPads made available to them by Micool Project partner, Dublin City University. Each school had full use of them for an academic term i.e. 10-12 weeks. All iPads were preloaded with a range of both Numeracy and Literacy Apps as well as a number of Creative Apps such as "Book Creator", "I-Movie", and "Explain Everything", among others.

Both primary schools catered for students ages 5-12; one school was located in a busy suburban area of Dublin city (School A) while the second school was located in a more rural area in the south-east of the country (School B). In one of the schools the teacher responsible for taking charge of the iPads and promoting their use was closely involved with the Micool Project through an affiliation with Micool Project partner, Infocus Training; this school also benefitted from two 3 hour training workshops provided by DCU prior to the iPads arriving in the school. In the second school the teacher who took on the role of managing the schools involvement with the iPads had already attended a week long training event on iPads provided by Micool Project partner, imedias, in Switzerland. While neither teacher held an official

post of responsibility for ICT in their schools as both teachers were quite young, they were seen as ICT enthusiasts and were frequently called upon by their colleagues and school principals for advice and assistance in this area.

The interviews for these case studies were conducted at the end of the academic school year 2016/2017. A total of 8 teachers, representing first, third, fourth, fifth and sixth classes participated in individual research interviews while focus groups were also conducted with students from third to sixth classes inclusive. Each focus group comprised 3-5 students.

Pedagogy and Classroom Use

Due to the limited time period each school had with tablets it is perhaps understandable that both schools focusses on using them to support project based work and more creative curriculum activities. While some teachers reported using the pre-installed content based apps to support literacy and numeracy skills, this appeared to happen only occasionally and mainly with very young children, aged 8 years and under. In School A teachers primarily used the iPads to support classroom project research and participation in “Whole School” based initiatives such as Tech-Week (www.techweek.ie) and the Community Endeavour Awards (www.sdcc.ie/community-endeavour-awards-2017). In School B the iPads were mainly used to support SESE and associated project work. SESE (Social, Environmental and Scientific Education) is an element of the Irish primary school curriculum encompassing three subjects, Science, Geography and History. As reported by teachers and students, the apps most frequently used were creative apps such as “iMovie”, “Book Creator”, “Puppet Pals” and “I can Animate”.

Across both schools teachers and students reported that using iPads added greater variety to classroom activities, which in turn made their classes more interesting and more enjoyable. Older children welcomed the freedom of being able to use “Safari” for conducting project research as well as using iMovie for more creative endeavours. It is interesting to note how iMovie was frequently used as a way for students to report out on the research projects they had conducted utilising a more

imaginative format rather than using more traditional written and poster display formats:

“When we were learning about Christianity we did some movies for our projects and also when we were doing our project on transport.. we had to do a project on the transport in our local area and how kids get to school. So we made a movie about it on the iPads. I thought it was cool making these movies. I really enjoyed it because you got to be creative using the iPads and it’s something that we wouldn’t usually do in school”

Student Focus Group, School A (6th class)

Apart from the opportunity iMovie afforded to students for creative expression and co-operative learning, it was also positively viewed by teachers for the role it played in developing students presentation and critiquing skills. As students had to synthesise their project findings in iMovie format for presenting and sharing with their peers, they were acquiring new skills in the art of identifying the most relevant information points through the movie editing process, as well as how to critique each others’ work in a constructive and helpful matter as this teacher noted:

“We used iMovie an awful lot for drama and doing group projects. And then when they finished they had to present their movies to the class and then critique each other’s. I found they were well able to kind of reflect back on their own work and give feedback to each other and they were very good at being constructive. They’re way better than a teacher is as they kind of take it from each other quicker than they do from an adult. So it really engaged them. They just loved it and begged to do it again”.

Teacher 1, School A

It was probably due to the skill acquired in critiquing each other’s work that these same students went on use the iPads to produce an award winning video on the school’s community garden, scooping the top prize of €1,000 euros for the school. The competition which was supported by the local County Council’s Community Endeavours awards, had a special category for Community and School Gardens/ Allotments to recognise the efforts of individuals and communities working together to improve their local environment. Thanks to the award the school intends to build a seating area in the garden to make it a more pleasant environment for students and teachers to come and enjoy the garden’s benefit.

The school also utilised the iPads to galvanise its efforts to support Tech-Week. Tech-Week is Ireland's nationwide festival of technology aimed at encouraging students, parents and community groups to become involved in activities and events promoting awareness about the role technology in society and the importance of STEM. It is organised by the Irish Computer Society (www.ics.ie) and takes place in April each year. During this week different teachers used the iPads to support a range of technology focused activities such as maths trail exercises whereby students were encouraged to walk around the school to identify mathematical shapes such as angles and circles in their surrounding environment, using the iPad's camera to capture these shapes. Another popular activity involved using the iPad's blue-tooth facility to help with the programming of blue-bots, where children as young as 7 were coding blue-bots to assist with mathematical and language learning:

"We used the iPads an awful lot during tech week with the blue-bots. I used them for every subject in the curriculum for teaching maths, a little bit of basic French and Spanish. The children created mats to use the blue-bots, so numbers one to ten, the colours, so little things like that in different languages and then they would have asked each other questions and got the blue-bots to move to that space on the mats. So if it was – how many children are in your family they might have asked that question in a different language, so if it was 5 – then as part of the answer they would have to program the blue-bot to move to number 5. So it was amazing in terms of the language development, the mathematical language, the positional language. It was fabulous for the development of the children and how well they engaged with this."

Teacher 3, School A

Another school-wide innovative activity involved the hosting of a 'KidsMeet' modelled on the 'TeachMeet'¹ phenomenon. This was held in the school hall where students from all different classes prepared nano presentations using the iPads to present out the various tech and STEM projects they had been involved in to an audience of parents and peers during Tech-Week.

While "iMovie" was very popular with, and very well utilised by 5th and 6th class students, younger children, i.e. aged ten and under, reported making greater use of

¹ A TeachMeet is an informal, organised meeting (usually in the style of an unconference) where teachers come together to share ideas and good practices mainly around classroom technology, but not exclusively so, as the TeachMeet concept has evolved and developed. TeachMeets are often organised to coincide with other educational events such as the CESI (www.cesi.ie) annual ICT Teachers Conference, Ireland or the BETT show (www.bettshow.com). UK.

simpler applications like “Book Creator” and “Puppet-Pals”. One group of students highlighted how easy it was to use Book Creator to combine both text and drawings as well as incorporating photos. They had no problems remembering and describing in-depth the “loads of different projects they had created” across the SESE curriculum that included projects on the Amazon Rainforest, World War 11 and projects about “people in poor countries”:

“S1: When we were doing the poor children one, we did Ethiopia in a group. I drew some pictures and we took a photo of the pictures that we drew and we put them in our book. And we got facts off the internet and we put them in our own words and we made different pages.

S2: And It’s like a real book when you make it because when you press a button the page flips over and you can write on both pages, and you could do a front and back cover. All of the pages can be different colours but my favourite bit of the colours was when we made like a wrinkly old cover like yellow and gold for our World War 11 project. “

Student Focus Group 1, (School B)

In addition to developing media literacy and narrative development skills, presenting project work through a multi-media format also helped students to learn, absorb and retain important information in a very meaningful and impactful way. When asked how they felt the iPad had helped their learning, one group of students had this to say:

“S1: Well we’ve researched all the stuff and now we know a lot about the right stuff like the rainforest. We didn’t know that there were about 59 million animal species there...

S2: ...Yeah and the four layers of the Amazon like the emergent layer and the forest floor.. see I know it all. So before we didn’t really know a lot about the rainforest except that there were very big, big trees there....

S3:... And now we know that there are like 2,000 animals in there and like 3,000 different types of trees...

S4:And that some of the trees are about 59 elephants tall...

S3:... And also I didn’t know that rainforests take up 13% of the world...”

Student Focus Group 2, (School B)

As this conversational interaction illustrates the information they gleaned through conducting their own research for their tablet based projects clearly resonated with students. The benefits of working in this way did not go unnoticed by their teachers

who commented how children will often switch off from learning very easily while listening to a teacher or reading from a book. Moving from such passive modes of learning to more active ways of conducting research and presenting their findings using the iPads multimodal capacities was seen as encouraging *children “to discover information on their own rather than having someone telling them what to do”*. This made learning much more stimulating and rewarding for children.

“With the iPads all the students got involved. They all loved doing their projects. It was a real reinforcer which they all participated in. They kept saying to me “Oh, this lesson is really interesting when we have the iPad”. And it was more interesting for me a teacher too because you’re able to do more. You know it’s very difficult with your own computer and the interactive whiteboard to get them all engaged, but when it’s in front of them on the iPads, even those that don’t bother learning too much all participated... you know so it’s amazing that way”.

Teacher 1 (School B)

Teachers also noted how using the iPads were also helping the development of student’s social and communication skills. Because they had to share the iPads with just 10 devices available to an average class size of 25-28 pupils, students had to learn how to collaborate and work together to complete tasks. Furthermore as part of movie making and story development students had to learn how to communicate ideas and agree roles and responsibilities as part of the production planning process:

“Because my class had to work in pairs or groups of three because there were not enough iPads it really helped them to learn about compromising and working together and sharing ideas and the importance of not taking over. So whether it was putting a story together or deciding on the idea before kind of going ahead with the Puppet Pals or the Book Creator, the importance of turn taking on the iPads and figuring out who will do what, or play what parts, and keeping on task as well, that was very good for their skills in learning how to work with each other”.

Teacher 4, (School B)

This observation is particularly interesting in the context of the development of C21st skills and attributes when one considers the networked nature of society and the value that is now placed on teamwork, collaboration, creativity, communications and emotional intelligence in the workplace. Although these primary school children are

a long way from entering the workplace, nonetheless, the provision of opportunities to work in this way is potentially laying important foundations for their cognitive, social and emotional development as C21st learners, citizens and future employees.

Germany - Background and Context

The use of technology and new media in German schools is supported by district media centres who work with all institutions involved in education from kindergarten to secondary and vocational schools. Schools can borrow technical equipment and other digital resources from these media centres for set time periods. This gives teachers and schools the opportunity to trial out new technology before deciding whether to adopt or not, before proceeding to purchasing. They also provide training materials and training courses for teachers and school leaders in new technologies and the use of media and digital resources for learning. One of these media centres operating in Lörrach was actively involved in the Micool Project. As part of its project commitment it provided iPads to a number of local schools for trial-out periods as well as delivering teacher training. A representative sample of teachers (n=10) comprising primary school teachers, vocational teachers and special needs teachers, who availed of the Media Centre's iPad resources and Micool training participated in the German case study

Pedagogy and Classroom Use

In the past decade the introduction of individual and cooperative learning to foster learning skills and student autonomy has become increasingly important in the German education system. Due to an increased emphasis on pupil-oriented teaching where education is tailored to the needs of the individual student as well as inclusion, a big emphasis has been placed on the deployment of newer, more hands-on, problem based-teaching methods. The development of personalised learning alongside a competence oriented curriculum has resulted in greater pedagogical freedom for schools and teachers. Consequently teachers now have greater autonomy in selecting lesson content, teaching methods and assessment to ensure that teaching is more student focused and personalised.

Against this backdrop the use of iPads in classrooms was deemed particularly beneficial for supporting ‘learning stations’ or ‘station work’, a popular pedagogic technique for supporting students self-directed learning as well as differentiation. The advantage of this method is that each station can contain a variety of resources that allow students to practice skills or explore topics by themselves. Utilising this approach teachers can design ‘learning stations’ with different levels of complexity or for different subjects. This makes them intrinsically flexible and capable of addressing many learners’ needs – thus supporting differentiation as they provide teachers with the opportunity to provide the same information in varied ways to engage all students, while also freeing up teachers to respond to questions or problems from students working individually or in groups. In this context the availability of iPads brought an extra dimension to station work by acting as another resource tool to add variety to learning activities as this teacher explained:

“I use the iPad all the time for station learning either for students doing research or using learning apps. It is very useful because on the one hand you can set the learning apps to different levels which supports differentiation, and on the other hand it supports independent learning because the pupils fetch their tasks from a table at the front of the classroom and go to the station where they can plan the tasks they have to complete that day and the order in which they want to do them.”

Teacher 5 (Primary)

Similarly another teacher observed:

“I do a lot of independent learning which means that the students decide what task they want to work on and I support them in their work as I move around the stations. In this way I find the iPad a very good teaching medium because you can set the apps so that the children can work at different levels suited to them. And also I have the possibility of printing out their results which shows me their progress status at any given time.”

Teacher 3 (Primary)

Because of its versatility as both a didactic and explorative device and its utility as a tool for both personal learning and group learning, teachers felt that iPads supported all curriculum areas from subjects such as “Human, Culture and Nature” to “Mathematics” and “ Foreign languages”. A metaphor used by one primary school

teacher who referred to tablets as *“the Swiss army knife of teaching”* aptly summed up the iPad’s intrinsic characteristics and affordances and its appeal as a classroom tool for many German teachers. With so many features combined into one unit such as learning apps, a camera, a voice recorder, office programmes, presentation capabilities and instant internet access, teachers appreciated the convenience factor and the fact that they could *“do so much with so little effort”*. Describing his use of the iPad to support classroom learning one teacher had this to say:

“In my last lesson which was a technology lesson the topic I was covering was on the structural engineering of bridges. So the children were working with pictures, texts and a problem solving constructional task that involved building a framework bridge with paper. At the end of the unit each student then had to make a short film using the app “Explain Everything” on the iPad about a special kind of bridge that is, a suspension bridge...I find filming is an excellent feedback tool”.

Teacher 1 (Primary)

Another teacher who was a self-confessed techno sceptic admitted that having access to the iPad was a great step forward for her due mainly to the creative possibilities it opened up particularly with artistic apps like “Stop Motion” animation. Apart from the exciting learning activities such apps created for students she was also enthusiastic about how working with such apps developed their team work skills:

“I find the creative possibilities really great, because the children have the opportunity to see themselves as productive and realise this is not just a consumer product. For me it’s very important that we take students away from just consuming. I’ve noticed already in the creative area, which I found incredibly exciting, that you can see very clearly who is good at visualising, who is good at acting and who is good at coordinating the group activities. So I think it’s very exciting to see those types of group processes occur and I am very happy when they can help each other out as that also is another form of teaching which I like to use.”

Teacher 6 (Primary)

Teachers working in vocational schools also found that using the iPad enriched the learning experience for their students. The ability to integrate iPad classroom content with the schools’ learning management system such as “Moodle” was singled out as being particularly beneficial, as were apps such as *“Padlet”*, *“Kahoot”* and *“Quizlet”*

which allowed teachers to test students' subject matter knowledge both individually and collectively. The competition element involved in using these apps appeared to motivate student and encourage more engagement and participation

“Quizzes like Kahoot are great for encouraging participation especially when you're revising or repeating material. The competition elements supports students motivation and encourages greater participation. So I find these apps a great way to revive lessons and add new motivation.”

Teacher 8, Vocational Teacher

This same teacher also noted how students were more enthusiastic about completing homework when it was linked to a tablet based activity :

“I could observe how students were more involved when I set their first homework task on the tablet. The students were already asking me in advance of the deadline if their documents had arrived. Some of the students who had problems sending it in were actively approaching me even before the deadline had expired. Normally the students are happy not to be questioned about homework, hoping it will go unnoticed if they don't do homework”.

The availability of iPads in classrooms and the ease with which they could be linked up to the classroom data projector also provided students with opportunities to develop their communications skills with one teacher noting that students could now *“practice their presentation skills more frequently in front of their peers”*. Furthermore, the ability to use iPads for tasks involving QR codes or making movies which introduced more activity and mobility to classroom learning, were positively viewed as providing another means by which teachers could vary their teaching methods and address different students' learning styles or preferences; thereby supporting all learners:

“I think tablets are very useful because on the one hand the very motivated students can get more content over the internet than from a teacher, and on the other hand even weaker students can benefit greatly from the fact that the lessons can be designed more individually as you can respond directly to their needs by tailoring specific content to them. So for self-directed learning the iPad allows you to take into account the various learning speeds of the different students and factor that in.”

Teacher 7, Vocational Teacher

Probably more so than other teachers, vocational teachers expressed some concerns about certain aspects of iPad usage, with some noting their potential as devices for distracting students, especially if their usage was not properly thought-through or carefully monitored. The ease with which students could access the internet or use other built-in iPad features had its downsides because as one teacher said *‘the iPad can also distract the students too much and they can busy themselves with other things like YouTube’*. Similarly another teacher highlighted how using iPads exposed deficiencies in students digital nous and technical know-how, arguing that students are not as tech-savvy as often thought:

“Unfortunately it has to be said that our students are not as media competent as we think, even in the use of smartphones and tablets. They need a lot of development in this area particularly when it comes to things like data protection, user settings and the simplest functions. So as teachers we should not expect too much from them initially in class.”

Nonetheless, despite these issues, vocational teachers were enthusiastic about the continued use of iPads in their classrooms because of the added value it brought to their teaching and students learning.

For teachers working specifically with students with special needs, the iPads’ communications potential was deemed particularly beneficial, alongside many of the accessibility features built into the IOS operating system which could be customised specifically for special education purposes. In this respect for non-verbal children who rely on Alternative and Augmentative Communication (AAC) devices like “talkers” (speech output machines), teachers found iPads a better replacement and less cumbersome to use.

“ I find the iPad very attractive, especially as a talker replacement. For students who have no pronunciation or who are difficult to understand, they can now communicate with the talker app during class as well as at home using the iPad. So I am very enthusiastic about the use of the iPad for supporting pupils with special educational needs as it supports classroom activity and participation, especially when it comes to communications.”

Teacher 10 (Special Needs)

There was also the added advantage that the use of iPads by special needs students helped to normalise their situation as they were now using the same device as other students in the class (i.e. a tablet) to do their school work, with the device also improving their levels of participation in regular classroom activities as this teacher noted:

“In the area of supported communications, the iPad is increasingly replacing the cumbersome talkers that we used to use. So the iPad can now be used as a voice output device in a variety of ways. For example, I can tell you about a student with autism who is currently using an iPad. This pupil does not speak to the teachers during the course of the lessons and is therefore excluded from participation in the lessons. The iPad is used in this case by the pupil to submit her answers in writing or to formulate a discussion contribution. In this instance the iPad then becomes the voice for this written submission and thus the pupil can participate with more than just yes and no statements in the lessons.”

Teacher 9 (Special Needs)

Because personalised learning and differentiation are so important in special needs education, teachers found both the variety of apps and the ability to set different learning level tasks within such apps very useful. This added extra flexibility to teaching and learning as well as making tasks more enjoyable for students with special needs and hence more motivating for them:

“Differentiation has a very high priority in Special Education as it does not work without differentiation. The iPad offers above all the possibility to respond better to individual students and to use customized learning apps. As many apps come with differentiation built into them it means students can work in different place within the app and their learning progress can be stored. This means there is always something new to do and this increases the students enthusiasm. And because all children are attracted to new technology the iPad adds extra motivation beyond just using work sheets or something similar.”

Teacher 9 (Special Needs)

Summary

This chapter has presented findings from the case studies conducted with teachers and schools who availed of the opportunity to use iPads on a short term basis, facilitated by Micool Project Partners in Ireland and Germany.

The advantage of this model is that teachers and schools had the chance to experiment with tablets to see if they suit their pedagogic needs before embarking on an expensive purchase programme. The variety of ways in which teachers used the devices for teaching and learning, even though they only had access to them for limited time periods, illustrates that both students and teachers derived numerous benefits from their use, which augurs well for future forays by these schools into mobile technology learning. Because of their positive experience with tablets as a result of the Micool Project both Irish schools were planning to purchase a tablet class-set of 10 devices for the forthcoming academic year, 2017/2018, with one school looking at an iPad solution, and another at a Microsoft Surface Pro solution. Similarly, the German schools had either already purchased or were considering investing in tablet class-sets.

Chapter Three

Model Three - 1:1 Tablet Deployment Models

Introduction

While the previous two chapters presented case studies on Micool project partner schools who were in the early stages of iPad deployment and usage, this chapter will feature two case studies from schools in Ireland who have been using iPads extensively for three years or more, when planning timeframes for their introduction is factored in. Both schools agreed to these case studies being conducted as part of the Micool project for illustration and comparative purposes. These two schools were chosen to participate in this study because they represent best practice examples of 1:1 iPad deployment models; thereby providing valuable insights into how the Micool project partner schools, and indeed other European schools might scale up or rollout mobile technology provision in the future. While the two models are quite different from each other in that one school has introduced a 1:1 iPad solution in selected classes only, while the other has introduced a school-wide 1:1 iPad solution, there are a number of similarities and approaches which schools interested in scaling up or introducing a 1:1 tablet solution, will find useful.

In particular a phenomenon worth noting is the fact that both schools have ceased using traditional textbooks, replacing them instead with interactive iBooks which have been developed and created by teachers themselves for their students. This development has largely been prompted by the fact that in Ireland the purchase of all textbooks is the responsibility of parents as books are not provided free. For students entering their first year of secondary school this is a very expensive outlay as textbooks have to be bought for all subjects with students taking up to ten separate subjects for the first three years of their secondary education. Approximate expenditure on books amounts to €350 in year one alone, with additional book costs incurred as students progress each year. With the average price of a student iPad costing €600 when insurance, accessories and app purchases are factored in, both schools were keen to make this as cost neutral an exercise as possible for parents. This meant eliminating the need to buy textbooks with teachers taking it upon

themselves to produce teacher generated content instead to be distributed to student iPads in iBook format.

Naomh Fionnbarra - Background and Context

Naomh Fionnbarra is an all-girls secondary school located on Ireland's North East coast. Established by nuns in the early mid C19th the school the school has existed for over 160 years. With an enrolment of just over 900 students and approximately 60 staff, it attracts students who live in the mid-sized urban town where it is located as well as students from its surrounding rural environs. In socio-economic terms its students come from a variety of backgrounds, from the less well-off to middle class professionals. The school has an excellent reputation for academic excellence and although nuns no longer run the school it has a distinct religious, catholic ethos. Four years ago the school management became interested in the use of iPads and as a first step, decided to equip all its staff with iPads initially for administrative convenience purposes. As time went on the educational benefits of iPads were investigated and after much consultation with staff and parents it was decided two years later, to roll out student iPads on a 1:1 basis with **one of its four 1st year classes**.

This case study was conducted in the second year of this roll out phase at which stage iPads had been rolled out to a new cohort of first year students, this time involving two first year classes. Effectively therefore there were now **three class groups using 1:1 iPads** comprising the initial first year class who were now in second year and two first year classes. Three focus group Interviews were conducted with a mixture of first year and second year students (n=8), while seven staff members including the Principal and ICT Co-Ordinator (n=7) were also individually interviewed. In addition as the school itself had conducted some anonymous surveys with students and teachers during the first year of its iPad roll-out, some of this data has also been used to supplement the interview data.

Interactive iBooks, Apps and the Digital Classroom

A classroom with no textbooks in which most learning is mediated through a mobile tablet device is a digitally enabled classroom. Its success depends not only on

having the right infrastructure in place but also on having well trained teachers who can identify and create a variety of digital resources to support student learning and classroom interaction. Discussions with teachers and students at Naomh Fionnbarra indicate that the creation and success of their digital classroom experience can be attributed to three key resources – namely, interactive iBooks for the delivery of engaging curriculum relevant content; commercially produced learning apps in particular apps such as “Kahoot”, “Quizlet” and “Padlet” to support assessment for learning; and course management tools such as “iTunes U” and “Showbie” for making course materials available on students iPads and for submitting and reviewing student work.

Teacher created iBooks were well rated and appreciated by students as they found them relevant, to the point and designed with the needs of students in mind. The incorporation of multimedia features such as videos, sounds and images made learning materials more engaging. Like any eBook they were easy to navigate and the ability to highlight important words and sections utilising the notes facility was an extremely useful and well used feature as this comment illustrates:

"My experience of learning with an iPad so far has been great, classes are much more exciting and interesting and we can watch videos and see new enough pictures of the event we are studying, studying is much easier because I have all my notes in the one place. For me the main advantage would be that you can highlight or put a note onto any word in the iBooks and if you don't understand a word you can double tap it and it defines it."

Student Focus Group 2, (1st year)

Furthermore students liked the idea of using teachers created textbooks as they added an element of personalisation to the material. Because the books they were using were created by their own teachers rather than some anonymous publisher. students felt the material the iBooks contained were more relevant as they were informed by teachers' tacit and experiential knowledge of what students needed to know. This eliminated some of the more superfluous material found in traditional textbooks which students often found contributed to cognitive overload and made learning more difficult:

S1: With the iBooks you have everything and because the teacher created it you have exactly what you need to know because the teacher knows what you need to know so they put it all in there. Rather than like in textbooks where you might have some stuff that isn't really important and that you don't really need to know...

S2:..... While a publisher could have been a teacher it's the teacher that you're having now that has been teaching for the last few years that can see what works and what doesn't, so they can base the book on that knowledge...

S3: ...And I think they cut out a lot of stuff you don't need. Like sometimes in text books you've got lots of information and it just kinda confuses you but in these iBooks only the stuff you need is there, so you know what you have to learn.. and also they put in past exam paper questions so I think that really helps me to prepare and learn”

Student Focus Group 1 (2nd year)

Similar sentiments were expressed by teachers involved in the design of iBooks who viewed them as being more up to date than traditional textbooks and more appealing to students due to their interactivity. Furthermore, the iBook was viewed as a type of repository or ‘placeholder’ which allowed them to integrate a variety of teaching resources from content and PowerPoints/Keynotes to videos and exam papers.

“Let's be honest when I was teaching with textbooks, I'd be supplementing this bit here and there and telling the students “Now cross that bit out, that's irrelevant”. I just feel the resources in the iBook are certainly more superior. Then the fact that you can embed videos in it, you're making it much more interactive, much more user-friendly and for the kids it makes it much nicer, and more interesting for them”.

Teacher 5

‘I'm currently creating the iBook for year 3 and I love the fact that you kind of have all your resources in one place. Before this I would have had a keynote in one place and a video in another place and then all the links elsewhere. Now I know even when teaching my non iPad class, I can go “Right if I want to show a video, off we go, it's in my iBook”.

Teacher 2

Although admitting that producing iBooks was ‘a big effort’ they strived where possible to share the workload by co-designing the materials at a departmental level

with geography teachers, language teachers etc. working together in developing the iBooks. The majority of teachers felt the advantages outweighed the disadvantages, particularly as they could update the books with new material each year:

“Making the iBooks was a big effort. Now I was fortunate with the science book because our science department is big, so it was a complete, collaborative effort and I wasn’t doing it on my own. Putting it together was easier for that reason. And the good thing is that we can change it as new material comes along. So you can change it year to year. It’s good because it’s your resource, it’s coming from you and it’s tailored to the individual student which is good. And it’s changeable as well if you need to change it , so you don’t feel like you’re stuck with this book.”

Teacher 3

As suggested here the ability to tailor iBook material to different student needs was also an additional benefit. Because teachers were creating the curriculum content themselves they could use the iBooks interactivity features to incorporate differentiation. This meant they could structure iBooks to accommodate different students’ attainment levels. There was also the fact that because a number of teachers were involved in creating the materials, students could now benefit from the wisdom and experience of not just the teacher who taught them maths for example, but all the other teachers involved in teaching maths to different year groups.

“Because you’re teaching them everyday you can see the different levels of the kids and then when you’re doing the iBook you can differentiate your material like that. So because you’re creating the material yourself you can have the questions and the content laid out in a more differentiated manner than it would be traditionally in the book. So as you’re creating it you can order the stuff so that it has easy, medium and hard parts... So it makes you think differently which is all part of your planning when you’re creating the iBook”

Teacher 4

“The other thing it’s great for as well is collegiality in your department. In our department now a fair few of us kinda put our stuff [sic materials] together, so it means the kids have the best of stuff from everybody. So your students aren’t just limited to my stuff as some of the notes that are in the iBook came from Eugina, Vera or Sylvia [not teachers real names]. So they’re really getting top notch stuff and if they find one too hard, they can pick from another. So I find that great as well.”

Teacher 2

Important as iBooks are in Naomh Fionnbarra, it should be noted that iPad usage was not limited to just using iBooks with both teachers and students indicating that iPads were used extensively in lessons in a variety of ways. Utilising the schools Wi-Fi, students could access embedded internet resources such as “Khan Academy” and “YouTube” either from within their iBooks or directly via the iPad’s browser when working on projects and conducting research. Content learning apps downloaded from the Appstore were also popular including “Duolingo” for learning languages such as Gaeilge (Irish) and French; “Geogebra” for mathematics and apps such as “Bernstein’s Guide to the Orchestra”, “Notation” apps and “Garage Band” for music classes. In addition Creative apps such as “Mind Mapping” for group work, “Comics Head” app for class projects and learning French and “iMovie” were also regularly used:

I like ‘Duolingo’ and ‘Garden’ because they are completely different. Duolingo improves your Irish education {sic learning the Irish language} massively. You try and learn at least five new words a day on it and in a week that would be 35 new words learned. Also Garden is an app that we use in science to learn the names of flowers. You take a picture of a plant and it tells you the name and some information about it. I would definitely use these apps at home too because you learn more in a fun way without even knowing it.

Student Survey Data

“GeoGebra ..I cannot emphasise how good that is for algebra and coordinate geometry. I literally cannot emphasise how much it improves the kids understanding of what I teach. I mean I’m seeing them use it to check answers and it’s brilliant. And I use Khan academy as well, so for the really bright girls it means they can go ahead and do whatever they want, quick exercises that they can check as they go along, so they don’t have to consult with me. It’s brilliant to have these apps, especially for those stronger students to really reinforce their learning in that way”.

Teacher 4

“A big thing for me this year is that I’ve started to record videos of our science class experiments. So now I constantly draw students attention to the fact that they are up there for them, and when exams are coming up, instead of just reading what they did, there are photographs there to remind them... They’re short videos, only two or three minutes but they can hear me calling out the steps and they can listen to them as often as they want. That’s great.. you couldn’t do that before and I have control over it as it’s not somebody else’s video and I can

change it to the way we did it in the science class and make reference to that and the results we got etc.”

Teacher 3

Undoubtedly the most popular and widely used apps were quiz and assessment apps such as “Kahoot”, “Quizlet” and “Socrative” which could be used across all subjects. As the school was heavily involved in promoting the concept of “Assessment for Learning” (AFL), even forming a dedicated AFL team, teachers found these apps an excellent resource for supporting this initiative. The ease with which such apps could be used for formative assessment - thus giving teachers an insight into how much students had learned from a particular topic, or identifying material that needed to be covered again, was invaluable, with one teacher indicating that ‘*I never really introduced assessment for learning properly until I had the iPad*’. Another teacher had this to say:

“I’m part of the AFL team so I’ve learned a good bit from that this year and there’s various kinds of techniques that we have been practicing. I find using quizzes on Kahoot really good because we are testing them in a fun way and they don’t even realise that they’re really being observed and monitored. They get really excited about it and they love it, they’re so competitive it’s not funny. So from that point of view I would never have been able to do that without the iPad.”

Teacher 1

Students too very much enjoyed using quiz based apps because it afforded them opportunities to work in groups and allowed them to compete either collectively or individually with each other. They also felt that these apps helped them to understand their own learning development in terms of how much they had learned and where the gaps in their own knowledge lay:

Kahoot and khan academy make me excited about learning. Kahoot is a fast paced quiz app with a timer on each question in which I compete with my friends. Khan academy is an app that's has questions on just about every different section in maths and it's fun and easy to use.

Student Focus Group 1(2nd year)

“I like the quiz apps because they really help me learn – like I think if I actually didn’t have those apps there would be a lot of tests that I would fail. So I find

Quizlet and Flash Cards are good cos you can test yourself on it. And I like to test myself because like it prepares me for the actual test."

Student Focus Group 3 (2nd year)

The benefits students gained from using assessment apps also featured prominently in observations and comments made by teachers in interviews and school gathered survey data:

I have used the app kahoot to quiz students on their spelling. I've never had time to do this before & have never had a technique available that would give instant feedback. Yes, this is the biggest support I have noticed. I have incorporated more assessment for learning techniques & this can help give the students more confidence & support before they sit a written exam.

Teacher Survey Data

Infrastructure, Professional Development and School Leadership

Managing and maintaining a 1:1 iPad model involves good planning, organisation and technical support. Investment in teacher professional development is also crucial in order to ensure that teachers have the confidence and competence to use tablets well in teaching and learning. As with any pedagogic change involving deviation from standard customs and practices, the success of introducing a 1:1 iPad initiative is very dependent on school leadership and management and how mobile technology is introduced and managed.

In order for schools to successfully use mobile devices on a 1:1 basis, a robust and reliable Wi-Fi system is essential. In anticipation of the introduction of iPads Naomh Fionnbarra upgraded its Wi-Fi system to accommodate the extra demands that would be required once students had iPads. For a school like this, located in a building which is over 100 years old, this was not without its challenges. Nonetheless, accounts from students and teachers confirmed that the Wi-Fi system was dependable and worked well most of the time with only the occasional Wi-Fi glitch experienced from time to time. The school also had an excellent ICT Coordinator who ensured that the infrastructure was maintained in good working

order and who was available to address urgent trouble shooting issues, even though she herself was also a full time class teacher.

Central to the success of the digital classroom experience in Naomh Fionbarra was the use of “iTunes U” as a repository for course content management and student and teacher interaction. Although not a fully-fledged Learning Management System (LMS), iTunes U has many useful features that help teachers manage content for students and deliver that content directly to mobile devices to make course materials more accessible. It also facilitates student and teacher interaction as students can submit their homework electronically and review their grades as well as availing of the app’s discussion and private messaging features. Naomh Fionnbarra was attracted to iTunes for a number of reasons: firstly as it comes bundled with iPads it was free to use while also adequately addressing their content management needs; secondly as part of the Apple eco-system it works as it should and is trouble free and therefore requires little technical support or resources at school level; and thirdly because teachers were investing so much time creating their own iBooks the proprietary nature of iTunes U makes it difficult to share them outside of the intended audience. This afforded a degree of protection for the intellectual copyright of teacher created iBooks, which in terms of teacher buy-in to the digital classroom experience, was important. As a content management and communication system iTunes U was well regarded by students and teachers alike with both parties making good use it, as well as the “Showbie” app for the exchange of information and resources to support learning:

“S1: I find Showbie is really good for learning French and Irish (Gaeilge). It helps with my oral work as the teacher sends us her recordings as it’s hard to get the pronunciation just in class. But when she records it and sends it to us it actually gets into my head as I can listen to it again and again until I get the pronunciation..

S2: ...Yeah and you can send your own recordings that you’ve practiced at home to the teacher as well so she knows that you’re doing your work and stuff.. S3:.... And it’s good for revision as you can listen back to the exact pronunciation of the words when you have an oral exam coming up..”

Student Focus Group 3

I love the iTunes U. I love that I can just send them out the stuff instead of having to photocopy it. I love that I can just send it out and they have it all there organised into the different topics. So if they're like – I need a worksheet on coordinate geometry, they can just click coordinate geometry and they can see everything I've sent them out on that topic. So it's all organised there for them, as in my notes, the topics, revisions, worksheets and stuff like that, so everything is just a click away”.

Teacher 4

As these were student owned devices, students were responsible for keeping their devices in good working order. To assist the process of making their devices ‘school-ready’ at the beginning of the academic year the school hosted an ‘iPad Deployment Day’ where the company who supplied the iPads worked with the school management and ICT Co-Ordinator to set up students’ iPads. Each student was allocated a school email address that was linked to their iTunes account. The supplier then activated each students account and assisted with password set-up and the downloading of approved school material and apps. The supplier was also contracted to provide technical support for student iPads for a period of 3 years.

Once their accounts were set-up students then managed their own devices, a process that was undoubtedly guided by a thorough and well defined ‘iPad Acceptable Use Policy’ (AUP) drafted by the school management in consultation with parents who also contributed to its development. In particular, parents insisted that the devices would be for school use only and that games and social media apps be prohibited. As part of its AUP, which was signed by both students and their parents, it was agreed that student iPads would be subject to random checks by teachers to ensure they were free of non-school related material. Interviews with students reveal that they respected these guidelines with students commenting that *“while we’re allowed go on the internet for doing homework, we’re not allowed to download apps that aren’t for school”*.

The AUP also provided strict guidelines on password protection, restrictions on camera and recording usage, the importance of charging the iPad every day at home, regular updating of the IOS, and ensuring that there was sufficient memory capacity on the device for school related material. To protect the ownership and integrity of the device, all students were required to use a photograph of themselves in school uniform as a screen saver, use a protective iPad case to prevent breakage,

and when not in use, store their tablets in heavy duty iPad specific lockers complete with a Tri- Circle Padlock for each locker. This was provided by the school. Failure to adhere to these rules and regulations were subject to disciplinary actions.

The development of the digital classroom in Naomh Fionnbarra would not have been realised without significant investment in both initial and continuous teacher professional development. Initially iPads were purchased for administrative purpose so that staff could easily input data into the e-portal system as laptops which had previously been used for this task were no longer fit for purpose. While providing all staff with iPads for this work, the school also equipped them with publisher produced eBook versions of the standard textbooks as well as learning apps, and each classroom was provided with an iPad connector for the classroom projector. During that first year the school provided both internal and external training sessions and courses on using iPads. As a result, some teachers started to move beyond just using them for administration and began to use them in class for showing YouTube clips, accessing the internet and using the publisher provided e-book. The ICT Coordinator also provided additional training support for teachers on an ad-hoc as requested basis. As time went on management began to notice that a majority of teachers were making less use of traditional text based resources such as 'teacher journals' and 'textbooks' as they became more accustomed to the devices, so much so that by the end of the first 12 months, teachers themselves were beginning to ask management *"Right, what can we do next? Where can we go with this? What else can this do?"*

School management responded by providing more training in the second year, with an emphasis on the pedagogic use of iPads. Such was the enthusiasm generated that management then decided to implement a 1:1 deployment model for one of the incoming first year classes for the forthcoming year. In an effort to reduce the cost of this initiative for parents, the ICT Coordinator, with the support of the Principal, also suggested the idea of teachers creating their own iBooks as a textbook replacement if they were going to introduce iPads for students. Staff interested in becoming involved were then asked to come forward. Much to the surprise of management half of its staff volunteered to become part of the iPad class initiative and take on the challenge of designing iBooks.

In response, an external provider was contracted to provide training in both 'Book Creator' and 'iBooks author' for staff. At the end of this training staff themselves decided that iBooks author was more suited to their needs, and, organising themselves according to subject departments, they began to work on the design and development of material for their subject area iBooks. This took place over a six month period from January to June of that academic year. As this process got under way substantial support was provided by the ICT Co-Ordinator who was on hand to assist and troubleshoot any difficulties with the authoring software. Undoubtedly, this considered and incremental approach to staff professional development over a period of two years, provided an excellent foundation for the introduction of iPads in the classroom when the first 1:1 iPad class came on stream at the commencement of the 2016 academic year.

It is well acknowledged in academic literature that the introduction of any new initiative in schools, particularly those involving new technology, depends on the quality of the school leadership and management. In particular, the role played by the School Principal and Project Champion is crucial. New initiatives rarely succeed without an advocate or champion, someone who is the acknowledged leader, and the support of the School Principal as s/he is responsible for influencing and shaping the organisational environment for success. This was clearly the case in Naomh Fionnbarra where on the one hand, there was an ICT Co-Ordinator acting as the iPad Project Champion, and on the other hand, a School Principal who was proactive in the development of the initiative and supporting measures to ensure its success.

Interviews with both reveal the extent to which they worked closely together to ensure staff, parental and student buy-in to the iPad initiative. The incremental nature by which they introduced iPads, starting with equipping staff with devices for administrative purposes, thereby giving them time to become competent with the technology before moving on to the next step of using them for teaching and learning, has proven to be a wise and effective approach. This 'baby- steps' approach as the ICT Co-Ordinator describes it, gave teachers space and time to develop their skill-set and curiosity around the technology's capabilities and its potential benefits for students. The fact too that everything was voluntary from who

wants to teach the iPad Class to who wants to develop iBooks, created an atmosphere of positivity and good will around the initiative that has led to its success. Starting with one first year class in 2015 using iPads, the school has now moved on and in 2016, iPads were introduced to two new incoming first year classes and the same again in 2017. This means that from September 2017 the school will have 5 classes in its Junior Cycle cohort from first years to third years using a 1:1 iPad deployment model. While this represents approximately 20% of the schools overall student population, meaning 80% of students are still learning in more traditional classrooms, there is a general consensus among both the school leadership team and teachers that this was the correct way for them to proceed.

T1: "I do think the approach that was taken here is the correct approach. I know of schools, a good few school, that basically just said, "Right what's the new thing, what's the buzzword – iPads, iPads for everybody" and not a clue what to do with it"

T2: "And that's all very well and good if you're starting with a new school, because you can employ the staff that are qualified or willing and able to do it. But when you have a lot of staff made up of older members, and then again some of our older members are the most innovative, like I am one of the older members at this stage, you have to be more cautious. So I agree with T1, the approach here was the correct one – incremental, don't go all out on iPads. Because as I said I know many schools that have, and nobody can use them properly."

Teacher Focus Group Interview

Considering the schools traditional academic orientation, the older age profile of many of its staff when iPads were first introduced four years ago (although this age profile has been reducing each year as teachers have retired), and the relative newness of tablet technologies in schools at that time, there was undoubtedly a wisdom attached to the decision to avoid a 'big bang' approach to tablet deployment. As this case study has illustrated, given the extent to which students and teachers feel that tablets have enriched the teaching and learning experience, the wisdom of that decision at this point in time has been vindicated.

Abbeyfield Grange Educate Together - Background and Context

AbbeyField Grange is a new second level community school that opened in 2015 with 66 first year students. It is among the first of a number of second level schools recently established in Ireland operating under the Educate Together patronage. Up to recently Educate Together schools existed at primary level only and from its inception over 30 years ago, the Educate Together patronage represented a new departure in Irish education from religious ownership of schools to a more secular, non-denominational model. A child-centered ethos, inclusiveness and democratic values lie at the heart of the Educate Together model.

AbbeyField Grange is located in the Leinster area, very close to Dublin. It is situated in a suburb where most families would be of middle class origins, working either in nearby high-tech industries or other skilled occupations in the surrounding Leinster area including Dublin city. Being a start-up school the Principal effectively had a carte blanche in terms of the schools ICT set-up and, having thoroughly investigated his options, he decided that from day one the school would be a fully-fledged digital school where everything from administration to teaching would be conducted using IT. To achieve this vision he introduced a 1:1 iPad deployment model. This effectively meant that all students and all teachers would use a tablet for everyday teaching and learning. This case study was conducted towards the end of the academic school year 2016/2017, by which time the school numbers had grown to 146 students, comprising both first year and second year classes. A representative sample of students from both year cohorts participated in six focus group interviews, (n=18). Group sizes range from two to four, with three focus groups from each year. Four teachers (n=4), two of whom worked closely with the School Principal in supporting the school's ICT system, were also interviewed.

Interactive iBooks, Apps and the formation of a Digital School

Unlike the previous case study where only some classes were using 1:1 mobile devices for learning, all students and all teachers were using tablets on a 1:1 basis in Abbeyfield Grange. This required significant commitment to the development of the schools digital ecology at a whole school level in order to realise the schools vision around the normalisation of digital learning. The most obvious manifestation of this

occurred at classroom level where teachers were creating their own digital resources in the form of iBooks, flashcards and slideshows; using a range of commercially produced apps for assessment and learning and utilising “Schoology”, a sophisticated learning management system which facilitated the hosting and sharing of course content, resources, files etc. between teachers and their students.

There was a remarkable similarity in the experience of using teachers created iBooks as already discussed in the previous case study. The affordances of the iBooks in terms of interactivity and other multimodal features, the ease with which students could highlight important text and terms as well as navigate the materials, all ranked highly in the feedback.

S1: “Since I’ve had the iPad I’ve been reading up our iBooks, and because it’s like visual, and there’s pictures to go with it, it’s just so much better...”

S2:... It’s helped me a lot in different ways as I am a kinesthetic learner so I like it because you can highlight things in it and all that. You can obviously do that on a physical textbook too, but they can get wet, ripped and all of that...And in the iBook you can get rid of the highlight too. So I find its just more accessible and easy to use.

S3: :I like the way you can search the page. Before you had to flick back and forth, hundreds of pages to try to find the page you need, but with the iBook you can just search for keywords and go straight to the page.”

Student Focus Group 2, (1st years)

The element of personalisation that teacher created iBooks involved was also a welcome development. Compared to traditional publisher created textbooks, iBooks were regarded as being more targeted, more up to date and more in tune with student learning and development needs. Hence students felt less bogged down by extraneous facts and material which they felt often impeded their learning. Because teacher created iBooks were fully aligned with material covered in class, students found it easier to learn:

S1: “I think they’re really good because you are learning exactly what you learned in class because the teachers make them. Where, if someone else makes the text book, the teachers could be teaching something different. I think it’s much better when the teacher makes the iBook because the teacher knows what’s in the iBook. So you’re learning the same thing..

S2:.... Yeah, they're focused on the class a lot more than just a normal textbook would be where we go and just read a page. The teachers can decide what goes into it and what the whole class needs to learn from it. So they choose the right things to put into it. I feel it's better to interact on the iBooks on the iPad than an actual book as it's so much easier being able to highlight stuff and write notes on the iPad than it is in a book and it goes into your head much better."

Focus Group 4, (2nd years)

To ease the burden and time commitment involved in creating iBooks, teachers worked together in subject teams, where possible, to design and develop the materials. As they became more experienced in using iBooks with their students, teachers found that they became more skilled in fine-tuning the material to suit classroom teaching and student learning needs, sometimes leading to a scaling back on what should be included which also helped to reduce the design and development time commitment:

"I think the iBooks we've created are quite impressive and a huge amount of work went into them, so I'm not going to lie by saying "ah no, I just pulled it together in a couple of hours". So the first iBook that I created took a long time. But then I thought, what do they use a text book for? They use it as a collection of notes with some interests and tasks and some extension work for the kids that are not 100% challenged in class. So then I pared back and the second one I made was much simpler and I would say maybe more effective, and less time consuming and I feel the kids are responding to this second one much better, as it's a little bit simpler".

Teacher 4

Alongside iBooks teachers also used a variety of digital resources to support classroom learning including slide show presentations, YouTube clips, flashcards and a variety of content and creative apps. As in Naomh Fionbarra both "Duolingo" for language learning and "Khan Academy" were among the most popular content based apps utilised along with 'coding' apps.

"I like Duolingo which is a language app that we use for French and I like it because there are lots of things you can do with it. Like there's something where you can speak into it, or you can translate something from French to English, or vice versa. It helps you learn, but in different ways rather than just staring at a bunch of words and not having any clue what they mean".

Student Focus Group 1, (1st year)

Assessment apps such as “Kahoot”, “Quizlet” and “Padlet” were also widely used to support formative assessment and revision in all subjects. Students enjoyed the fun element they brought to classroom based activities as well as the competitive element:

“My favourite app is Kahoot because it’s such a fun way of getting together and it’s a fun way of learning cos when you’re in class sometimes you might be thinking “oh this is so boring”. And whenever the teacher goes “Ok we’re having a Kahoot at the end”, everyone gets lively and they’re working hard because they just want the Kahoot to come quickly.”

Student Focus Group 2 (1st year)

“I find these apps extremely beneficial when it comes to revising and studying. I remember a time when I was not very sure about something in science and we did a Kahoot on it and I completely understood everything afterwards. I learned from my mistakes because I got some questions wrong. Every app we use is beneficial for revising and learning more things.”

Student Focus Group 5 (2nd year)

These benefits did not go unnoticed by their teachers who could see that utilising these assessment apps also helped teachers themselves to identify which students were struggling with course materials and address their difficulties in a timely manner:

“I like using the iPad quiz apps because they’re quick and interactive and because I want to be sure that they all understand what we’ve done it helps me see who needs that bit more support because in the lessons themselves there’s usually tasks where they have to spend 10 or 15 minutes on an activity or a task, so that gives me the opportunity to go down to those struggling to explain something we had just covered that they might not understand.”

Teacher 3

The most widely used and popular apps were creative apps especially “PicCollage” “Educreations”, “Explain Everything”, and “iMovie”. Both “Educreations” and “Explain Everything” were used to support Assessment for Learning (AFL) and Peer learning. Using these apps students were encouraged to make short recordings and videos of topics and concepts covered in class which they then shared with their peers. This

helped to reinforce their learning by having to explain it to their peer group. Teachers could also use them for making quick videos of material covered in class to help with student recall later. “PicCollage” was also well utilised for group work and student presentations when working on research projects:

“My favourite app is PicCollage. I like using it for projects and little pieces because you can put images together and just explain it that way and have labels to see what they are. It’s just a nice way of presenting a project”

Focus Group 3, (1st year)

Discussions with students and teachers revealed that “iMovie” was being used very creatively to enhance and extend students’ learning experiences. The English teacher described iMovie as a ‘*fantastic resource*’ that she used extensively with her first years where they would film and act out certain scenes from books and plays. Similarly the PE teacher was using it for monitoring skills progress and helping students develop their own self-assessment and peer assessment techniques through using video analysis to identify areas for further improvement. And even for a subject like maths students were using iMovie’ in an innovative and creative way as this example illustrates:

“We recently did an activity in Maths, where the discovered Pi, measuring circles and all that, so I said to them - That’s a brilliant discovery and you’re now going to create a news report on this discovery and you have to present it in such a way that your mam (sic mother) would know what the word circumference means when she’s watched it. So you’re going to have to explain it well. And they really love doing things like this and they get so involved making news reports and writing scripts and breaking down scientific language into every day language. They’re so creative and it’s so much fun. They just love it.”

Teacher 2

Another example of the creative use of iMovie to support learning was provided by the students who decided to create a dance routine as part of their activities for ‘World Language Day’, in the form of a rap. As part of the video each student in the class was required to name the dance step out-loud in a different language. By means of projects like these students were immersed in a variety of learning activities encompassing interculturalism, foreign language learning, artistic expression, choreography and film making as well as group work dynamics.

Infrastructure, Professional Development and School Leadership

Building a digital school from the ground up is undoubtedly a very ambitious endeavour. Although many of the challenges faced by established schools such as retrofitting older buildings that are not fit for purpose, or introducing change in an established school culture were not present in a greenfield site such as this, it is still a big risk as it represents a departure from the norm. The success of implementing a digital schools solution using mobile devices at Abbeyfield Grange depended largely on the quality of its supporting ecosystem made up of three key elements comprising a cloud-based infrastructure, continuous teacher professional development (CPD) and a school leadership and management team driving the digital normalisation process.

The backbone of the school's infrastructure was a cloud storage solution comprising a VLE known as "Schoolology", a staff sharing platform and an office administration system. Crucially, because everything was stored in the cloud, there was no need for a server on site which eliminated technical maintenance responsibilities from the school. As all learning was tablet based, there were no school computer rooms to be maintained either. From a teaching and learning perspective, "Schoolology" was key as it was where teachers could store all their digital resources including iBooks which students could download to their devices using the Schoolology app. With Schoolology students could also communicate with teachers and other students, receive feedback on their work and check what homework assignments they needed to complete when home. This made it an essential platform for engaging students in learning outside of the classroom. Unlike older legacy VLE's, Schoolology's modern interface made it an intuitive and attractive system for both students and teachers:

"My favourite app is Schoolology. It's basically an educational Facebook where teachers post virtually everything you've ever done in class onto it. You can access it any time as long as you're connected to Wi-Fi. There's no excuse for not doing homework because you didn't take it down in class. You can just send out a message and someone will respond within minutes because there's so many people online. I find it the most resourceful out of all the apps."

Focus Group 5 (2nd year)

An examination of the VLE platform illustrated that teachers were making full use of its many functionalities including features like gradebook, attendance tracking, analytics and discussion forums, as well class and course folders for organising information and enhancing classroom interactions as described on by one teacher:

“We chose Schoology as our VLE because is so user friendly and it’s very easy for the students to use because it’s a similar interface to Facebook. I like it a lot as it has so much stuff... like it allows me as a teacher to communicate with the students. Also I have my own class folder for every class I teach and every teacher is the same. So it allows us to assess our student, provide feedback, and share resources, and then also record how they’re getting on over the 3 years of schools up to Junior Cert² level through the grade book facility. I like it because you can set different weightings on different tasks you want them to do and it brings all the results together in the final end product. I find it allows for better learning for the students and improves their focus as well.”

Teacher 3

In order to manage so many mobile devices the school used an external vendor who set up all the student accounts and downloaded all the apps for each incoming first year group. A secure firewall and a Mobile Device Management System also helped to filter and block out undesirable apps and materials. Both students and parents were also required to sign up to the “Schools Digital Citizenship and Acceptable Usage Policy” which sought to promote responsible use in relation to online activities and iPads.

As every student and every teacher had an iPad all classes were equipped with a data projector and apple TV where teacher materials and student work could be shared and displayed using the iPad’s airplay facility. To ensure that iPads were kept in good working order and to assist students struggling with basic iPad operations and day to day maintenance the school set up a student “iTeam”. Two students in each class were members of the iTeam. The iTeam was managed by two teachers regarded as the iPad/technical staff experts who met with the iTeam once a week. On a day to day basis the iTeam helped to troubleshoot basic issues as they arose such as problems logging on to Wi-Fi, app downloads, insufficient storage, forgotten

² The Junior Cert is an official Irish state examination taken half way through students’ secondary education, when students have completed the junior cycle phase of secondary school comprising the first three years. The average age of students taking the exam is 15 and 16 years.

passwords or difficulties operating Apple TV and airplay. More serious issues that they couldn't resolve were escalated to the iTeam teachers.

"The iTeam is a great idea. We're kind of like the support group that people can come to if there's a problem and we can help them out. And if there's a problem that's off the scale that we can't handle we will tell one of the leading IT Teachers. I really enjoy being part of the iTeam because I've been brought up looking at screens and I love working with technology".

Focus Group 5 (Student iTeam Member)

S1: "I find the iTeam very helpful, If it's something small that there's really no point in bothering a teacher about but you're not entirely sure how to use it, it's helpful to go to your iTeam rep and say "I don't really understand how to use this, do you remember how?"..."

S2: "...But sometimes it's easier to go to a teacher, depending on what the problem is. At the start of the year I was having issues logging into iCloud. It just wouldn't take my password no matter what I did. So I ended up having to go to the Teacher to get it sorted. But for other things, like if you forget your password or you are not connected to Wi-Fi, you can go to your iTeam and they will connect you back".

Student Focus Group 3 (1st year)

The iTeam was also responsible for randomly checking student iPads to ensure they were free from inappropriate content, games, photos or illegal downloads. As they became more experienced and knowledgeable about the types of issues that affected student iPads, iTeam members were meticulously recording the problems and solutions to build a troubleshooting and solutions guide for new iTeam members, so that standard problems could be more quickly resolved. They were also proactive in issuing guidelines and procedures in relation to things like minimum storage requirements and noting frequently inappropriate games and content appearing on student iPads. Some of the solutions they came up with included a recommendation that all students must maintain a minimum 2GB free space at all times to ensure sufficient space for the downloading of educational materials as well as a firewall to block popular inappropriate material:

"We do random checks on screens to check the iPads for games and inappropriate content that shouldn't be there. And recently we've set up this firewall as well. So we've gone around to five students in every class and we've asked them to write down a list of games or inappropriate content that people may have downloaded or that they've downloaded themselves. We've written

down the names of those games and got them blocked, so now every single one of those games and inappropriate apps can't be downloaded."

Focus Group 5 (Student iTeam Member)

One of the reasons why students were able to download non-school related content was due to the fact that although parents could purchase iPads from the school recommended vendor, parents were also free to buy the devices from any supplier. This made the task of mobile device management more challenging. So after two years of operating this arrangement the school has now decided that from 2017 onwards all iPads will be purchased through its recommended vendor who will operate a full mobile device management system on its behalf. Under this new arrangement student access to the app store will no longer be possible and apps will be pushed out to them as required and authorised by the school. This was an inevitable development when one considers that school numbers over the next five years will increase significantly as the school grows. Inevitably this will increase technical management issues and the school is now taking appropriate steps to manage and minimise this workload.

As a start-up school teacher professional development and training naturally was a high priority, particularly given the schools vision of embedding digital normalisation into the fabric of everyday life. Unsurprisingly, most of the teachers recruited were recent teacher graduates who by their nature were young, enthusiastic and open to new ideas and approaches. Although quite adept at using technology in their personal lives they were not necessarily skilled in its pedagogic application but they were willing to explore and to learn and were fully committed to the schools digital normalisation vision. Reflecting on her experiences of having iPads in a previous school one teacher had this to say:

"In my first year as a qualified teacher I was in a school that had an iPad trolley, which was great but I didn't know how to turn on an iPad, so I was terrified of the trolley and in that year, I never used it once which is so unfortunate. I think when you have new teachers come in you need to sit them down and say "here's an iPad, here's how you sign in. This is how you take them out. This is how you put them back in." Because it's such a wasted resource otherwise...My experience here has been completely different because this school is fantastic with respect to CPD. We got CPD in our subject areas before we even got the iPads."

CPD (Continuous Professional Development) at Abbeyfield Grange took many forms from structured one and two day training courses to short two hour sessions hosted by staff experts and outside vendors, to “drop-in” clinics hosted at various points throughout the academic year.

“We had fantastic training both years really. It was really important for us at the start to have formal training and then we had a number of short two hour follow up sessions as well. There was a couple of times some of the vendors from places like Schoology came in to the staffroom so we could troubleshoot with them.”

Teacher 1

“I felt the way that the CPD was organised was great. The worst type of CPD is someone standing at the tops of the room saying “this is what you can do”. I need someone to help me with the things I’m struggling with, like initially I had a little trouble with the rubric on Schoology. So the Principal kind of saw that a few of us were struggling, so he got one of their guys to come out for a day to the school. He was based in a room for the day and he covered every teacher for 30 minutes. So you didn’t feel like an absolute idiot (sic. fool) saying “I don’t know how to do this”. It was actually a case of “How do I do this”? So it was targeted and specific and it was very useful.”

Teacher 4

Teachers also received training on iBooks Author to help them create their iBooks and naturally, because they were co-creating the materials based on subject areas, this provided many opportunities for informal learning and the development of shared expertise. Other school wide initiatives such as ‘Team Teaching’ and ‘Classroom Peer Observations’ provided additional CPD opportunities for teachers to learn and develop with, and from, each other

“I think the benefit of team teaching is that it’s like an instant CPD everyday because if I’m with someone I can say “that was really cool. What was that? What did you use there?” And then you’re like “ok I’ll give that a go the next day”. But I think if I wasn’t in this school, if it was just me in isolation like in a lot of schools, just me with my iPad, I probably would have become a lot more complacent. But the benefit of seeing other teachers using it has really helped I suppose to keep me on my toes.”

Teacher 3

Without question the ongoing investment in teacher CPD has played a vital role in the process of digital normalisation at Abbeyfield Grange. This was best articulated by one teacher who said *“We use the iPads so much, almost without thinking, like take a picture of that there or let’s get out Educreations and do some quickfire questions. So it has revolutionised a lot of things so much”*. Similarly another teacher noted, *“All teachers have particular strengths but mine absolutely was not ICT, but I can now classify ICT as one of my strengths because I’ve learned so much from my colleagues whose ICT was really strong.”*

As in the previous case study, the role of the School Principal in helping the school to realise its digital ambitions was crucial. Aided and abetted by two Project Champions, he was instrumental in driving the digital normalisation agenda in the school and laying the foundations for the evolution of a digital school. It was very much a team effort based on a distributed leadership model in which all participants felt involved with, and committed to the realisation of this vision. As one teacher noted *“The Principal’s role has been crucial. In terms of the iPads and the technology, we are all invested in it now but it was him who introduced it and established the right ethos for us. We are very lucky to have him as he is so progressive, so very open to new ideas and very welcoming as a well.”* Although it is still early days in the schools development firm foundations have already been established which can only bode well for the schools digital future as it develops and matures.

Conclusion

This case study report has documented different school experiences with mobile technologies in a number of European schools. In so doing it has highlighted both similarities and differences in terms of how schools used tablets to enhance teaching and learning and different deployment models. For the Micool Project partner schools, most of whom were using tablets for the first time, the use of mobile devices represented an exciting new departure for teachers and students. Clearly, as the evidence from this case study suggests, tablets were changing the dynamics of the traditional classroom environment, thus making learning more enjoyable, more interactive and more engaging. Much of this can be attributed to the affordance capabilities of the devices themselves that allow for their ease of use and seamless integration into the natural rhythm of classroom life as they can support a variety of activities from independent research and group project work to didacticism and assessment to support student learning.

In addition, mobile devices were also helping teachers to think differently about their teaching methodologies and approaches in that teachers saw how they could use the devices to support more autonomous and independent learning, differentiation, more group work and more creative activities as well as supporting students with special needs. In this respect we can discern the early beginnings of a change process in terms of classroom learning and teaching, and a growing consciousness at both school and teacher level, of the need to change in order to engage students inhabiting an increasingly digital world.

Undoubtedly, findings that emerged from the Micool partner schools will add to the growing body of evidence that tablets when used effectively can enhance teaching and learning in different cultural contexts which will be of interest to policy-makers who may question the universality of their appeal. Furthermore, by using a case study methodology and “thick description” (Denzin, 1989), to document the schools’ experiences, this study has illustrated how in the hands of enthusiastic and innovative teachers, tablets are adaptive devices that can be shaped to fit local and national educational contexts.

Finally it should be noted that while the Micool Project partner schools were at the early stages of mobile device adoption, this study has also examined two more established and embedded tablet adoption models in schools using different versions of a 1:1 deployment solution. It is hoped that their inclusion will provide a blue-print not just for the Micool partner schools, but also for schools elsewhere, of what a digitally enabled classroom or school looks like; of what can be achieved when school leaders have a clear vision of how they want their schools to change in order to meet the learning needs of the C21st; and the multi layered steps and systems involved in realising this vision. For schools and teachers reading this report who are considering introducing mobile devices it is perhaps fitting to end this report with the prescient words of Thoreau, (1854), who said- *“If you have built castles in the air, your work need not be lost; that is where they should be. Now put the foundations under them.”*

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