Personal Digital Assistants – teachers prefer the personal

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Abstract

This paper will present the results of a small-scale project, funded by the UK Teacher Development Agency, where 13 teachers and 3 trainee teachers in one secondary school science department were given handhelds (Personal Digital Assistants or PDAs) with cameras and internet access for the academic year. The aims were:

- to build capacity - enabling trainee teachers to share their mlearning practice;
- to enable school based associate tutors to join the elearning community linked to the initial teacher training course and
- to encourage reflective practice amongst trainee teachers by enabling access anytime and anywhere to blogs for recording their teaching experiences.

However, initial indications are that not all these aims succeeded. The handhelds were viewed as personal devices rather than enabling access to a community of practice. Nearly all participants praised the personal information management functions of the devices but the teachers did not use the handhelds to access the course virtual learning environment and students did so only rarely. Email and SMS (texting) for both personal reasons and work within the school related context were more popular. Most popular were the multiple methods of recording available on the handheld: video, audio and written notes. Teachers used them to record observations on each others' lessons, students' work, student behaviour and trainees' progress in teaching. Whilst the concept of blogging did not appeal and was not used by the trainee teachers, they did record personal reflections on their teaching in Word. Finally, there were clear signs that the handhelds were taken out of the participants' pockets or bags to be used only when relevant and then replaced. This was perceived as a distinct advantage compared to desktop or even laptop based computers in the classroom with handhelds affording technology at a teacher's side and not in their face.

Introduction

In a comprehensive review of the use of mobile technologies such as handheld computers, personal digital assistants (PDAs) and Smartphones in learning and teaching Naismith et al (2004) identified aspects of learning relevant to students' use of mobile devices in both formal and informal learning contexts. In order to help them evaluate the most relevant applications of mobile technologies in education they classified these aspects into six groups that could be used to describe the use of mobile devices with students. Four of these classifications are linked to types of learning theory:

- behaviourist,
- constructivist,
- situated and
- collaborative.

Two relate more to context and application:

- informal and lifelong learning, and
- learning and teaching support.

It is this last area of learning and teaching support that is particularly relevant to initial teacher training where students move regularly between university and school placement and are expected to acquire, decipher and understand a wealth of information, both pedagogical and practical, in the process.

Another review, this time of innovative practice with e-learning in further and higher education within the UK (JISC, 2005) identified three key features of mobile technologies: portability, any time-any place connectivity and immediacy of communication that underpin their potential for learning and teaching support. These features: portability since PDAs are pocket sized; any time-any place connectivity as PDAs with GPRS or wi-fi connectivity enable flexible and timely access to e-learning resources; and immediacy of communication through 'phone or email, are leading to empowerment and more effective management of learners (especially in dispersed communities). Such a range of affordances for learning and teaching support bodes well for the potential use of PDAs with student teachers, who are expected to teach as well as learn during their training. Previous work with teachers using PDAs in schools (Perry, 2003) has shown that

PDAs can be supportive of teaching in that they offer considerable potential to make teachers' management and presentation of information more efficient. One Science teacher described their range of potential benefits to Perry; "I would never willingly go without one now; it is my instantly accessible encyclopaedia, thesaurus, periodic table, diary, register/mark book, world map and even star chart!".

Efficient management of information is indeed essential for students following the Postgraduate Certificate of Education (PGCE), a one-year science teacher training course in the UK. They need access to and a means to store information: on the National Curriculum, examination board syllabi and school based schemes of work; to supplement their subject knowledge; for course administration; for assignments and for pastoral support. Additionally, whilst the students are directly supported by a mentor from the school when on placement, their university tutor needs feedback on their students' progress and to assure themselves of their well being. Access to email and the internet has become essential to managing this process. However, whilst all community schools in England now have connected desktop computers, the socio-cultural context within the schools means that student teachers are reluctant to use these. They tend to be perceived as belonging to the pupils or other members of staff. Providing student teachers with PDAs is one way of resolving this issue and, indeed, previous research (Wishart, Ramsden and McFarlane, *in press*) where trainee teachers in Science trialled the use of internet enabled PDAs to support them in their teaching and learning has shown that this can be effective. Another study investigating the development of e-learning communities amongst initial teacher trainees dispersed on their school placements (Hughes, 2005) found that the students preferred PDAs to laptops as they were smaller and lighter. Wishart, Ramsden and McFarlane (2005) reported that their PGCE students could and did use their PDAs to access course related information. The students especially appreciated just-in-time internet access from any location for both personal and professional reasons and they stayed in email contact with their tutor though they preferred to use SMS texting or MSN to keep in touch with their peers. However, not all the student teachers used their PDAs regularly and many of the group were uncomfortable about being the only one in the class or school with a PDA.

Thus this project was set up with the main objective of building capacity within one school; enabling teachers and trainees in a science department to share their m-learning practice and allowing both students on placement miles away from the University and their school based teacher mentors to join the e-learning community linked to the PGCE course. Another objective was to encourage reflective practice amongst the trainee teachers. Employing reflective practice is recommended by Pollard (2005) as being of vital importance to teachers in order to develop evidence-informed professional judgement. The students would be able to use the PDAs anywhere and anytime to reflect on their teaching experiences by means of web based logs known as 'blogs'. These could enable both the recording of their reflections on teaching and allow the university tutor to have oversight of their progress as reflective practitioners. The blogs would also act as a mechanism for storing their reflections for later use in assignments.

Method

Thirteen science teachers at a local community school and six student teachers on the PGCE one-year teacher training course at the University of Bristol were given handheld computers to use throughout the academic year. These were PDAs chosen from the Pocket PC range then available in the UK that used the mobile phone GPRS network to connect to the internet and contained cameras. Previous research (Wishart, McFarlane and Ramsden, 2005) had shown that initial teacher trainees preferred Pocket PC based handheld computers to Palm OS based ones.

The models used in the study included Qtek 2020, Qtek 2020i, i-mate, XDA II and XDA IIi, almost identical hardware (shown in Figure 1) running Pocket PC 2003. The PDAs were supplied with aluminium protective cases and screen protectors. Separate collapsible Stowaway keyboards were provided where the participant requested one.

Figure 1. XDA II clone PDA

Mobile phone connectivity was supplied by Vodafone as it had

proved reliable in the project area in the earlier study. It was arranged that staff and students could receive and send up to a total of 6MB data including web pages, emails and texts a month without cost to them though they would be expected to pay for any voice calls they made.

The sample of teachers was selected through opportunity, with the head of chemistry at the school being an experienced PDA user and the head of science being willing to explore their use amongst his staff. The three students allocated to this school by the University during each of two teaching practices were then invited to join this study. All agreed though none of them had used a PDA before however, they had all used Word, Excel and Powerpoint in their studies and/or work.

On introduction to the mobile devices students and staff were shown how the PDAs have the potential to support them in:

- collaborating via the course Virtual Learning Environment (VLE) discussion groups and email;
- accessing course documentation (via the VLE or via synchronisation with a PC);
- just in time acquisition of knowledge from the web;
- acquisition of science information from e-books and encyclopaedias;
- delivering accurate figures for scientific constants and formulae;
- organising commitments, lesson plans and timetables;
- recording and analysing laboratory results;
- recording pupil attendance and grades;
- photographing experiments for display and reinforcing pupil knowledge;
- maintaining a reflective web log (blog) that could allow them to record lesson evaluations and other reflections on their teaching.

The six students were participant action researchers in the project acting on their teaching and learning by means of the PDA and then reflecting on and amending their practice (Wadsworth, 1998); they reported in by online questionnaire twice during the academic year. There was also

a dedicated discussion area on Blackboard, the course VLE, should they prefer this method of exchanging information and ideas about the PDA project. Additionally a focus group of all student PDA users was organised for the end of the first block of their teaching practice in order to collect impressions and share potential uses face to face.

Available teaching staff participated in a similar focus group discussion during the spring term and twelve were interviewed about their use of the PDA in the summer toward the end of the academic year. The totals given for number of teachers' responses in the results section vary as staff left during the discussions in response to pupil needs.

Results from teachers

Four to five months into the study, during the Spring term, teachers were asked to report whether they were still using the PDA. As shown in Table I. below only half were using their PDA.

Table I. "Are you still using the PDA?"	n
Yes	6
No	6

On discussing reasons for not using the PDA three clear positions emerged. These were choosing to use an alternative technology to support teaching, lack of engagement with the study and finding the PDA display difficult to read. Two teachers were not using the PDA as they now had alternative access to ICT which they found fitted their purposes better. Since the school had agreed to become involved with the PDA project each teaching laboratory had been equipped with a desktop computer, one teacher had purchased a digital camera and several had acquired USB memory sticks. All of these were suggested as being better for the purpose of designing presentations at home and bringing them to school for lessons. Another two teachers had not yet got around to trying the PDA out yet and a third teacher found having to manage glasses (as the display was too small) and the stylus simultaneously too much trouble.

Table II lists the activities that were reported by more than one teacher as being used successfully to support teaching and mentoring student teachers.

Table II. PDA Applications that Support Teaching	**Illustration**
Making notes in meetings or for lesson observations using Word	Figure 2.
Calendar /Diary Scheduler	Figure 3.
Taking photos and videos	Figure 4.
Searching /Researching (internet)	

Figure 2 shows an example of the notes made by an experienced teacher during an observation of a student teacher's lesson, these were then beamed using infra-red to the student's PDA for her to include in her reflections on her teaching. The teachers noted the advantages of being able to use the PDA to quickly and easily make notes both in formal meetings and on accidentally meeting up with colleagues in the corridor between lessons.

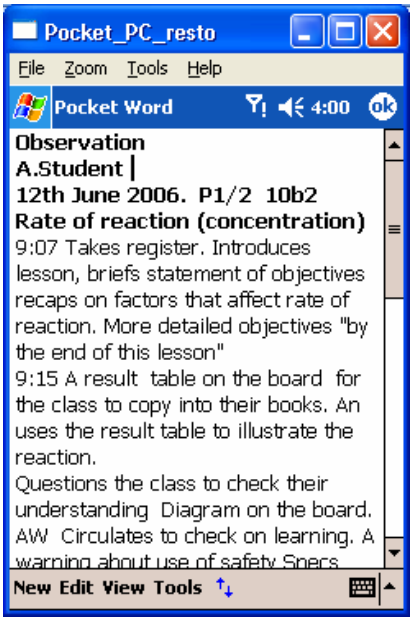

Figure 2. Lesson observation

Figure 3 is an illustration of how the Pocket PC Calendar can be used to display a teaching timetable, whilst the diary design was not as appropriate for teaching as customised timetabling software, it was still one of the most popular applications.

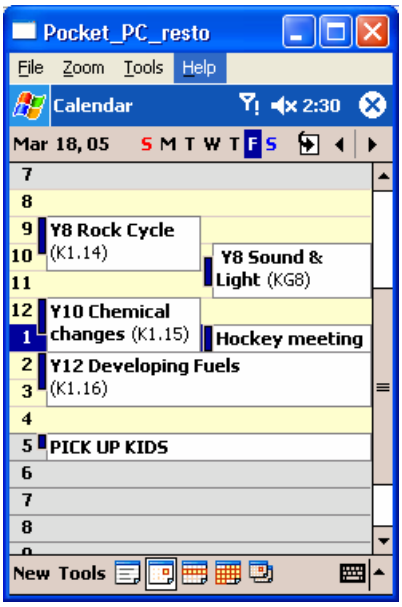

Figure 3. Calendar showing a teacher's diary

Two teachers, a biologist and a chemist, were particularly enthusiastic about the potential of using images to record day to day activity in lessons, as shown in Figure 4 and displaying them to the class as a reminder of previous work or revision at a later date.

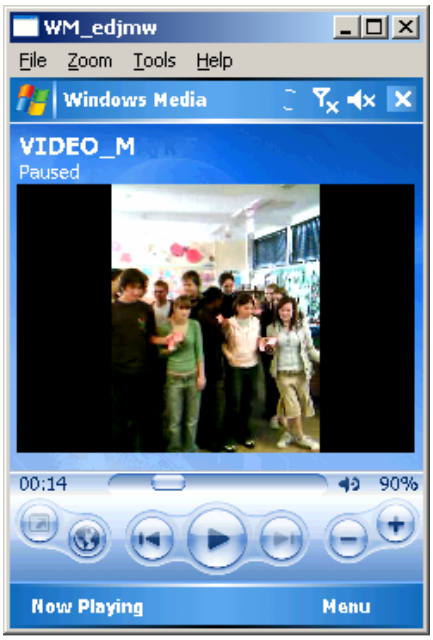

Figure 4. Using the camera

Access to the Internet was also reported particularly favourably especially for keeping abreast of breaking news usually unavailable during the school day (such as the cricket scores). Additionally one member of staff was very emphatic about how useful it was to set up a class administration system in Excel on a desktop computer and synchronise it to the PDA so that could be quickly and easily updated during lessons. He used multiple windows for attendance, grades, practical skills achieved and commendations etc. as shown in Figure 5 below.

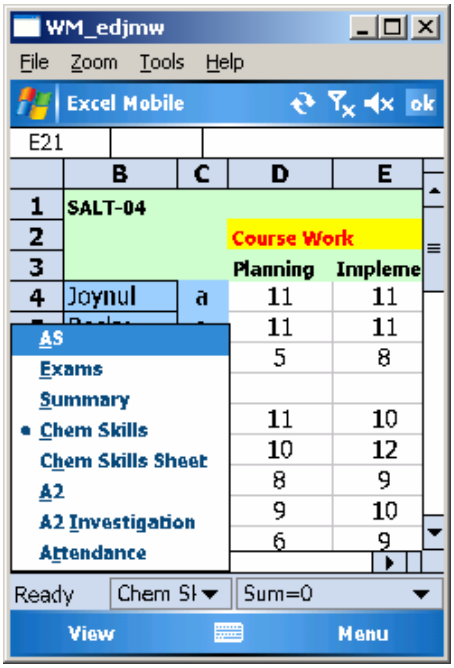

Figure 5. Using spreadsheets for class administration

However, when it came to participating in the e-learning community designed to support the student teachers in the school, as Table III shows, the teachers were less forthcoming.

Table III. "Communication with the PGCE students' tutor?"	n
I haven't	5
In person	1
By email from a desktop PC	1

In fact the teachers' communication using the PDA was much less than anticipated with only occasional use of SMS texts and email to contact each other or friends and family outside school. More use was made of beaming files to the student teachers than messaging or emailing them.

One teacher made innovative use of the PDA to support behaviour management in the classroom by recording a pupil's use of strong language during the lesson and playing it back to him afterwards. The student, who had previously been immensely tricky to deal with, immediately acknowledged that he'd been out of order and apologised.

Results from Student Teachers

Results from the online questionnaires completed by the six student teachers (three from the autumn term teaching practice who were allowed to keep their PDAs when they moved to a different school and three from the spring term practice) show similar trends. As Table IV shows, towards the end of the spring term just over half had given up using the PDA .

Table IV. Are you still using the PDA?	Autumn Term	Spring Term
Yes	3	2
No	0	4

Two students had given up as they had allowed the PDA battery to discharge and had lost their diaries and stored work, another found the PDA more hassle than pen and paper and another found it faster and easier to use a laptop that had become available. However, all the students agreed that using the PDA was easy and five of the six disagreed with the statement that the PDA was of no use to them as an individual. Though all the students trialled the applications used by the teachers as described earlier in this section there was no clear agreement amongst this group as to whether having a PDA might support their learning and/or teaching. There was clear agreement though that the two applications that were the most useful were the calendar for organising their timetable and the task list for organising their multiple commitments. They also used Word for making notes on lesson observations and for receiving feedback from experienced teachers on their own lessons.

The intended focus of the project for the students of sharing their reflections on their teaching experience with their tutors via a blog was not successful in that students in this study preferred not to use it but it was effective in proving that the software: Blogs in Hand on the PDA and Pebble on the server, worked effectively. One student sums it up neatly "I saw my school based associate tutor every day, so had little need to share thoughts and ideas with him in this way. Also, I prefer to keep my personal reflections to myself." The university tutor was simply not perceived of by the students as being in need of this information. Another student teacher pointed out "There seem to be more important things to do. Whether this is the case or not is debateable but that is the perception when you are on the front line, teaching." The students did however use the PDAs to reflect more privately using Word to make personal notes.

Finally, the several of the student teachers reported a feeling of confidence about their use of the PDA, being able to access the internet wherever they happened to be for both personal and professional information. Also the ability to use and then hide the PDA back in a pocket or bag led to it being perceived as educational technology that was more manageable in front of pupils than a desktop computer. The objective of the study to build capacity in m-learning within one school was met in that no-one reported feeling uncomfortable about using a PDA in the classroom though sharing innovative practice was more successful amongst the chemists amongst whom there was a keen PDA user.

Discussion

This small-scale study clearly illustrates the overwhelming nature of the social and cultural context in which new technologies are trialled. Of the three aspects cited by JISC (2005) as being key to the use for mobile and handheld technologies for learning and teaching support, portability and any time-any place connectivity were clearly important to both the teachers and student teachers but immediacy of communication was not deemed relevant to their needs. The university tutor's perception that she needed to be party to the students' development whilst on placement was not shared by the student teachers who reported that they felt their training needs were met by the school. In particular the concept of blogging as a way of encouraging and

sharing reflections on teaching was not supported by the six students in this study. This result needs further research to ascertain whether it is student and/or school specific. For instance, another e-learning communities in initial teacher training project carried out in London (Jack and Scott, 2005) investigating university tutors communicating with their students by means of video-conferencing found that such conferencing worked well with particularly needy students.

The handheld PDAs were used successfully by some of the teachers for personal support with timetabling, records of meetings, observations, students' attendance and grades, images and just-in-time information from the internet thus fulfilling the enabling person-plus vision for information and communications technology (ICT) originally put forward by Perkins (1993). However, several months into the study half the participants were not using the PDA, some of these had moved on to other technology that had become available and, in the case of the teachers involved, some had not started yet. Thus the teaching staff appear to be following the bell curve model of diffusion of a successful innovation proposed by Rogers (1995) and shown in Figure 6.

Figure 6. The five categories of potential innovation adopters (Rogers,1995)

At the tail end there were the two teachers who had yet to try the technology and the four who were not convinced of its use. However, in this study, the leading edge of early adopters had not settled on the PDA as it competed with other recently acquired technological innovations. Digital cameras and USB sticks which were considered better by two of the teachers for designing presentations for lessons at home and bringing them to school for lessons. Those teachers and student teachers that continued to use the PDA prioritised its organisational and personal management functionality which, of course, is the original design brief for a *personal* digital assistant. Though these teachers used PDAs to support their pupils' learning by, for example,

using the camera to record layout for a class practical and audio recording to support class management they did not use the PDA for presentations.

Both teachers and student teachers recognised the potential of the PDA for learning and teaching support as described by Naismith at al (2005) and identified the same three software applications as central to this potential as in the earlier study by Wishart., McFarlane and Ramsden (2005). These were the calendar or diary scheduler for organising yourself, the spreadsheet of attendance or mark book for organising your pupils and the use of a word processor to make notes on information and events immediately they are encountered.

There were clear signs that seeding a science department with PDAs led to greater confidence amongst the student teachers about their use than in the earlier study (Wishart, Ramsden and McFarlane, *in press*). The handhelds were taken out of the participants' pockets or bags to be used only when relevant and then replaced. This was perceived as a distinct advantage by the inexperienced teachers compared to desktop or even laptop based computers in the classroom with the handhelds affording technology at a teacher's side and not in their face.

Conclusions:

Despite acknowledging their potential for supporting collaboration teachers mostly view PDAs as personal devices. Not all participants were sufficiently interested to trial the devices and the perceived lack of reliability where this generation of PDAs can lose their data if the battery is allowed to discharge was a significant barrier to their engagement.

However, providing a PDA for all teachers within a department enabled a culture for student teachers where their use could be experimented with and the experienced teachers that continued to use the PDAs found that they provided individual teaching support through:

- internet access;
- taking photos;
- class administration and

- in particular, diary scheduling.

Additionally, recording notes on students' lessons and using the infra-red beam to share them was very useful to both the teachers and trainees who continued to use the PDAs. However, the objective for this study of using blogging to facilitate reflective practice was not met. The student teachers were not comfortable with the concept of sharing their lesson observations and their own reflections on their teaching beyond the school where they were placed.

Finally, for effective deployment of mobile devices in teaching and learning support there needs to be recognition of PDAs and other Smartphones as part of the 'whole' ICT system within an institution. Issues such as using the wi-fi to connect to the wireless network, connecting the PDAs to the data projectors and connecting the PDA cradles to the classroom desktops need a significant amount of facilitation in the school context where access to computer networks is heavily restricted.

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