

13

Use of Mobile Technology for Teacher Training

JOCELYN WISHART

UNIVERSITY OF BRISTOL

UNITED KINGDOM

Abstract

This chapter describes a small-scale project, funded by the UK Teacher Development Agency, where all teachers and trainee teachers in one secondary school science department were given handheld Personal Digital Assistants (PDAs) for the academic year. The aims were to build m-learning and m-teaching capacity, to enable school based associate tutors to join the e-learning community linked to the local initial teacher training course, and to encourage reflective practice amongst trainee teachers. However, 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; however, the teachers did not use the handhelds to access course information and trainees did so only rarely. The ability to access Google from any location to answer students' and colleagues' questions was more popular. Most popular were the multiple methods of recording available on the handheld: video, audio, and written

notes. Teachers used these to record observations on each others' lessons, students' work, student behaviour, and trainees' progress in teaching. The concept of using blogs to reflect on practice was not taken up though trainees did record personal reflections on their teaching in Pocket Word for later use in course assignments.

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
- collaborative

Two relate more to context and application:

- informal and lifelong learning
- learning and teaching support

It is this last area of learning and teaching support that is particularly relevant to initial teacher training where trainees 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, anytime-anyplace connectivity, and immediacy of communication that underpin their potential for learning and teaching support. These features are leading to empowerment and more effective management of learners (especially in dispersed communities): portability since PDAs are pocket sized; anytime-anyplace connectivity as PDAs with General Packet Radio Services (GPRS) or WiFi connectivity enable flexible and timely access to e-learning resources; and immediacy of communication through phone or email. Such a range of affordances for learning and teaching support bodes well for the potential use of PDAs with trainee

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 trainees 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 trainees are directly supported by a mentor from the school when on placement, their university tutors need feedback on their trainees' progress 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 trainee teachers are reluctant to use these. They tend to be perceived as belonging to the students or other members of staff. Providing trainee teachers with PDAs is one way of resolving this issue and, indeed, previous research (Wishart, Ramsden, and McFarlane 2007) has shown that this can be effective where trainee teachers in science trialled the use of Internet enabled PDAs to support them in their teaching and learning. Another study investigating the development of e-learning communities amongst initial teacher trainees dispersed on their school placements (Hughes 2005) found that the trainees preferred PDAs to laptops as they were smaller and lighter. Wishart, Ramsden, and McFarlane (2005) reported that their PGCE trainees could and did use their PDAs to access course related information. The trainees 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 trainee teachers used their PDAs regularly, and many within the group were uncomfortable about being the only ones in their 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 trainees 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 trainees 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 trainee 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 contained cameras and used the mobile phone GPRS network to connect to the Internet. 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 trainees 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 trainees 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 trainees 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
- organizing commitments, lesson plans and timetables
- recording and analysing laboratory results
- recording student attendance and grades
- photographing experiments for display and reinforcing student knowledge
- maintaining a reflective web log (blog) that could allow them to record lesson evaluations and other reflections on their teaching.

The six trainees 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 trainee PDA users was organized 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 student 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 1 below only half were using their PDA.

TABLE 1 Use of PDA

Are you still using the PDA?	n
Yes	6
No	6

On discussing reasons for not using the PDA three clear positions emerged: 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 information and communication technology (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 failed to try out the PDA, and a third teacher found managing eye glasses (as the display was too small) and the stylus simultaneously too much trouble.

A list of the activities that were reported by more than one teacher as being used successfully to support teaching and mentoring trainee teachers is as follows:

- Making notes in meetings or for lesson observations using Word (see Figure 2)
- Calendar/Diary Scheduler (see Figure 3)
- Taking photos and videos (see Figure 4)
- Searching/Researching (Internet)

Figure 2 shows an example of the notes made by an experienced teacher during an observation of a trainee teacher's lesson, these were then beamed using infra-red to the trainee's PDA for her to include in her reflections

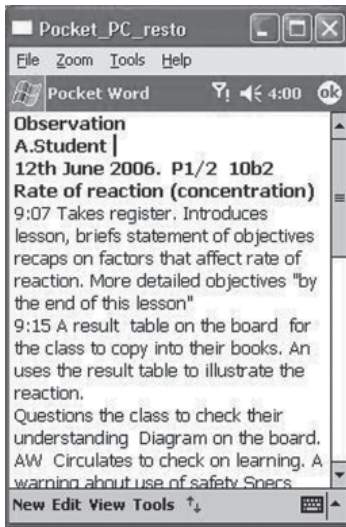


FIGURE 2 Lesson observation

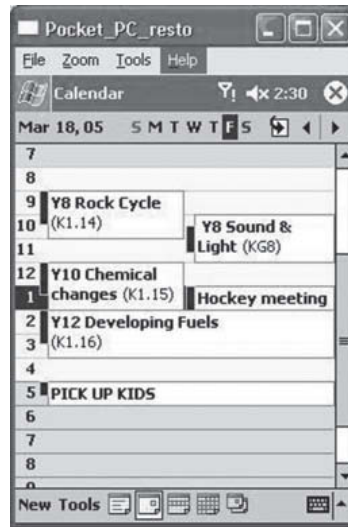


FIGURE 3 Calendar showing a teacher's diary

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 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 customized timetabling software, it was still one of the most popular applications.

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.

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 synchronize it to the PDA so that it could be quickly and easily updated during lessons. He used multiple windows for attendance, grades, practical skills achieved, and commendations as shown in Figure 5.

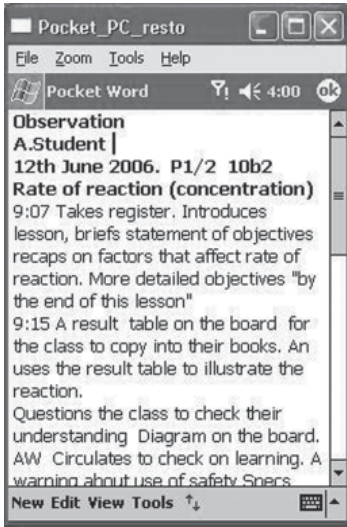


FIGURE 4 Using the camera

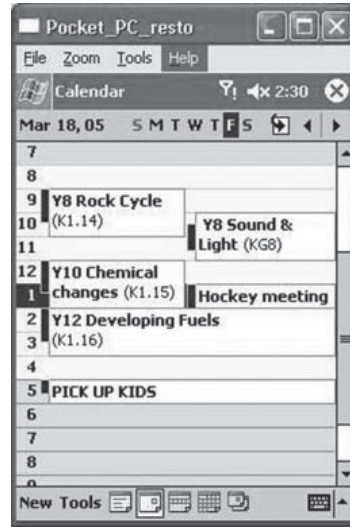


FIGURE 5 Using spreadsheets for class administration

However, when it came to participating in the e-learning community designed to support the trainee teachers in the school, as Table 2 shows, the teachers were less forthcoming.

TABLE 2 Participation in the e-learning community via PDA

Communication with the PGCE trainees' 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 trainee teachers than messaging or emailing them.

One teacher made innovative use of the PDA to support behaviour management in the classroom by recording a student'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 had been out of order and apologized.

Results from Trainee Teachers

Results from the online questionnaires completed by the six trainee 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 3 shows, just over half had given up using the PDA towards the end of the term.

TABLE 3 Use of the PDA

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

Two trainees had given up as they had allowed the PDA battery to discharge and lost their diaries and stored work, another found the PDA more hassle than a pen and paper, and another found it faster and easier to use a laptop that had become available. However, all the trainees 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 trainees 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 most useful applications were the calendar for organizing their timetable and the task list for organizing their multiple commitments. The web browser was used (most often via Google) to answer queries and to find information to support teaching, but more often to support personal interest or need. 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 trainees of sharing their reflections on their teaching experience with their tutors via a blog was not successful in that trainees in this study preferred not to use it. However, it was effective in proving that the software (Blogs in Hand on the PDA and Pebble on the server) worked effectively. One trainee 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 trainees as being in need of this information. Another trainee teacher pointed out: “There seem to be more important things to do. Whether this

is the case or not is debatable, but that is the perception when you are on the front line, teaching.” The trainees did, however, use the PDAs to reflect more privately using Word to make personal notes.

Finally, several of the trainee teachers reported a feeling of confidence about their use of the PDA, especially 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 students 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 anytime-anyplace connectivity were clearly important to both the teachers and trainee teachers, but immediacy of communication was not deemed relevant to their needs. The university tutor’s perception that she needed to be regularly informed about trainees’ development whilst on placement was not shared by the trainee 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 trainees in this study. This result needs further research to ascertain whether it is trainee and/or school specific. For instance, other e-learning communities in initial teacher training project carried out in London (Jack and Scott 2005) investigating university tutors communicating with their trainees by means of video-conferencing found that such conferencing worked well with particularly needy trainees.

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.

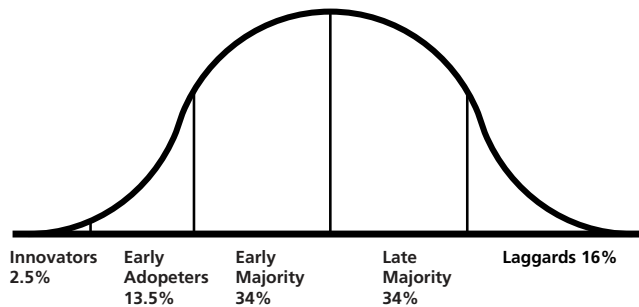


FIGURE 6 The five categories of potential innovation adopters (Rogers 1995)

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 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 trainee teachers who continued to use the PDA prioritized its organizational 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 students' 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 trainee teachers recognized the potential of the PDA for learning and teaching support as described by Naismith et al. (2004) 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 organizing yourself, the spreadsheet of attendance or mark book for organizing your students, and the use of a word processor to make notes on information and events immediately after they are encountered.

There were clear signs that seeding a science department with PDAs led to greater confidence amongst the trainee teachers about their use than in the earlier study (Wishart, Ramsden, and McFarlane 2007). 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.

Implications for Practice

Following this study and the earlier trial reported by Wishart, Ramsden, and McFarlane (2007), the following practical applications appear to be of most benefit to teachers and teacher trainees using PDAs:

- Attendance, achievement, and behaviour monitoring – events can be captured at any location within the school. Recording may simply be via a prepared spreadsheet or tick list, but the use of video and audio to capture behaviour has the potential to provide incontestable evidence.
- Diary scheduling – a calendar application that usefully combines personal appointments with school teaching timetables and dates for student reports and parents' evenings would be welcomed.
- Making notes at point of need – teachers should explore which method of text entry they prefer, taking the time to train the character recognition if they plan to handwrite and decide where they prefer to record information. For example, some teacher trainees used Notes, yet others used Word, but the most popular place for making notes was in the Calendar.
- The application that was best received by pupils in school involved was the use of the PDA camera by the teacher to record their work and experimental set ups.

Conclusion

Despite acknowledging their potential for supporting collaboration, teachers mostly view PDAs as personal devices and used only the software that supported their personal information needs. 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 trainee teachers where their use could be experimented with and the experienced teachers who continued to use the PDAs found that they provided individual teaching support through:

- Internet access
- taking photos
- class administration
- diary scheduling in particular

It was clear that the just-in-time nature of the individual support – having almost instant access to personal calendar, class lists and grades, and Google was important to the trainees and supported them in their learning. Additionally, recording notes on trainees' lessons and using the infrared 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 trainee 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 WiFi 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.

References

- HUGHES, S. 2005. JANUS Project: Looking back to the future. Training and Development Agency for Schools (UK). http://www.tda.gov.uk/upload/resources/doc/e/e-learning-case-studies.doc#_Toc92694920 (accessed November 9, 2006).
- JACK, D., and R. SCOTT. 2005. Partnership with schools through WebCT and videoconferencing. Paper presentation, *TDA e-learning and teacher training conference*, November 11, London.
- JISC. 2005. Innovative practice with e-learning. Bristol: Higher Education Funding Council for England (HEFCE). http://www.jisc.ac.uk/eli_practice.html (accessed March 6, 2006).

- NAISMITH, L., P. LONSDALE, G. VAVOULA, and M. SHARPLES. 2004. Report 11: Literature review of mobile technologies in learning. Bristol: Futurelab. http://www.futurelab.org.uk/research/reviews/reviews_11_and12/11_01.htm (accessed March 3, 2007).
- PERKINS, D. 1993. Person-plus: A distributed view of thinking and learning. In *Distributed cognitions*, ed. G. Salomon, 88-110. New York: Cambridge University Press.
- PERRY, D. 2003. Handheld computer PDAs in schools. Coventry: British Educational Communications and Technology Agency. http://www.becta.org.uk/page_documents/research/handhelds.pdf (accessed March 6, 2006).
- POLLARD, A. 2005. Reflective teaching: Evidence-informed professional practice. London: Continuum.
- ROGERS, E. 1995. Diffusion of innovations. 4th ed. New York: The Free Press.
- WADSWORTH, Y. 1998. What is participatory action research? *Action Research International*, Paper 2. <http://www.scu.edu.au/schools/gcm/ari/ari/p-ywadsworth98.html> (accessed July 24, 2006).
- WISHART, J., A. MCFARLANE, and A. RAMSDEN. 2005. Using Personal Digital Assistants (PDAs) with Internet access to support initial teacher training in the UK. Paper presentation, *mLearn 2005*, October 25-28, Cape Town, South Africa. <http://www.mlearn.org.za/CD/papers/Wishart.pdf> (accessed November 9, 2006).
- WISHART, J., A. RAMSDEN, and A. MCFARLANE. 2007. PDAs and handhelds: ICT at your side and not in your face. *Technology, Pedagogy and Education* 16 (1):95-110.