How Can Teacher Trainees Use Mobile Phones and Personal Digital Assistants to Support Their Teaching and Learning?

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Abstract

This paper reports on an overview of the results of three research projects conducted with small groups of graduate student teachers in the UK set up to identify the potential of handheld personal digital assistants (PDAs) to support learning and teaching during their one year intensive pre-service training programme. PDAs are early versions of Smartphones with internet access, cameras and basic office applications. Three applications, all linked to the use of the PDA for information management, were consistently and regularly reported by the student teacher as supportive. These included the calendar or diary scheduler with a task list for personal organisation, the spreadsheet management tool for organising pupil information such as attendance and grades and the word processor for making notes. The camera was also seen to be popular for recording both personal and school events. Students' use of these latter two applications for text and image capture can be seen as supportive of a constructivist approach to learning with the student teachers building their knowledge through using the PDA to bring notes and images from different locations together for their university assessed work. Use of the PDAs to access email and the internet was also popular though, for most of the students, the socio-cultural context of being a student teacher on a relatively short placement in a school impacted negatively on their use of the devices.

Keywords: Teacher training, Mobile phone, PDA, Mobile learning

Introduction

Benefits to learning from giving students in Higher and Further Education access to internet enabled Personal Digital Assistants (PDAs) or mobile phones (Smartphones) had been identified in the early 2000s by both the EU funded, global Mobilearn project and the UK's Joint Information Systems Committee (JISC). The JISC review of innovative practice with e-learning in further and higher education (JISC, 2005) suggested that the portability, any time, any place connectivity and immediacy of communication of mobile devices were key to their success. For example, having PDAs was seen to enable flexible and timely access to e-learning resources and immediacy of communication through voice call, texting or email, all of which were reported to lead to empowerment of and more effective management of learners (especially in dispersed communities). Examples given by JISC (*ibid*) include three Further Education colleges in Yorkshire, where PDAs are being used to support students in outreach and work based learning. There, the PDAs were seen to be supporting self-paced learning and students' development of personal organisation skills.

Informed by their work on the Mobilearn[1] project, Naismith et al.'s (2004) mobile learning literature review for Futurelab classified effective mobile learning

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[1] http://www.mobilearn.org/

activities (including those conducted with children and the general public as well as university and college students) by their underpinning ethos. Four categories are linked to aspects of learning theory:

- behaviourist, as using PDAs and/or mobile phones is rewarding,
- constructivist, as handheld devices allow students to build knowledge bringing together information from different locations,
- situated, as the built knowledge is authentically situated in a relevant context and
- collaborative, as any time, any place communication enables increased collaborative learning opportunities.

Two further categories relate more to context of the learning activity and method of application:

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

This last area of learning and teaching support is particularly relevant to initial teacher training (ITT) in science where students move between university and school based practice being expected to acquire, decipher and understand a wealth of information, both pedagogical and practical, in the process. This information may come from an electronic book, dedicated science software or the Web, especially via a course linked Virtual Learning Environment (VLE), or from previously recorded pupil data or via communications with peers and tutors. In the UK the one year initial teacher training course, the Postgraduate Certificate of Education (PGCE) is particularly information heavy. It also requires the students to spend 24 of the 36 weeks of the course in a partner school rather than in the University making access to conventional information sources for students such as the library difficult. In particular, the students need access to the documentation of the various UK statutory requirements for schools including the National Curriculum and information to supplement their subject knowledge such as science data and teaching resources. Then there is the documentation associated with being on the PGCE course itself such as timetables, assessment guidance, pupil mark books, lesson observation records and lesson plan proformas. Students of other professions where training also requires access to sizeable quantities of information (such as medicine and the law) have already found PDAs useful in that they can deliver information directly to the individual as and when required (Manhattan Research, 2002).

Additionally it was anticipated that having the PDAs would provide opportunities for the student teachers to connect and build their learning between and across both university and school contexts. Indeed, the use of PDAs or Smartphones is particularly relevant to the student teacher, who is expected to teach as well as learn. Previous work with teachers using PDAs in schools (Perry, 2003) had shown that they offer considerable potential to make teachers' management and presentation of information more efficient. One Science teacher noted "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!"

However, it should be noted that working with PDAs and mobile devices is not always successful, Trinder, Magill and Roy (2005) point to a host of problems; the need to remember to recharge the battery and to synchronise with the host computer are common to all operating systems, as is the small screen size and a host of other issues are platform specific. Therefore, over a three year period starting in October 2004 the use of handheld PDAs was trialled on the University of Bristol PGCE in order to identify where potential learning and teaching support opportunities were borne out in practice. At first, the PDAs were made available to groups of volunteer student science teachers selected at opportunity and then the range of participants was widened to include practicing teachers themselves and modern foreign language (MFL) student teachers. The original purchase of the PDAs for these projects was funded by the UK Teacher Development Agency. In each case, the students or teachers were participant action researchers acting on their teaching and learning by means of the PDA and then reflecting on and amending their practice (Wadsworth, 2001).

Method

In the first project year, reported in Wishart, Ramsden and McFarlane (2007), 14 student teachers following the one-year science PGCE (Postgraduate Teacher Training Programme) were given either a Windows Pocket PC or a Palm OS-based handheld and trained in its use. Data packages including web pages and email were provided by Vodafone as it had proved reliable in the project area in a pilot test, though students would be expected to pay for any voice calls they made. During the training, students were shown how the PDAs have potential to support them in:

- collaborating via the VLE (Blackboard) discussion groups and email
- accessing course documentation (on PDA or via Blackboard or via synchronisation [synching] with a PC)
- just-in-time acquisition of knowledge from the Web
- acquisition of science information from e-books, data tables and encyclopaedias
- organising commitments, lesson plans and timetables
- recording and analysing laboratory results
- recording pupil attendance and grades
- capturing images eg. of experiments and demonstrations for redisplay to reinforce pupil knowledge or of their teaching to evidence progress
- maintaining a reflective web log (blog) that could allow them to record lesson evaluations and other reflections on their teaching.

This pattern of a one-year loan was repeated in a second project (reported in detail in Wishart (2009)) but this time with only the six students placed (at different times during the year) in a single secondary school and simultaneously loaning PDAs with Wi-Fi and running Windows Mobile 5 to all the 13 science teachers in the school. Practising teacher engagement was sought to remove constraints reported by the first

group of students who felt that having the PDA drew unwarranted attention to them and to increase involvement of the school based mentors in the e-learning community linked to the initial teacher training course.

In the third project (reported in Wishart (2008)), the remaining Wi-Fi enabled PDAs were loaned for the academic year to a group of seven modern foreign language (MFL) student teachers to gain information from a contrasting context.

In each case the students involved in the project reported back on their experiences of PDA use at key points in the PGCE year via questionnaire at half term breaks and at the end of their school based teaching practice placements and via a face to face interview at the end of their course. Up to three focus groups were also arranged at opportunity each year to collect richer details and share experiences on PDA use.

Results

Results from the original 14 student science teachers

Three students used the PDAs on a regular basis throughout the year and another eight students used theirs intermittently throughout the year. Three gave up on theirs during the year citing both hardware issues computers and challenges arising from the socio-cultural context in schools. Common hardware problems were the loss of data when the battery was not recharged and difficulties in synchronisation with school computers whereas contextual issues included embarrassment at the attention the PDA attracted from pupils and lack of time to continue to explore the use of the PDA under the pressure of teaching, planning for teaching and writing up university assignments.

The most frequently reported successful activities using a PDA for teaching and learning support were:

- using the internet as a resource (Google)
- using MS Word for lesson evaluations, observations etc
- 'to do' list /Calendar
- calculator
- email

In addition the three enthusiasts used MS Excel to produce spreadsheets for:

- auditing their teaching competences against the QTS standards
- recording class attendance, grades and commendations

It was noticed that students who were successful at personal use of the PDA were more likely to use the PDA more often for learning and teaching support. The most useful personal activities with the PDAs reported were:

- email
- to do / Task list
- SMS/Texting

- calendar/date book for schedule/timetable
- internet for personal use – recipes, maps, shopping
- taking photos
- making notes/audio reminders.

Whilst the PDAs had similar functionality the Windows based PDAs were largely preferred by the students to the Palm based ones for their ease of operation.

Results from the second study: experienced school science teachers

Windows Mobile PDAs with internet connectivity through mobile phone network data plans and Wi-Fi were loaned for the academic year to thirteen teachers in a secondary school science department. Again the amount of use made of the PDAs varied extensively by individual. Successful activities using a PDA used most frequently to support teaching were:

- using MS Word for making notes in meetings and/or lesson observations
- Calendar
- taking photos
- searching /researching on the internet

There was only one enthusiast in the school who, in addition to the above used his PDA for

- email
- calculator
- to do / Task list
- MS Excel (spreadsheets for attendance and grades etc)
- voice call

In addition, he reported "I will be at a great loss if you reclaim the PDA from me. I personally find it very useful for collecting data, class marks, making notes during lessons, doing student observations, sharing files with colleagues and many others."

What about the student teachers in that second study?

In this instance, there was limited use, with four of the six students having given up on the PDA by the end of the training year. Having to keep these early 'Smartphones' charged to avoid loss of personal data was a perennial problem and data loss over the vacation happened to at least two of these students, yet in one of the focus groups these students described having the PDAs as "ICT at your side and not in your face" (ICT is the acronym commonly used in UK schools for information and communications technology). That is to say that the ability to take out the handheld device, use it to access the necessary information and then to hide it back in a pocket or bag led to it being perceived as educational technology that was more manageable in front of pupils than a laptop computer. The two applications cited by the student

teachers in this project as most useful were the calendar for scheduling and the task list for organizing their multiple commitments.

Results from the third study: Modern Foreign Language (MFL) student teachers

Seven student volunteers were loaned the Windows based PDAs and given training in their use. However, during this particular project the PDAs were used much less than had been anticipated, given previous experience with the science student teachers. The students recognised their potential but were unwilling to spend time on the exploration necessary to put this potential into practice. Established practices in employing ICT to support MFL teaching such 'language labs' and the socio-cultural context in school had even more impact on the MFL student teachers than the science trainees. One student highlighted the different subject cultures herself; she noted "And I think if you look at the use of ICT in MFL, although we're very competent at certain areas, a lot of us need the idiot's guide… to put it bluntly… on how to do it. Whereas when I've spoken to my friends who do science, maths and even humanities… seemed to use ICT much more readily and easily…".

The results of the post-project interviews clearly indicated that the MFL students were not yet confident in their pedagogical identities and most felt they could not disrupt the established practice with the novel technology. When they did use the PDAs, applications that they reported to be most effective were those that enabled the capture of on-the-spot events and reflections such as video and making notes.

Discussion

Whilst a few enthusiasts used the PDA widely, there were really only three applications on the PDAs that maintained their popularity with the teachers and teacher trainees in the different investigations. These appeared to be key to managing student teachers' learning of how to teach in the field and included 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. This information which often contained reflections on the teaching process can then be incorporated quickly and easily into the assessed components of the PGCE course. The effectiveness of this is reinforced by this student's comment, "During teaching practice I have found myself constantly bombarded with new and noteworthy information (e.g. scientific facts, ideas for teaching approaches, school procedures, evidence for Qualified Teacher Status (QTS) standards, etc. The PDA has allowed me to keep meaningful notes of this information, and structure the information (i.e. file) in a way that allows me to access it easily." In addition, the camera (both video and still) was used at opportunity to record personal and work events by both the science and MFL groups and accessing the internet and/or email when a desktop computer was unavailable was also popular.

It was noted that in addition to straightforward information management, the successful uses the PDAs were put to by the student teachers supported a constructivist philosophy of learning. For example, making notes on teaching observations in school in separate files and later, through a process linked to further research and reflection,

reconstructing those notes into a written essay in response to a course set task demonstrating learning. Other examples of a constructivist approach involved using images and video captured of science experiments or of one-off events such as demonstrations or role-plays (in both science and MFL) and used to scaffold the pupils being taught in revising and constructing their own understanding of the subject matter being taught.

However, the communications capability of the PDA was also essential to its success. Having the internet available as a portable resource welcomed by the students, it was the software application that, though used less than the others, the original group of science student teachers considered to be most helpful to both teaching and learning. It appears that having the internet literally 'in your hand' can enable the PDA to act as a distributed memory system, for the wealth of information on the internet means you can use the PDA to answer virtually any question from your pupils. One student science teacher even used 'chat' on a PDA successfully during a lesson to solicit answers to pupils' questions about the structure of the heart from medical students he knew. Finally, email for keeping in touch with the university tutor, other students, family and friends can provide valued support for students who are working on school placements away from the rest of their peers.

Another important factor to be considered though is the socio-cultural context of the PDA use; at the time of this investigation the sight of teachers using PDAs or Smartphones was rare in schools. Additionally, in many schools in the UK the use of mobile phones by pupils is banned. These circumstances led to feelings of discomfort amongst the student teachers about getting the PDA out in front of the class. One student found the interest it generated amongst her pupils detracted from her teaching and another reported concern about having it stolen. In the second study where every member of a science department was allocated a PDA, there were fewer reports of the devices drawing unwarranted attention but still only small numbers of enthusiasts continued to use the devices. It should be noted though that an initial teacher training course is an extremely busy time – a number of the students that gave up on the PDAs described the course demands as preventing them from devoting time to necessary exploration of the PDA functionality. One salient issue that prevented more students taking pictures to use in their teaching was their concern about the number and level of permissions required to photograph children. Even where the students had been reminded of the opportunities for capturing multimedia evidence of their progress for assessment by their tutor and such image capture had been cleared with their schools, they were concerned as to how taking photos would be perceived and few took photos of activities. Those that were taken were mainly of outside classroom events. It appears that strong socio-cultural pressures militate against the use of personal mobile devices to support teaching and learning in UK schools. The results of these studies support Hartnell-Young and Heym's (2008) proposal that moving the focus of schools' acceptable use policies from the devices themselves to activities they are used for would be a useful step forward in engendering a more open climate to enable teachers and pupils to explore the potential of mobile phones to support learning. This would be a timely move as, in the not too distant future, teachers will be looking at pupils potentially bringing next generation mobile devices containing pico-projectors that can project the phone's screen onto walls and tables into class.

Conclusions

PDAs and mobile phones have the potential to support both learning and teaching on an initial teacher training programme. In particular, student teachers reported their information management functions (diary and task management, making notes as documents or spreadsheets) to be supportive, though image capture, internet access and email were all also deemed useful to support learning and personal needs. However, the social and time pressures associated with being a student teacher meant that, in the studies reported here, only a few enthusiasts really tested the PDA to its full potential. For these enthusiasts, the PDAs provided an opportunity to bring information together across time and place as images and text to aid building their understanding for university assessed work.

References

Hartnell-Young, E., & Heym, N. (2008). How mobile phones help learning in secondary schools. Coventry: Becta. Retrieved from http://www.lsri.nottingham.ac.uk/ehy/LSRIfinalreport.pdf

JISC. (2005). Innovative Practice with e-Learning. (Bristol, Higher Education Funding Council for England (HEFCE)). Retrieved from http://www.jisc.ac.uk/eli_practice.html

Manhattan Research. (2002). Taking the pulse: Physicians and emerging information technologies. Retrieved from www.manhattanresearch.com

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004) Report 11: Literature review of mobile technologies in learning. Bristol: Futurelab. Retrieved from http://www2.futurelab.org.uk/resources/documents/lit_reviews/Mobile_Review.pdf

Perry, D. (2003) Handheld Computers PDAs in Schools (Coventry: British Educational Communications and Technology Agency). Retrieved from http://dera.ioe.ac.uk/1644/1/becta_2003_handhelds_report.pdf

Trinder, J., Magill, J. & Scott, R. (2005). Expect the unexpected. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile learning: A handbook for educators and trainers* (pp.). London: Routledge.

Wadsworth, Y. (2001). The mirror, the magnifying glass, the compass and the map: Facilitating participatory action research. In P. Reason & H. Bradbury (Eds.), *Handbook of action research* (pp.420–432). London: Sage Publications.

Wishart, J. (2009). Use of mobile technology for teacher training. In M. Ally (Eds.), *Mobile learning: Transforming the delivery of education and training* (pp..). Edmonton, Canada: AU Press.

Wishart, J. (2008). Challenges faced by modern foreign language teacher trainees in using handheld pocket PCs (Personal Digital Assistants) to support their teaching and learning. *ReCALL, 20* (3), 348–360.

Wishart, J., McFarlane, A., & Ramsden, A. (2005). *Using personal digital assistants (PDAs) with internet access to support initial teacher training in the UK*. Paper presented at MLearn'05.

Wishart, J., Ramsden, A., & McFarlane, A. (2007). PDAs and handhelds: ICT at your side and not in your face. *Technology, pedagogy and education*, *16*(1), 95–110.