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Using Personal Digital Assistants (PDAs) in Healthcare Settings

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Abstract

This paper reviews the potential of learning resources provided in PDAs and investigates the ways in which clinical learning within two comparative institutions can be supported by using small handheld computers.

Keywords

Clinical learning, Personal Digital Assistants (PDAs),

1. INTRODUCTION

New technologies, especially mobile devices, are now emerging as tools that can provide seamless learning across different contexts, e.g. in the hospital, in the classroom and at home. Healthcare and medical education is a key work based learning context where mobile technologies have been widely embraced as learning tools. PDAs are used by many healthcare practitioners, particularly in North America. Many reports on PDA use can be found in the medical informatics literature, although the focus is not always on their use as learning tools (e.g., Lindquist et al., 2008, Garrison, et al 2003, Peters, et al, 2003, Lee, 2006, Barrett, et al, 2004; see also Walton, et al, 2005).

Recent studies in this area have shown that mobile technologies can provide additional opportunities to practitioners, especially in specific contexts and niche activities. It is also proposed that these technologies may support learner centred and innovative approaches to learning and teaching. Linquist et al (2008) in particular highlight the need for further action research into the development of appropriate functions and software for PDAs in a learning context. Although PDAs are not suitable for everyone, (for example, due to difficulties in manipulating for disabled users and small screen size) they can bring opportunities for learning in to any environment including commuting to work and anywhere that they will be taken. Having access to such a hypermedia environment allows users freedom to follow their activities in different environments they encounter and enables bridging of these activities.

When providing mobile learning opportunities in healthcare settings 'the situated nature of the activity' can be taken into account as one of the guiding principles. Mobile devices can provide learning whenever they needed, in the form required by the users and suitable to the context it is sought from. Kukulska-Hulme and Traxler (2007) maintain that mobile technologies can support diverse teaching and learning styles, and lend themselves particularly well to personalised, situated, authentic and informal learning. In the current study, the availability of the PDA and associated resources provided an opportunity where healthcare professionals could actively use their work place as a learning environment. This directly supported the transfer of knowledge and skills and encouraged specific application of general principles.

This study therefore seeks to review the potential of learning resources provided in PDAs linked to VLEs (Virtual Learning Environments) and to investigate the ways in which clinical learning within two comparative institutions can be supported by using small handheld computers also called personal digital assistants (PDAs).

These compact and portable devices can contain and organise a vast amount of information that can be accessed any time anywhere and at the point of care. PDAs and similar devices have become a valuable tool for clinicians and educators as they facilitate certain tasks such as getting immediate access to relevant clinical facts (for example checking for drug interaction, calculating important parameters) or expanding the differential diagnosis (Torre and Wright, 2003). These devices appear to be a cure-all for clinicians to cope with the amount of medical information confronting physicians every day. On the other hand, we still need to know how PDAs have been used and evaluated in patient care and medical education. Therefore this study will contribute to the research on the use of PDAs in clinical practice and medical education.

We specifically aimed to find out possible benefits and barriers from using PDAs for clinical learning within a variety of different contexts. This should support a deeper understanding of practice based learning increasing productivity, improving communication, providing immediate assistance, supporting evidence based medicine. None of the data collected relates to the specific patients or hospital practices. The project primarily concentrates on clinical learning processes through transferring learning materials into PDA within two comparative organisations.

2. CASE STUDIES

Case study 1:

The first case study is in the context of teaching of general surgery within a Turkish teaching hospital for specialists, doing their clinical practice in the hospital environment. The objective of the activity was to help participants make use of knowledge gained during their medical training in their clinical practice. PDAs were distributed to the participants as learning tools to support their learning and interaction by allowing access to learning materials related with their clinical practice. There were three participants in this case study.

Case study 2:
The second case study deals with the teaching of an ehealth course for 1st year students starting a health informatics course of study in the UK. This case study investigated the effectiveness of mobile learning in terms of teaching and learning experience by using PDAs as learning tools in an ehealth context for clinical and non-clinical students. The course, presented by the Centre for Health Informatics in Multiprofessional Education (CHIME) in University College London, is a requisite part of the Health Informatics curriculum. The objectives of the course are to prepare students to be part of an online learning community; to encourage them to reflect upon and practice their study skills and apply the skills and knowledge gained during the course to their workplace; to orient them to the literature and other resources to support their ongoing learning.

PDAs were made available to a selection of volunteer students as supplementary tools to support their learning and interaction by allowing access to learning materials related to the course. These materials can already be accessed through the UCL VLE so participation in this project provided only supplementary access rather than changing their learning resource access rights. The project recruited 6 participants for the second case study.

Each case study comprised a selection of comparative factors to allow for generic issues across these factors to emerge. Case Study 1 focuses on students later on their learning pathway in a specialism. Case Study 2 focuses on students early on their learning pathway in a far more general course on ehealth.

2.1 The Device
This PDA is a combined pocket PC and telephone using wi-fi and Bluetooth technology and also serves as a camera, mp3 player, GPS navigation system and a voice recorder. It uses numerous communication technologies so it can deliver information such as e-mail and calendar details when used with an appropriate mail server and software such as Outlook. Students taking part in the study were also provided with a 2 GB memory card for extra capacity and to provide course resources.

Figure 1. The PDAs used in the study.

2.2 The Study
Resources: Resources available for both courses included a large amount of text, recorded videos, images, photograph, audio interviews, and internet resources. The activities were designed to allow participants to use their PDAs in a variety of ways to support their course based/clinical based learning (see Figure 2).

The resources for CHIME students included all the course materials they have on their course web site including web links and library access. Course materials were presented in different formats but PDAs were able to present all the course materials correctly (Figure 3).

Figure 2. Resources on varicose veins that were provided on PDA for Case Study 1 participants.

PDAs were distributed to the volunteer students with details on how to use the devices and how to complete the project feedback on their activities. The quick guide to 'How to use the PDA', separate from the guides that were included with the device contained tips and advice to start using the PDA to access course resources and recording facilities included in the device. It consisted of information on:

- o Setting up the PDA
- o Familiarisation exercises (Opening and reading from a .pdf file, Listening to an audio file, Watching a video, Making an audio recording, Using the PDA to take notes, Creating anew note, Creating a new word document)
- o Accessing course resources from the PDA
- o Hints and tips (on Closing open applications, Copying files from desktop PC to PDA, Using GPRS, Using wifi)
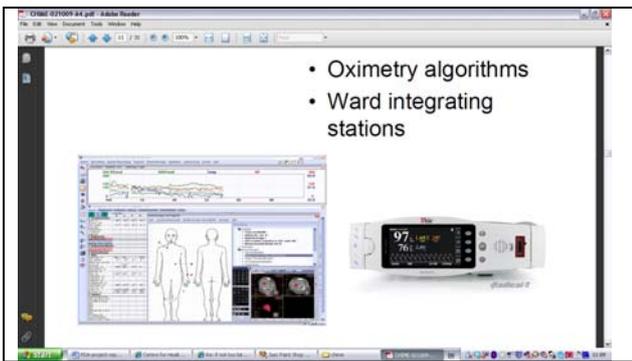

Figure 3. An example of resources provided for CHIME participants (Case study 2).

2.3 Implementation

Method: Students were asked to access the PDA resource or web-based resources and send us emails about where they where when they accessed the resources and a sentence or two on what they felt about this type of access. Email reminders were sent to participants to support their access of the resources and recording activities. Return of these accounts (preferably by email) was completed once a week for two months and only took a few minutes to complete. At the beginning and end of the project an online questionnaire was used to ask the participants to review their usage of the mobile devices for access to their learning materials.

During the course of their training, UK participants provided data with weekly emails and an end-of-project focus group; Turkey participants provided data with a couple of telephone contacts and an interview and all Turkish participants were interviewed face to face at the end of the project.

Participants: Turkish participants were all doctors working in hospitals; a professor in general surgery, a junior doctor in general surgery and a clinical fellow in anaesthesia.

UK participants were volunteers from UCL's CHIME course for NHS personnel. The UCL programme is designed around a range of learning pathways to meet the needs of students from various backgrounds and with various learning objectives. The sample for the present study contained: Clinical governance

pharmacist, 2 NHS trainee managers, Senior information analyst, Health Information Lead, and Patient information officer.

2.4 Findings

The general findings of the study can be summarised as follows:
- o Devices were used both as a learning device to help participants with their course materials and also as an organiser for their personal and professional life. During face to face interviews Turkish participants shared contents of their devices with the interviewer that contained their diaries, photos (both personal and professional), music, their .pdf files for teaching and learning.
- o Participants synchronized the PDA with their PCs and found this invaluable, particularly for storing and reading emails, and keeping calendar and contact details.
- o Participants used the devices to 'bridge' the different contexts of their learning environment (home, work) and also their personal environment. It was not used as the main medium of learning but when other opportunities were not available the portable devices provided means to keep up with study or work tasks:

Participant UK: *Today the new topics came up on Moodle. I had to take the bus to work this morning, so I checked the new topic on my PDA, I didn't do any work on it, as the bus was noisy, but I was able to familiarise myself with this weeks topic and then go through it fully on my laptop when I got home.*

- o For most of the participants it was difficult and slow to connect to the Internet via the PDA.
- o For one of the Turkish participants it was important to get medical reference information in the PDA' when and where they require'. He suggested, for example, a Drug reference book Vademecum would be extremely useful for that purpose. But he did not know if it was available as an e-book.
- o Battery life limitations were a problem for some participants in both contexts. Especially for participants in Turkey, as practicing doctors, it was important to be able to get all calls when they were 'on call'. When the battery in the PDA went flat in the middle of the day it created problems for users.
- o There were some unexpected uses of the PDAs when other means of accessing the learning resources were not available:

Participant UK: *So far, I have found it most convenient how quick and easy it is to transfer files to and from the PDA - when I am in a rush and haven't got time to finish reading a web page, for example, I just plug in the device, save the page and drag it across.*

- o Two of the UK participants compared and found that some features of the PDA were better than

iPhone (use of stylus to write, ease of working with Microsoft documents) and Blackberry (screen):

Participant UK: *Once able to read the PDFs, the screen was clear and larger than my own BlackBerry so made it easier to read documents.*

    o   Learning potential of such a device was recognized by participants in both countries.

    o   The PDAS were found to be a little outdated – big and not always synching with new operating systems.

    o   The camera was not found to be good quality by one of the users in Turkey.

Participant TR: *I was going to take a picture of varicose veins on a patient when visiting a hospital, but when offered the proper hospital camera by my colleague I accepted because it would be a much better picture from that camera.*

It is clear from these findings that health care professionals expect PDAs and similar devices to become increasingly useful. Healthcare institutions can help their employers by providing ready to use applications such as drug formularies, reference databases and schedule information. This study also showed that any support and training provided by the institution would help employers to use technology to increase efficiency. This was mainly true for Turkish participants as in the Uk technology and the applications are more 'PDA-friendly'.

3. CONCLUSION

Many studies in this area mention low use as one of the findings of clinical based PDA use. There are several reasons for this finding. One of them is the personal nature of the PDAs and similar devices. Users all have different expectations from their mobile device. If the device is provided in the context of a project, it is selected by someone else. Getting used to a device provided to you takes time. Another reason might be the fast pace of life in clinical settings and when there are better ways of communication, e.g. face to face, this is preferred. In addition, in the beginning a PDA may look like a complex and confusing technology to users who are not very experienced with technology. For that reason providing the right support and relevant applications and resources in the devices is essential.

However there are many areas where PDAs provide valuable functions for doctors and other clinical personnel and this study showed that with the correct approach and technology, real benefits in terms of accessing resources and synchronising planning and personal information can be achieved. One of the advantages of PDA is the speedy access to required knowledge and an opportunity to check for the latest medical information in a convenient way. Access to drug and medical information as mentioned some of the

participants in this study may improve patient care and will make it more efficient and time saving.

As mentioned by Turner et al (2005) "junior doctors are currently expected to carry with them at all times unwieldy reference volumes and a Dictaphone, all of which could be replaced with a single PDA." (Turner, Milne, Kubitscheck, Penman & Turner, 2005; p.216) and they aim to address in their future work to focus on meeting junior doctors' information access needs with PDAs. The current project echoes the findings from Turner et al study and we agree that reference information in PDAs is a very accessible aim that would make life much easier for junior doctors.

4. ACKNOWLEDGEMENTS

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