

The use of Personal Digital Assistants in Nursing Education

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Interprofessional E-Learning and Collaborative Work: Practices and Technologies

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Chapter 26

The Use of Personal Digital Assistants in Nursing Education

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ABSTRACT

The use of Personal Digital Assistants (PDAs) and smartphones (combined mobile telephone and PDA) in Nurse Education is a relatively new development, in its infancy. The use of mobile technologies by health care professionals is increasing, and it seems likely to accelerate, as mobile information and communication technologies become more ubiquitous in wider society. The chapter reports on a small-scale feasibility study to evaluate the practicalities of supporting student nurses on their first clinical placements with PDAs that have been pre-loaded with reusable e-learning objects. The student nurses generally found the PDA easy to use and carry on their person, valued the availability of the reusable e-learning object on their clinical placements and called for more of them to be made available to learners.

INTRODUCTION

Clinical Nurse Tutors face the challenge of managing large numbers of students in clinical skills sessions, when demonstrating and practising skills acquisition, including interprofessional working. This involves maintaining accurate and fair assessments of individual performance that may later serve as evidence of safe practice for their clinical placements. There needs to be a means of continuing this supportive learning environment,

in the transition from simulation to reality, to ensure the bridge from theory to practice is strong.

Ideally, to enhance learning and support development of decision-making skills, students should have access to information at the moment and the physical location where it is needed. In relation to this, a major aim of pre registration nursing programs is to assist students to attain competencies for practice, for example, in the use of the tools and technology associated with nursing. Healthcare professionals need to continually update knowledge and skills, in order to enhance their clinical practice and professional develop-

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ment. Similarly, student nurses in any speciality must get into the habit of continually becoming familiar with the latest practice recommendations, such as guidelines for preventing the spread of infection and standards from regulatory agencies.

Using the world wide web can help meet these needs, given that anyone can publish web-pages that are then available instantly across the globe. Information published on line offers advantages compared to text books and journal articles, which are often outdated by the time they reach publication and distribution. However, up to 2003, connection to the internet was typically on either a desktop or laptop personal computer. Since that time, pocket-sized personal digital assistants (PDAs), also known as palmtop computers, with wireless access to the World Wide Web have become available.

The first PDA, the Apple Newton MessagePad, was launched in 1993. In 1996, Nokia introduced the first mobile telephone with full PDA functionality (a genre known as ‘smartphones’). However, early PDAs relied on wired connection to networked desktop or laptop PCs, until the launch in 2003 of the Hewlett-Packard iPAQ H5450. This was the first PDA featuring built-in Wi-Fi for connecting to wireless computer networks and the World Wide Web. In 2009, the majority of PDAs sold are Wi-Fi enabled smartphones, for example, the RIM Blackberry, the Apple iPhone and the Nokia N-Series. It is argued in this chapter that the Personal digital assistants (PDAs) and smartphones can enable nurse educators can incorporate into the curriculum opportunities for students to develop critical approaches, and also introduce information technology as a tool in clinical decision making. This will serve as a foundation for using mobile computing technologies later in their careers.

This chapter describes a small-scale feasibility study in which the practicalities of using smartphones to support the undergraduate nursing curriculum programme at a UK University were evaluated. The students who participated were

drawn from all branches of nursing, and were in their first year of nurse training.

BACKGROUND

In the mid-1990’s the World Wide Web radically changed the possibilities of our information landscape, and simultaneously became available to users of pocket-sized hand held computing devices such as Personal Digital Assistants (PDAs) (Murphy 2005). Even so, the use of PDAs in nursing was rare until comparatively recently. The Cumulative Index to Nursing and Allied Health Literature (CINAHL) has had a subject heading for PDAs (“Computers, Hand-Held”) since 1997, while the National Library of Medicine first used the term “Computers, Handheld” in the Medical Subject Headings (MeSH) in 2003.

Discussions in the early articles focused on theories of informatics and technology. More recent articles indicate that PDAs are in wider use (De Groote, 2004), for example in nursing practice and student education. Interestingly, the Medical professions have written most of the literature on PDA use in health care, and it is clear that as a group they are very interested in this. Members of other health care disciplines also demonstrate interest in using PDAs (De Groote, 2004). The integration of personal digital assistants (PDAs) into health care delivery continues to grow; and health professionals are adopting PDAs faster than the general public (Stolworthy et al., 2000).

However, there has been little evidence that PDAs improve patient care (Fischer, 2003). PDA use by healthcare professionals tends to be in the context of on everyday routine. Many use their PDAs as a diary or address book, rather than as a knowledge base (Criswell & Parchman, 2002). Considering these facts, it might be argued that the use of PDA s has not been fully understood or its full potential recognised by health care professionals. However, the PDA can be considered a new learning tool, offering the potential to keep

healthcare professionals up to date with developments in evidence based practice, and having potential to help nurse educators meet students' educational needs, as will be seen.

There is emerging evidence of PDA use in graduate nurse education as well as undergraduate nursing programs (Thomas et al., 2001). There have been accounts of how various institutions have used PDAs, for example, Huffstutler (2002). While university libraries have been known to provide information and support to students who use PDAs, many health care programs making use of PDAs seek help from institutional information technology department instead (Young, 2002).

The incorporation of information and communication technologies into nursing practice and education by student nurses and staff is potentially challenging, particularly on their clinical work placements. To meet the healthcare needs of today's society, student nurses are expected to demonstrate compassion when providing patient care. However, reduced time for patient contact may have eroded their ability to do so. It has become clear that increasing staff workloads have increased while staffing levels have decreased in the clinical setting (Aston & Molassiotis, 2003). Simultaneously, nursing curricula are forever evolving, introducing new ways of learning and new learning technologies, partly in response to the challenge of accommodating increasingly large student cohorts.

When student nurses go on clinical placements, teaching in the ward area is guided by both time and space limits. In light of nursing shortages, teaching that takes place at the patient's bedside is not always possible, and it is becoming more difficult to take students away from the ward area to train them. Thus the students' educational needs are not always reliably met within the current context of patient care settings. Nursing educators can usefully integrate technology as a means of support to student's learning and to prepare the new generation of nurses as independent learners.

Pre-registration nursing programmes aim to assist undergraduate students to attain competencies for practice, including interprofessional working, and the earlier these skills are introduced the better. Nurse tutors need to constantly review areas where information and training gaps exist, to highlight where nurse mentors at clinical placements and university-based tutors can play a larger part in training and preparation, both before and during students' clinical placements. In the case described here, a need was identified for first-year undergraduate students on their first clinical placements to have access to learning materials and resources at the moment they are needed, to enhance learning and support development of practical clinical skills (Huffstutler, 2002). In the feasibility study reported in this chapter, tutors responded to these pressures by developing a way to meet students' individual learning needs and styles.

The Use of PDAs by Student Nurses

The evidence discussed in the preceding section of increasing adoption of PDAs by healthcare professionals suggests that PDAs can be considered as if any other piece of healthcare equipment. It is arguable that nurse educators should begin to introduce PDAs to student nurses, given the importance of providing opportunities for students to become familiar with PDAs as a tool for clinical skills development. Both tutors and students are more likely to learn to use PDAs effectively through consistent use in both clinical and classroom settings. However, it was seen in the preceding section that there is currently limited literature addressing use of PDAs in the nursing curriculum, and it appears that their educational potential in clinical settings is relatively unexplored.

The preparation of student nurses will always involve the development of clinical skills at the patient bedside, therefore quick and easy access to information is needed, not only in the skills laboratory but also in clinical practice. PDAs can operate as if electronic text books to help student

nurses manage the information they need to learn. In the past, when students had queries about practical skills, they would turn to textbooks for answers, often having to find relevant volumes. This can be very time consuming, when there are so many clinical skills to learn, not to mention the problem of carrying heavy books to clinical placements. A PDA can enable student nurses to retrieve information in the clinical area quickly and easily, conserving precious learning time (Koeniger-Donohue, 2008).

PDA's can provide nurses with portable access to extensive reference materials as well as other organizational resources and time saving benefits. This can be in the form of reusable e-learning objects accessible from a central point by an entire cohort of students. The experience of learning from a PDA potentially offers students an opportunity to revisit at will any practical skill and reflect on their interpretation and understanding of it, so knowledge is accumulated and transferred into an individual's own understanding (White et al., 2005). This way of learning alongside other supportive mechanisms promises an enriching clinical experience for the student. This is especially relevant when mentors are busy with heavy workloads and staffing has decreased due to cut backs in the economy (Yonge et al., 2002), and ward areas are as a result struggling to meet the educational needs of student on clinical placements.

The ultimate goal of nurse educators is to develop competent and passionate student learners, who feel supported in transition from academia to clinical practice. PDA's can be a powerful tool that 'holds the hand' of trainee nurses when reassurance is needed. This could help reduce students' stress, which has been found to lead them to miss work shifts or abandon their studies (Timmins & Kaliszner, 2002). However, handheld devices must fit into the ward routine, and not be perceived as extra work, or as interfering with the nurse-patient interaction or nurse mentor relationships. The question of the practicalities of PDA's on clinical

placement required investigation before tutors at the university in which the case study reported in this chapter took place could decide whether to invest time, effort and money in their adoption as learning tools.

Feasibility Study: Knowledge in the Palm of your Hands

In 2008, a small-scale feasibility study was undertaken at Coventry University to examine the fundamental practicalities and issues surrounding the use of hand held devices (PDA's) by first year student nurses on their first clinical placement. It was thought that by creating reusable learning objects covering relevant skills and competencies and loading them onto a PDA, student nurses from any branch of nursing can practice the skills and competencies in the clinical room, were their mentor unavailable.

The student nurses can gain confidence and requisite background knowledge prior to the hands-on portion of their learning, saving the mentor time to work toward mastering these skills. The student nurse can then move to the patient bedside to gain the crucial supervised practice required to successfully and safely perform clinical skills. While the learning object used in the study was not explicitly designed to promote interprofessional learning, this was appropriate, give the aims of the feasibility study to explore the fundamental practicalities of smartphones on clinical placements. It is worth briefly outlining the nature of the learning object, however, and considerations that were taken into account to conduct a fair trial of the PDA.

The reusable e-learning object was designed to make the learning experience personally relevant and meaningful, related to unambiguous skills that students had previously learned in the skills laboratories run in face-to-face university-based teaching. This was so the nature of its content did not distort the students' smartphone use by being perceived as irrelevant or too challenging

in its content matter. It comprised a “teachable moment” that was developed by nurse educators at the University into a reusable e-learning object that depicts a generic clinical skill for all branches of nursing, a hand-washing technique known as the ‘Ayliff procedure’ (Ayliffe, 1992). The resulting reusable e-learning object features a set of film clips that demonstrate and explain the Ayliff procedure (Gould, 2008), and was loaded on to each smartphone, enabling the participants to take it into their clinical practice placements.

The issue of using smartphones in a clinical area was discussed with an infection control nurse. It was decided that students should not use smartphones at patients’ bedside and only in a study area. Thus it was explained to the participants that as an infection control precaution, smartphones were only to be used in the study room in the clinical area, and never at patients’ bedsides. Ethical approval for the study was sought from the University ethics committee, and was duly granted.

Methodology

PDA Choice

To ensure that the PDA has a long service life, given the capital investment necessary for their purchase, the best choice of product needs to be considered carefully. Having a standard device was crucial, and one that is simple to use by all. Basically, there are two operating systems: the ‘Palm’ System and the ‘Pocket PC’ System. This study used a smartphone running the palm operating system. It was found by the course tutors that this operating system has the advantage of simplicity and ease of use. Smartphones are becoming as popular as ordinary mobile phones, which most students already possess, thus it was thought that the students would be more likely to adapt to a smartphone rather than a pure PDA.

It is worth noting that there is also a learning curve for the tutors involved. It was important that the research team had access to the log in

information, so they themselves could not be ‘locked out’ of the smartphones. Preparing the smartphones for use is time consuming, in that reusable e-learning resources must be loaded onto each one. However once loaded the data are stored permanently.

Participants

The sample comprised eighteen female students volunteers from a cohort of 215 students, as the researcher only had funding for twenty smartphones. The students were from the first year of a pre-registration nursing program that ran in January 2008, covering all four branches of nursing; adult, mental health, child and young persons, and learning disabilities. They were about to go on their first clinical placement, and they were to visit different types of placements, hospital based and community. It was considered important that the participants expressed an interest in the use of such technology, as should any technical hurdles become apparent while the students are on placement, they would have to solve them with only telephone or email support from the researchers.

Ethical Briefing of Participants

The project was introduced to the students during one of their initial lectures, and a participant ethical briefing sheet was distributed. The briefing explained that each participant would be asked to complete both a pre- and post-placement questionnaire to evaluate the use of the smartphone, that they had the right to withdraw from the study at any time, and that their responses would be anonymised and pooled, then statistically evaluated and published. Students read the information and asked any questions, and those who were interested signed up to participate. A further date was arranged for those who signed up to meet with the researchers and learn how to use the smartphone and discuss the project further, after which they signed the necessary ‘consent to participate’ forms.

Training for Smartphone Use

The smartphone is a tool that a student must learn to use effectively, just as they would a medical tool such as a tympanic thermometer or sphygmomanometer. Clinical Skills are developed through consistent practice in the clinical skills laboratory, and similar techniques can be used to familiarise individuals with a smartphone.

To these ends, the participants were invited to a workshop on how to use the smartphone. This session provided hands on experience, in a structured supportive environment. Each student was briefed about how to use the smartphone and provided with an instruction leaflet, and was then shown how to log into the device. They were briefed that after their twelve-week placement had finished, they were to return the smartphone to the researchers. It was also explained that as an infection control precaution, the devices were only to be used in the study room in the clinical area, and never at patients' bedsides.

Getting started with a PDA is like learning any other new skill. A positive attitude, practice and willingness to make mistakes will help to overcome initial unfamiliarity. The students were thus asked to keep the smartphone in their coat pocket or work bag while in placement, so as to have the reusable learning objects available whenever they felt they needed to review the handwashing technique. The students were reminded that they were not alone. A contact number for the researchers was provided, in case the participants needed technical support. They were also made aware that they were effectively in a networking group with other students in the placement using the same device.

Pre-Placement Questionnaire

The students next completed a pre clinical placement questionnaire. Its purpose was to gather information about their general familiarity with information and communication technologies, and

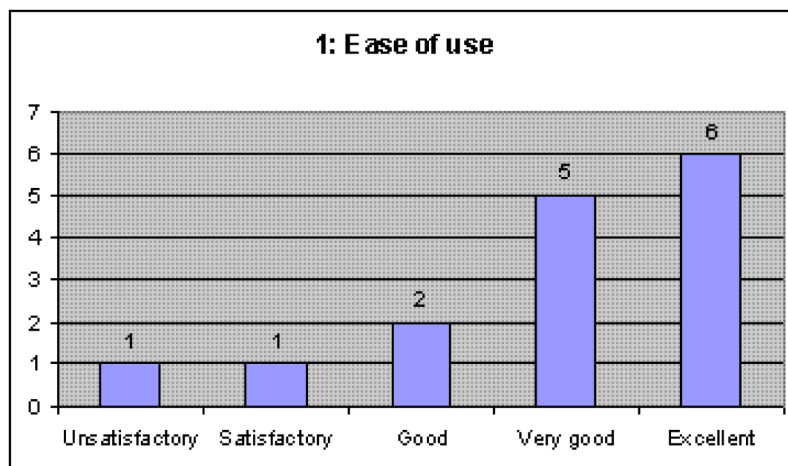
any learning resources they had used so far in their training for the hand washing technique. It was found that the majority of participants owned a mobile phone. Furthermore, nine of the eighteen participants possessed PDAs of their own, and were familiar with the function and layout of these devices. All students seemed keen to participate in the project, and did not appear worried about using the smartphones.

The main learning resources that the students had used prior to clinical placement were clinical skills laboratories, online learning, handouts/leaflets, Objective Structured Clinical Examinations and Clinical skills tutors. Objective structured clinical examinations are used as a form of assessment of clinical skills at the beginning of the nursing curriculum. Students found clinical skills laboratories and open laboratories the most effective way of learning the hand washing technique. The majority of participants found pictorial presentation, continual practice of the skill and memory aides the most effective ways of remembering the eight-step hand washing technique. Some felt that they needed reminders of these steps, not only in the skills laboratories but in clinical practice placements.

The participants felt that, pre-placement, they were able to demonstrate the correct hand washing technique, and would practice further to become proficient at this clinical skill. The participants were then asked to comment upon the least effective method of learning. The majority stated that the least effective was learning from textbooks and from previous practical experience before entering the nursing course. It could be argued that textbooks offer abstract experience, not 'hands on' concrete experience, and that previous care experience may not have taught the most up-to-date technique.

Finally the students were given the option to state their Objective Structured Clinical Examination (OSCE) score on the pre- placement questionnaire. All OSCEs include the assessment of hand washing. All of the participants in the

Figure 1. Overall ease of use



sample indicated that they had passed the year one OSCE, however, some chose not to record their actual score on the pre-placement questionnaire.

Post-Placement Questionnaire

Each participant then took their smartphone into their first clinical placement, and twelve weeks later returned from their placements to the University for the theoretical component of their course. At this point, each participant completed a post-placement evaluation questionnaire, so that their thoughts and experiences on using the smartphones while on their placements could be evaluated.

The questionnaire comprised eighteen likert scale questions and answer options in three 'blocks' of questions. The first block covered the usability of the smartphone. The second covered the educational effectiveness of the reusable e-learning object. The final block covering the participants' feelings about the value of using the learning objects and smartphone on placement. The data of interest in this account are the first and third question blocks, which dealt with the usability of the smartphone, rather than the block covering the reusable e-learning object

itself. This is partly because the latter was not explicitly designed to promote interprofessional learning, but mainly because this chapter seeks to examine the practicalities of mobile learning on clinical placements.

The scores on each question for each participant were entered onto a MS-Excel spreadsheet, and the number of participants choosing each response option for each question were summed and then entered onto bar charts that summarised the overall results for each question. The measure of central tendency is the modal response, the response option chosen by the greatest number of participants. The findings are presented below.

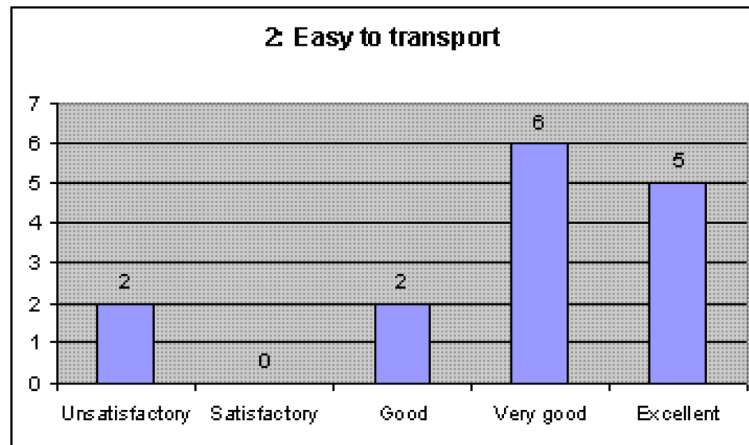
Q1: Overall Ease of Use

Thirteen of the eighteen participants rated the overall usability of the smartphone 'good' 'very good' or 'excellent'. The central tendency, the mode, was six participants who agreed with the latter (see Figure 1).

Q2: Smartphone Portability

Thirteen of the eighteen participants rated the portability of the smartphone 'good' 'very good'

Figure 2. Smartphone portability

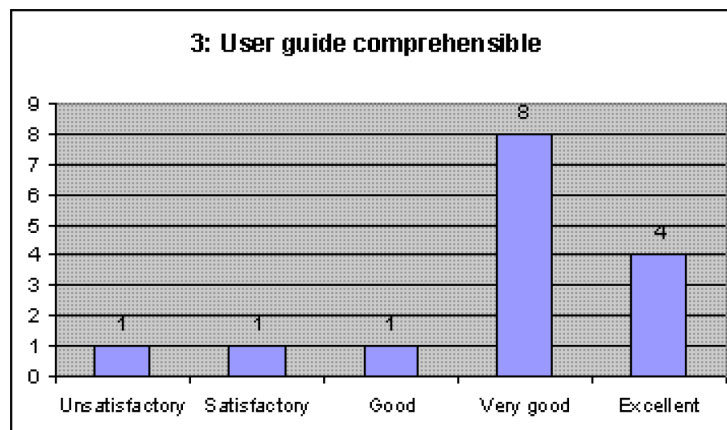


or 'excellent'. The central tendency, the mode, was six participants who agreed that the smartphone was 'very good' in this respect (see Figure 2)

Q3: Comprehensibility of the Smartphone 'User Guide'

Thirteen of the eighteen participants rated the user guide to the smartphone that was provided by the researcher to the participants as 'good' 'very good' or 'excellent'. The central tendency, the mode, was eight participants who agreed that the user guide was 'very good' in this respect (see Figure 3).

Figure 3. Comprehensibility of the smartphone 'user guide'



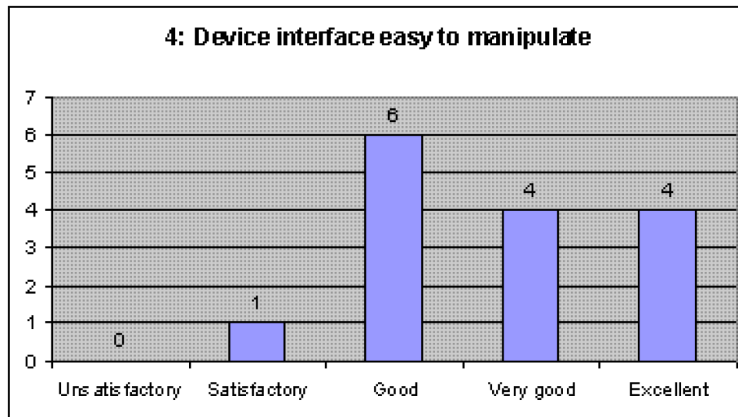
Q4: Device Interface Usability

Fourteen of the eighteen participants rated the ease-of-use of the smartphone user interface as 'good' 'very good' or 'excellent'. The central tendency, the mode, was six participants who agreed that the smartphone was 'good' in this respect (see Figure 4).

Q5: Smartphone Battery Life

Ten of the eighteen participants rated battery life (the time between recharges) of the smartphone

Figure 4. Device interface easy to manipulate



‘satisfactory’ or ‘good’. The central tendency, the mode, was seven participants who agreed with the latter (see Figure 5).

Q6: Smartphone Usefulness in the ‘Clinical Area’

Ten of the eighteen participants rated the usefulness of the smartphone in the ‘clinical area’ as ‘satisfactory’ or ‘very good’. The central tendency, the mode, was six participants who agreed with the latter (see Figure 6).

Questions eight to twelve focus on the learning object itself. As has already been discussed,

it is felt more appropriate to focus on the delivery technology and the practicalities of its use. This is in part because the learning object was intended for cross-professional use, rather than one which explicitly promotes interprofessional learning. For these reasons, the next question to be examined is number 13.

Q13: Reflection on Learning

All 18 participants tended to agree that using the smartphone on clinical placement enabled them to reflect on clinical skills, with no ratings of ‘unsatisfactory’ given. The central tendency, the

Figure 5. Smartphone recharging frequency

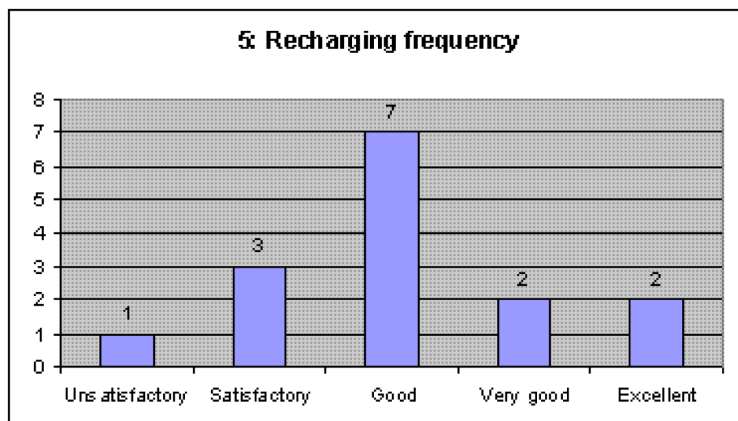
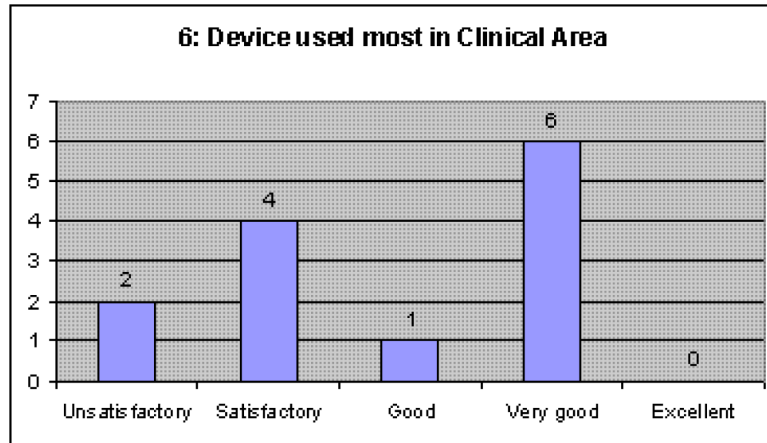


Figure 6. Smartphone use in the 'clinical area



mode, was six participants rating the smartphone as 'excellent' in this respect (see Figure 7).

Q14: Smartphone Enhancement of Learning

Fourteen of the eighteen participants rated the way the smartphone enhanced independent learning as 'satisfactory', 'very good' or 'excellent'. The central tendency, the mode, was eight participants agreeing with the latter (see Figure 8).

Q15: Smartphone Facilitates Flexibility of Learning Place and Rime

Fourteen of the eighteen participants rated the ability of the smartphone to facilitate flexibility of learning place and time as 'satisfactory' to 'excellent'. The central tendency, the mode, was nine participants agreeing with the latter (see Figure 9).

Figure 7. Reflection on learning materials

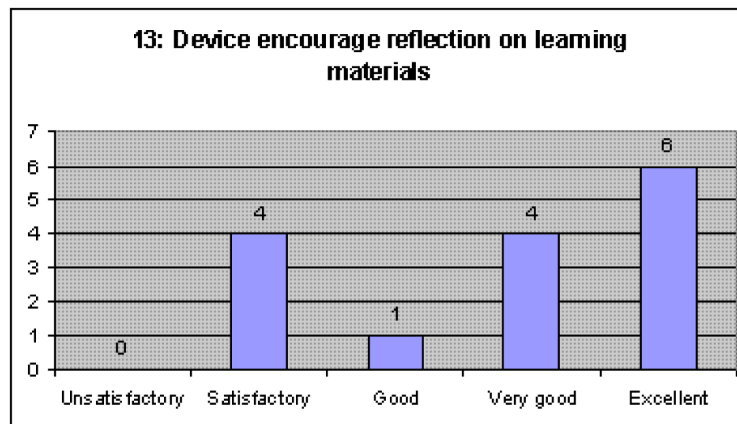
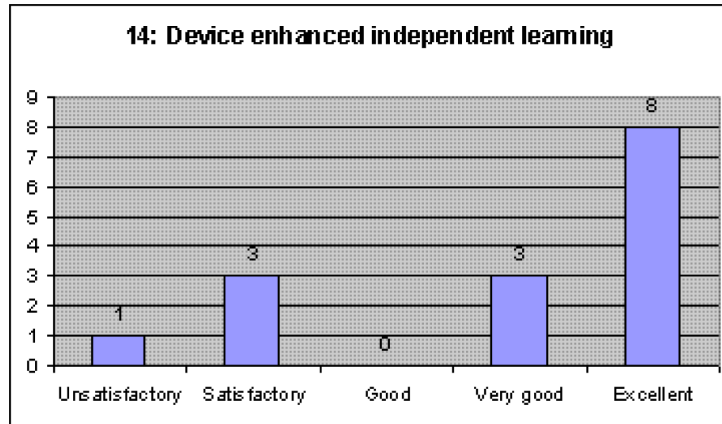


Figure 8. Smartphone enhancement of independent learning



Q16: Mobile Learning Accommodates Individual Learning Styles

Thirteen of the eighteen participants rated the ability of mobile learning to accommodate individual learning styles as ‘satisfactory’ to ‘excellent’. The central tendency, the mode, was five participants who agreed that mobile learning was ‘very good’ in this respect (see Figure 10).

Q17: Mobile Learning Sustains Individual Learner Motivation

Thirteen of the eighteen participants rated the ability of mobile learning to sustain their motivation to learn as ‘satisfactory’ to ‘excellent’. The central tendency, the mode, was seven participants who agreed that mobile learning was ‘excellent’ in this respect (see Figure 11).

Figure 9. Smartphone facilitates flexibility of learning place and time

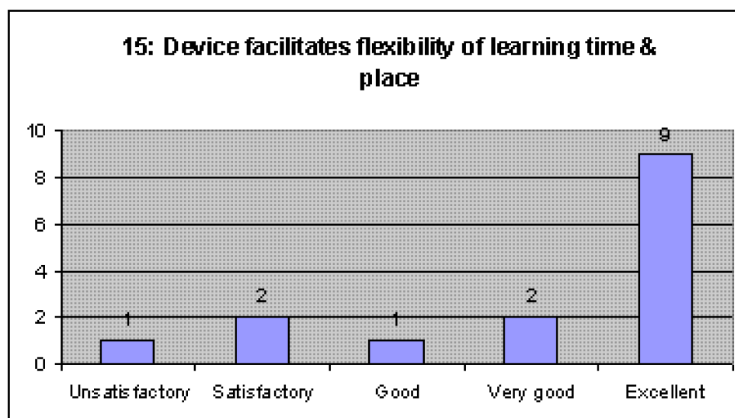


Figure 10. Mobile learning accommodates individual learning styles

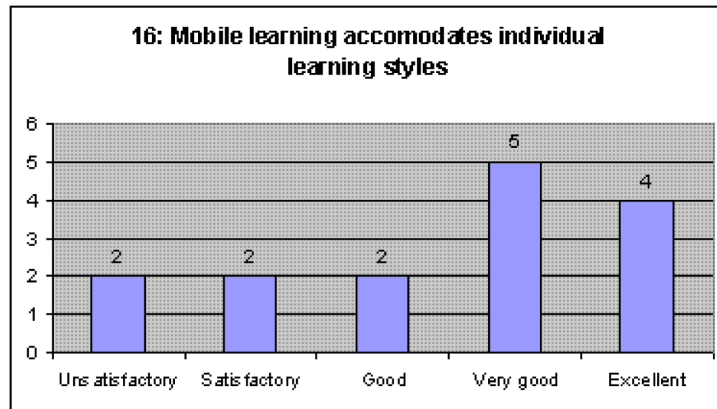


Figure 11. Mobile learning sustains learner motivation

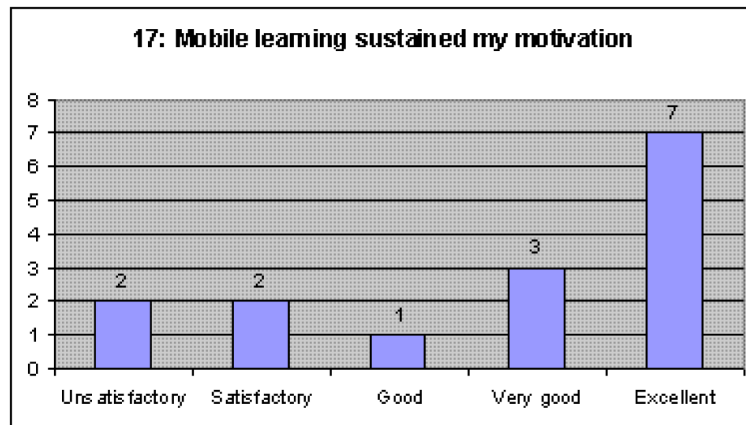
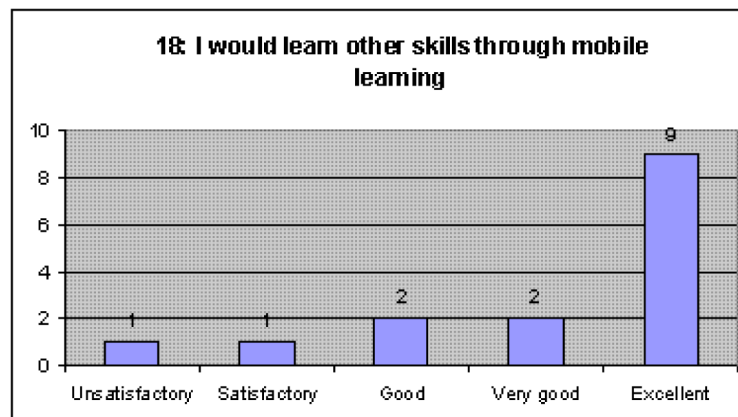


Figure 12. Willingness to engage in mobile learning again



Q18: Willingness to Engage in Mobile Learning Again

Fourteen of the eighteen participants rated their willingness to engage in mobile learning again as 'satisfactory' to 'excellent'. The central tendency, the mode, was nine participants who agreed that mobile learning was 'excellent' in this respect (see Figure 12).

It is interesting to note that many students made comments that indicated they wanted more smartphone-based learning and learning objects, as the selected quotes below clearly demonstrate:

happy to do more learning supported by a mobile device in the future

It would have been good to have all the clinical skills sessions on a device, the Aseptic technique especially

DISCUSSION

The small-scale feasibility study reported here provides evidence that smartphones pre-loaded with reusable e-learning objects are a useful and practical means by which to support student nurses on their first clinical placements. Opportunities do not always arise in the clinical area to practice certain skills, this study strongly suggests that the smartphone can act as a back up mechanism. It thus seems reasonable to conclude that nurse academics and hospital trusts can use such mobile information and communication technologies to take a more proactive approach to bridge the theory-practice gap.

The students in the study felt that a smartphone pre-loaded with reusable e-learning objects facilitated independent learning. It seems plausible to imagine that their use may facilitate the phenomenon whereby students retain a higher

percentage of knowledge when they learn at their own pace (Nelson 2003). In addition, Students who for whatever reason had no opportunity to attend the clinical skills sessions offered will not lose out. There are however organizational and technical barriers to the large-scale adoption of PDAs or smartphones, and they will now be discussed briefly.

Change Management

Moving towards supporting collaborative learning with PDAs and smartphones requires consideration of not only the student's learning needs, but also those of their tutors and mentors, as well as the circumstances of their clinical placement. It must be remembered that clinical Staff are not always technical experts, and they are primarily concerned with providing patient care under tight time constraints. Imposed changes in work habits may be met with resistance from staff and students. It is important that these barriers are considered before any introduction of handheld devices in the clinical area.

One possible barrier to student nurses' use of PDAs is lack of knowledge of how to use them. While the majority of the participants in the feasibility study reported in this chapter owned a mobile telephone, not all individuals have grown up with mobile technology, for example, students returning to study aged over forty years. It could also be argued that the nursing culture has not encouraged nurses toward information and communication technology use either. Furthermore, training that enables students to use new technology takes time; time that is taken away from patients.

For PDAs to be successfully integrated into their education, it should be explained to student nurses why they should be using them, what they can offer, which models to buy, and how to operate their PDA applications. The value of introducing mobile computing devices to students early in their education has been recognised for some time (Thomas et al., 2001). Nurses are skilled in

information management, routinely collecting and organizing data. Tutors can explain that by using a PDA that has relevant electronic resources uploaded onto it, nurses will find answers in their hands, not at the nurses' station. It can be explained that PDAs can bring benefits such as increased productivity, reduced errors, better patient care, and increased worker satisfaction (Huffstutler et al., 2002). All nurses need to network with other nurses to share information, to assist in research, provide and receive mentoring, emotional support, and friendship. PDAs can play a role in many of these areas, thus their adoption can be justified in these terms.

PDAs can also be a means by which to help health care staff stay abreast of new information about clinical skills and support mentors in their teaching role. It follows that the information on the PDA will need continually updating, as evidence based research changes as fast as technology. However, it is possible that, nurses can support PDA development by creating their own learning resources. The creation of learning objects that meet the needs of nursing students on placement and reflects and supports previous learning in clinical skills laboratories can itself be incorporated into the curriculum as a reflective learning exercise.

FUTURE DEVELOPMENTS

The feasibility study reported in this chapter involved a small sample of eighteen students, due to only twenty PDAs being available. While sufficient to demonstrate the feasibility of PDAs on clinical placement, however, it is too few for a thorough evaluation to be made and firm conclusions to be reached. Furthermore, the participants put themselves forward on the basis that they had an interest in using information and communications technologies. It is quite possible that those who chose to participate were eager to have access to as much help as possible, whereas those who

did not may have been too anxious about using new technology.

Further action research can shed light on these questions, which has implications for the possibilities of scaling-up the use of PDAs in nurse education. The next developmental step would be to develop and evaluate a core online repository of PDA-ready reusable e-learning objects to satisfy the needs of students on placement. Of particular interest would be the value of this approach as a means to support the development of interprofessional working in students on placement.

This would require a set of reusable e-learning objects that explicitly promote and explore inter-professionalism, rather than a generic skills object that is essentially cross-professional rather than interprofessional in nature. On the other hand, cross-professional e-learning objects can form the basis of interprofessional learning if used as discussion triggers between students from different professional groups, for example, nurses, medics, occupational therapists, dieticians and social workers. The inherent potential for communication through smartphones with Wi-Fi internet capability opens interesting possibilities in this regard. For example, online discussion boards are already available to the students of the university where the feasibility study was conducted through the interprofessional learning module that all healthcare students, regardless of their professional pathway, must undertake.

CONCLUSION

Student and practicing nurses are likely become more familiar with handheld technology in their daily lives as these technologies become more ubiquitous in society, and such devices are likely to become more prevalent in the workplace. In the near future, it is thus likely that nurses will be increasingly open to the use of handheld technology to enhance nursing research and nursing practice.

PDAs open the possibilities for effectively delivering educational material that is always available at the point of need, regardless of an individual's physical location, as long as its use does not compromise infection control. The clinical mentor is supported during busy times, as students can use this as an intermediate measure. Learning can take place at any time and place, with one or multiple users, providing great flexibility and ensuring work coverage.

The results of the small feasibility study described in this chapter indicate that most of the students participating in the study were comfortable with this approach to mobile learning, finding it useful and calling for greater use of PDAs. The findings demonstrate that this approach is a feasible way to enable universities to meet students' individual needs to be on-demand while they are on clinical placement.

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