M-Fieldwork for Information Systems Students

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Abstract

Fieldwork has long been identified as providing students undertaking professional studies with a means of implementing theory into a real world context. In recent years some educators, particularly in the health sciences, have introduced mobile devices to support students' fieldwork learning. In many ways there is a natural link between fieldwork and mobile technology. In this paper we report on a trial to introduce mobile support into the study of information systems in the field. The experience showed that mobile devices can assist students collect data in richer, multimedia formats and make subsequent classroom presentations of their field study much more interesting. However, it also revealed certain usage and deployment issues with the mobile devices themselves which have implications for device selection and educational design.

1. Introduction

Degree programs aimed at preparing students for the professions have for many years included work experience components. These may be in the form of short fieldtrips ranging from ½ day up to a week or more, or extended professional placements in the workplace for 1 or 2 semesters' duration. Both field trips and work placements have the advantage of allowing students to apply classroom theory to real-life situations and of aligning their knowledge with their future work environment. Learning becomes situated in the context of a "time and location, … the learner's trajectory, goals and motivation, the surrounding resources, co-learners, and other available conversants" [13].

Field-based learning encourages curiosity, motivation, group interaction and enjoyment of the outdoors [7]. Fieldwork is one way of improving effective learning and raising learning retention, particularly if it is "active", where learners participate in observations and recording, rather than passive fieldwork where students watch the teacher [7].

Moreover, fieldwork provides many of the elements of experiential learning. The central tenet of this learning theory is that the active experience of the learner should be uppermost. It embodies a move towards "a more participative, learner-centred approach, which places an emphasis on direct engagement, rich learning events and the construction of meaning by learners" [1]. Modern experience-based education owes much to David Kolb and his experiential learning cycle with its movement from concrete experience, to observation and reflection, abstract conceptualization and finally generalization of knowledge to new situations [6]. The student's experience and cognition during and after fieldwork provides deep learning – an orientation towards understanding, personal sense-making and active learning – which will achieve better learning outcomes than the surface approaches of memorization, reproduction of knowledge and lack of personal engagement which typify the traditional didactic model of education [10] [8] [11].

More recently there has been a shift to integrating field-based experiential learning with mobile technology. Some teachers, particularly

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those working in medicine and nursing, have begun experimenting with personal digital assistants (PDAs) and other devices. In many ways there is a natural link between fieldwork and mobile devices, which can act as powerful support tools in most environments. Such tools need to enable students to capture and recall data and events, integrate information from different sources, help solve problems in the world, and "augment conversations" by providing learners with a way to communicate, collaborate and share information [13].

In this paper we report on an investigation to extend the use of mobile-supported fieldwork (m-fieldwork) to a discipline which has not, to our knowledge, used mobile devices in educational fieldwork before, despite its considerable expertise in mobile technology. The case involved 340 students enrolled in an introductory information systems (IS) subject delivered by a Faculty of Information Technology (IT) in the first semester of their first year of study. The students used PDAs and other mobile devices to capture data about information systems in use outside the laboratory. The data was then used in classroom presentations. The main learning objective of the exercise was to get students very quickly interested in, and thinking about, information systems early on in their study. Fieldwork was chosen in preference to investigations in the artificial environment of the laboratory as a way of forcing students to consider the complexity of systems in their context of use. It was believed that this would provide a richer learning experience.

This paper begins with an overview of the literature on the use of mobile devices to support students undertaking fieldwork. Details of the deployment of mobile technology in the IS subject are then given, followed by a description of the methods used to evaluate the educational trial. The findings are presented and these are discussed, before finally outlining proposals for future directions in this area.

2. M-Fieldwork Literature

Case studies of m-fieldwork in education show three primary uses of the technology (see Figure 1). Firstly, the multimedia capabilities of many mobile devices – phones, PDAs and digital cameras – can capture data in a range of formats, including sound recordings, video, photographs, text and GPS co-ordinates on a map [12]. Secondly, as PDAs have acquired the power of many desktop computers, they can be used to store reference materials in text form, or libraries of video clips for quick consultation in the field [15]. Thirdly, mobile phones and PDAs are being used as communication tools to keep students in contact in the field, allowing them to telephone or SMS their teachers or other students [14]. Of these three uses, it is the first that has been the main focus of the trial described in this paper, with students capturing data in various forms during their field study.

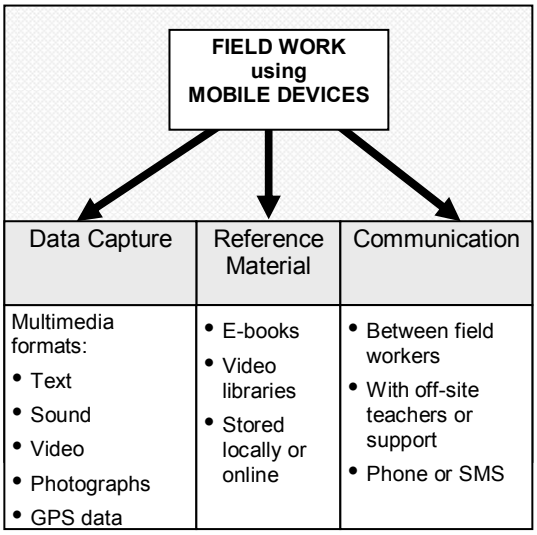

Figure 1: Uses of M-Fieldwork Technology

The reported examples generally show this application of technology is in an exploratory stage, with many challenges still to be resolved. One of the main issues shared with most other educational applications of mobile technology – with the exception of podcasting, which has been implemented on a large scale in some universities – is that it is usually based on short-term projects rather than a long-term embedding of the technology into the core curriculum [16]. This is probably due to the untried nature of the application of the technology to the educational context, but also a result of the cost of the hardware and usage charges billed by telecommunications providers. Most case studies have been funded by one-off grants or small loans [16]. Sustained large-scale implementation – for example, to supply all field-work students in a degree program with PDAs with Internet connection – would require a substantial investment which is probably beyond most universities financial capabilities. Investigation of low-cost solutions to m-fieldwork remains a top priority, and was also a concern of this study. Low-cost solutions include the need to research

the factors which influence students' willingness to use their own devices.

Many examples of m-fieldwork in the educational setting come from the health sciences, usually from projects with medical students, but also from students of nursing, pharmacy and occupational therapy [15]. The substantial investment in healthcare and healthcare training has supported their implementation. The Knowmobile was a Norwegian project aimed at providing medical students with just-in-time knowledge access via PDAs [14]. The knowledge was necessary for their on-the-job training in hospitals and G.P.s' surgeries, as well as at home and while commuting to their workplace. Although students were eager to use the PDAs, they did not find them useful for accessing the on-the-job information resources they needed or for collaborative work.

The usability of the Knowmobile project devices compared poorly with the usability of reference books and other established information sources. For example, webpages did not adapt well to the PDA screen size, and a specially prepared medical e-handbook did not support quick interaction and was thought inferior to the paper-based handbook. There are particular challenges with designing mobile technology for fieldwork because of limited attention capacity of users in motion, the challenges of working outdoors and the need for high-speed interactions [9].

Technical issues also were an impediment in the Knowmobile project, with slow downloads of webpages and delays in receiving messages from a collaborative m-learning messaging service. In addition to usability and performance issues, the high quality of the communication infrastructure in the hospitals, such as a rapid paging service, availability of PCs and SMS via mobile phones, competed with the PDAs and was a third factor in their non-use. This experience might suggest that PDAs may be more suited to the first of the three uses described at the beginning of this section (capturing data using its multimedia capabilities), and less suited to the two others (accessing reference material in the field and keeping students in contact with others). This helped confirm the direction chosen in our study, which focuses on data capture.

Another PDA health training case study in the UK showed similar issues, particularly with regards to usability of a foldable keyboard for typing and a range of performance issues, some of which were corrected half-way through the training period [5]. The devices were used for further training of existing health workers both to access online references and log patient details and learning reflections. After six months the typing of the reflections was abandoned in favour of traditional handwritten learning diaries. However, the software was re-written to improve performance, and the performance problems associated with accessing online resources were removed by installing electronic medical reference books on the PDAs. Despite this, a major problem was poor user acceptance. The researchers concluded that time and proper user support are necessary for mature professional learners to absorb the new technology. This should include a dedicated m-learning trainer to provide ongoing, personalized support in jargon-free language. Their experience showed that the "provision of an expensive hi-tech device is not enough of a benefit in itself, as the novelty of having a new gadget soon wears off" [5]. This study suggests again that accessing online reference material in the field has many problems, and that multimedia formats are preferable to text for capturing data. Students in our study were therefore encouraged to take photographs, as well as record videos and sound, during their fieldwork.

Some other studies come from the area of childhood education. HandLeR was a prototype Handheld Learning Resource developed to extend children's learning beyond the classroom (either on excursions or at home) by allowing them to capture images, sound and text which could then be related to learning resources available via the Internet and organized into a conceptual map for sharing with other children and their teachers [13]. Generally the prototype was found to fulfil these objectives and similar results were hoped for in our study. However, problems were encountered with usability and battery life of the HandLeR prototype. Moreover, the prototype lacked the ability to adapt to changes in learner needs as children aged, nor was data persistent, so that long-term projects could not be supported. To overcome persistence problems in our study, students were encouraged to download collected data onto computers for later use in presentations.

GIPSY was an m-learning project involving high school and university students who collected field data on PDAs in a geo-information science course [17]. The location of the field data was mapped using GPS. Despite problems, again with usability, performance and battery-life, the project was largely successful. Students, for example, developed information nodes on a given route, allowing access to information in multimedia formats via users' mobile devices. The design of the activity provided integration of desktop work

in the classroom with mobile-supported fieldwork: PDAs allowed the students to collect location-based data in the field, analyze it back in their labs, and then check the results again in the field. Feedback from students confirmed that weight and size are defining criteria for mobile-device selection, even if screen size is sub-optimal on small devices compared with laptops and tablet PCs. The researchers stressed that m-learning works only when its implementation is logically embedded in the educational activity. The focus of investigation in our study – information systems in their context of use – represents an unmistakable opportunity for the application of mobile-supported fieldwork.

3. The M-Field Study in IS

The fieldwork trial took place in a core subject, Introduction to Information Systems. There were a total of 340 students undertaking the subject, mostly undergraduates with some postgraduates. The majority of students were enrolled in an IT degree, a combined business/IT double degree, or a business degree with an IT major. Though similar subjects had been taught before, the subject was a new one, introduced with a large-scale revision of the undergraduate IT program.

3.1. Learning and Teaching Objectives of the Fieldwork

The learning objectives of the field study were as follows:

1. The primary learning objective of the subject was for students to "Understand how information systems are used in business to support the work that people do" (Introduction to Information Systems Subject Outline 2007). In order to get students to understand this, a number of learning strategies were employed, including a major field investigation of the information systems used in a small business, such as a video store, and the mini field investigation supported by mobile devices reported in this paper.
2. Because this was a newly revised subject, it was believed to be a good opportunity to introduce students to the latest and most up-to-date information systems. The issuing of mobile devices to capture field data as well as the choice of a mobile phone system as one of the systems under study furthered this objective.
3. A major objective of the new undergraduate degree was to systematically build graduate attributes – personal, professional and intellectual. Three attributes which were incorporated into the field study were: "the ability to work in collaborative environments as a productive member of a team", the "capacity and aptitude for continued learning", and "competency in … oral professional communication, and effectiveness in the formulation of reasoned arguments and clear explanations in … speaking" (Faculty of Information Technology, Course Redesign Proposal 2006). Firstly, the field study lent itself to teamwork [7]. Secondly, students were required to employ a number of research methods in order to gather data during their study. Thus they moved from being passive acquirers of content to becoming active generators of knowledge, an essential step of life-long learning. Thirdly, they presented their findings orally to their class following the investigation in the field.

In addition to these curriculum learning objectives for the students, there was also the teaching objective, given a high priority in the revision of the undergraduate degree, of improving the quality of teaching and hence the quality of the learning experience. Active fieldwork is a proven way of improving learning outcomes and learning retention [7].

3.2. Fieldwork Procedure

The conduct of the field study is summarized in Figure 2.

The mobile field investigation occupied the students for Weeks 3 and 4 of a 15-week course once they had begun their exploration of IS theory in class. They undertook the study during the 1½ hour lab time for each of those weeks plus homework between classes. For each lab group of up to 30 students, three information systems had to be studied: an ATM, the university library catalogue (both in the context of its use in the library and remote use online), and a mobile phone system. The systems were chosen to cover a diversity of system types, users, degrees of familiarity to the students and contexts of use (ATM: outdoors; catalogue: indoors or online; mobile phone: use anyway while stationary or moving). For each lab group, students worked in three large teams of 7 to 10 people investigating and then reporting back to their class on one of these information systems. A small incentive

(namely 3% towards their final mark for the subject) was given to each student who took part in the exercise.

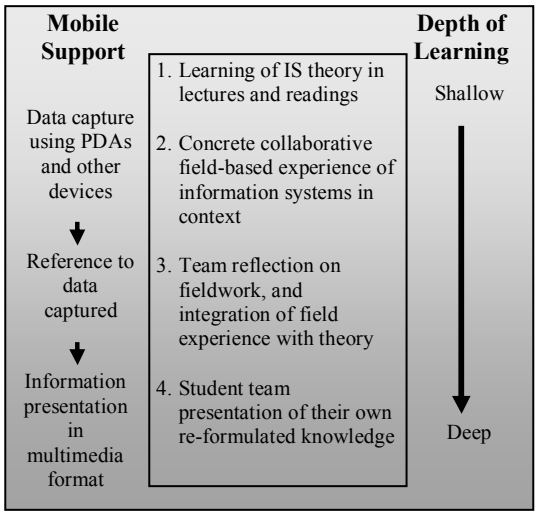

Figure 2. M-Fieldwork Learning Pathway

The students were given seven questions to focus their research, based on issues raised in their lectures and readings:

1. What are the components of the IS?
2. Who are the people involved in the IS?
3. What data is input, processed and stored by the system, and what information is produced by the system?
4. What procedures or processes need to be followed to use the system?
5. What technology (hardware, software, networking) forms part of the system?
6. What particular issues and challenges does the design or operation of this system pose?
7. Any other issues that you think are of interest (optional).

Each team was required to employ at least four different research methods to gather information about the system:

- Literature Search using a popular search engine and a search of academic journal databases.
- Field Observation of "how real (non IT) people use the system in real life"
- Interviews with users "about their use, views and concerns about the system".
- Participant Observation, in which a member of the team used the system and made notes about its usability or other issues [3].

For the presentation which followed the first week's investigation, students were given wide latitude as to how and what they presented. However, they were invited to use photos, videos and sound recordings of people using the systems and the context in which this use occurred. Each team had about 10 minutes to present followed by another 10 minutes of questions and discussion.

3.3. Mobile Support for the Fieldwork

To assist the students in the last three research methods, most teams were issued with one PDA. Where logistics prevented the distribution of PDAs to all lab groups (12 labs in total, with some running concurrently), some teams instead used their own mobile devices (usually a mobile camera or digital camera, occasionally a laptop or PDA), or chose to take notes in the traditional way using pen and paper. The teams who used their own devices did so spontaneously, probably prompted by the encouragement to include multimedia material in their presentations, or perhaps by hearing that other students were being issued with PDAs.

The PDAs provided by the Faculty were i-mate JasJams, powerful instruments with 3G capability, 400 MHz processing speed and 64 MB of memory. The devices were equipped with a camera, sound recorder, extensible keyboard as well as stylus for operating the screen keyboard and icons. Despite the sophistication of the device, minimal training was given because of the short time frame for the activity. A two-page instruction handout was issued to each team in hardcopy. The team then had to work it out for themselves.

For security reasons the PDAs had been engraved with the name of the university and an ID number. In addition, each tutor had to sign a log book against the numbered devices issued to them, and students signed an undertaking that they would look after them properly and return them by the end of their lab session in the first week of the activity. The lecturer went from class to class all day collecting PDAs from one tutor and issuing them to the next.

Once field observations had been taken, the PDAs were brought back to the lab and data downloaded to a PC. The purchase of the hardware had been funded by a university infrastructure grant but no money was available to pay for usage charges. Moreover, after the PDAs had been acquired, an incompatibility was discovered between the wireless capability of the devices and the wireless network in the Faculty. Hence the need to download data physically via a USB cable.

4. Evaluation Methodology

The methodology used to evaluate the IS m-fieldwork trial was a case study approach [2]. Qualitative and quantitative data were collected. The study was mainly subjective and interpretive since the "world in which the educational researcher is interested … is subjectively structured, possessing particular meanings for its inhabitants" [3]. Evaluation data was collected from the lecturer and from the students. Data analysis was not based on any pre-determined framework, but rather searched for emerging issues, themes, and repeated patterns.

4.1. Student Evaluation of the PDAs

Twelve of the student teams issued PDAs completed an evaluation of the devices in Week 4 following their classroom presentation. They were asked:

1. Did you use the PDAs?
2. What other mobile devices did you use?
3. What were the 2 best things about using the PDA or other mobile devices to gather information about the system you investigated?
4. What were the 2 worse things?

All these teams had used the PDA provided, with the exception of one team who had found it too difficult and instead employed their own mobile device. This team had answered Question 3 in relation to their own mobile device, but answered Question 4 about the PDA. All other responses referred to the PDA. Most teams gave two answers to each of these questions, but not all did, so that the number of best features or worse features was less than the 24 expected for each. The answers to Questions 3 and 4 were collated from a thematic analysis of the responses, grouping answers according to distinct and often commonly recurring themes. This provided quantitative data, but also the exact wording of responses was available for qualitative review.

4.2. Evaluation of the Presentations

The lecturer completed an evaluation form based on viewing 14 student presentations. Of the teams evaluated, 5 had been given a PDA, 2 of these also used a mobile device of their own, 9 had not been issued with a PDA, and of these 4 had used their own devices. That left 5 teams who did not use any mobile device in their fieldwork, compared to 9 who did. Questions answered included:

1. Were the PDAs used in the fieldwork?
2. What other mobile devices were used?
3. In what multimedia formats were data collected as evidenced in the presentation?
4. Did the technology help meet the objectives of the learning activity, in particular to get students understanding the complexities of information systems, turning students into researchers and generators of their own knowledge, and improving the quality of the presentations and their interest value?

The lecturer noted the number and types of different mobile devices and multimedia formats used. In addition, comments were recorded regarding how well the student teams appeared to have achieved the learning objectives. In order to facilitate comparison of the achievement of the learning objectives depending on whether mobile support was available or not, a crude measure was instituted whereby 0 was given to each team who was assessed as not having achieved the objective, and 1 was awarded to each team who had achieved the objective. These were summed for each category of mobile support (PDA/Other mobile device/No mobile device) and converted to percentages for that category.

4.3. Fieldwork Evaluation

Some other qualitative data on the m-fieldwork was extracted from statements students made individually in their end-of-semester subject evaluations. This was relatively limited since the question on fieldwork was general, not specifically on the mobile support given: "Did you like the Mini-investigation of the 3 systems (ATM, Library Catalogue, Mobile Phone System)? How might it be improved?" Answers provided insights into a range of issues, including whether the learning objective regarding team work had been fulfilled.

5. Findings and Discussion

The results of the thematic analysis of the student teams' evaluation of the PDA support are summarized in Table 1, while the results of the lecturer's evaluation of the presentations are summarized in Table 2.

Table 1. Results of Students' PDA Evaluation

Best Features		Worst Features	
Themes	**Responses (%)** (n=23)	**Themes**	**Responses (%)** (n=22)
Multimedia capability: Photos: 8 Video: 8 Sound: 3 Text: 1	60.9	Poor usability	68.2
Ease of use of certain functions	17.4	Poor performance	9.1
Fun to use	8.7	Cumbersome hardware	9.1
Connectivity	4.4	Lack of system compatibility	4.6
Organizer capability	4.4	Inadequate help	4.6
Portability	4.4	Not allowed to take PDA home	4.6

Table 2. Results of Lecturer's Evaluation of Presentations

	MOBILE SUPPORT		
	PDAs (n=5)	**Other Devices** (n=6)	**No Device** (n=5)
Multimedia*	6	6	0
	Photos: 5 Video: 4 Sound: 1		
Knowledge of IS	100%	100%	100%
Demonstrated Research Skills	100%	100%	50%
Interest Value of Presentation	80%	100%	20%

* Number of multimedia formats used. Note that some teams had both PDAs and another mobile device and therefore it is impossible to separate out which was used to record the photos, video or sound.

5.1. Multimedia Data Capture to Support Fieldwork Research and Presentations

The mobile devices did assist with gathering data in a richer format, and organizing and presenting the students' knowledge in an interesting way. Whether it lead to a better understanding of IS is another matter.

The best thing about using the PDAs in the field study, according to 61% of student responses, was their multimedia capability, the fact that they could take photographs and videos and record sound (Table 1). It also showed that photos and videos were the most popular format for capturing data, with equal numbers of students specifically mentioning these on the PDA evaluation. In the presentations evaluated by the lecturer, the number of teams who used photos (5) or videos (4) was almost equal (Table 2). Sound recordings were liked by some students, but not as many: they were mentioned by 3 teams in the PDA evaluation, and used in only 1 class presentation (Tables 1 and 2). Only one team commented favourably on the ability to "Take notes with Windows Word (keyboard)".

Only one team who had been issued with a PDA did not use any multimedia in their presentation. Generally, the presentations delivered by teams who had used no mobile device in their field study were less interesting, with most students lacking the presentation skills needed to make up for the lack of photos of the systems in context, filmed interviews, etc. (Table 2). Examples of comments from the lecturer include: "Presentation not as interesting with no pictures – lots of slides of bullet points without any graphics"; "Used whiteboard as graphical aid to show the wireless system network, but not quite as interesting without graphics. Whiteboard a bit dirty and diagram not showing very clearly. Therefore objective concerning presentation not as well fulfilled. Also discussion not as lively".

However, there was *no* evidence from the presentations that teams who were supported by mobile technology did any better in coming to an understanding of the three systems under study than teams without devices. For example, one of the latter teams gave a presentation on the mobile phone system which was assessed as, "*Very* good coverage including good issues, e.g., environment, social issues, health, etc." However, a more precise evaluation tool (not just 0 or 1, as used here) might be needed to really assess whether there is any impact on knowledge levels with mobile support or not.

Evidence from the presentations of the success of turning students into researchers was much weaker for teams without a mobile device (Table 2), possibly because they could not show their research methods so clearly. However, the fact that they had no trouble demonstrating a good knowledge of the complexities of information

systems indicates that their research approach was as valid and not noticeably impacted by their lack of mobile support.

An unexpected problem that surfaced during the exercise was concern by library security staff: a student noted in their subject evaluation that it is "important to speak to Library staff beforehand as there were issues with taking photos with security." Obviously the multimedia capabilities of mobile devices create an issue which does not normally exist with traditional note-taking.

5.2. Collaborative Learning

Apart from the suitability of the PDAs to fulfil objectives of the fieldwork task, we have noted additional benefits. One of the advantages of fieldwork that has been identified in the past is that of socialization [7]. This was also apparent in our study, where students new to university reported finding friends in the subject evaluation of the fieldwork task: "was good to meet the people in the lab early in semester"; "Love to work with group"; "getting into groups were fun. Made many friends"; "Group work helps us get to know our classmates while also learning about the subject"; "learnt team work and organizing group works"; "It prepared us for the group assignments"; "made me learn about how to communicate with group member"; "you put overseas students with local students, that's help me a lot in communication". However, several students requested smaller groups: "Group size was ridiculous"; "as it is divided by 3 large group in the very first tutorial, it is hard to get around if you are not active outgoing that sort of type"; "Smaller groups, large groups become a distruction and only a minority of group members do the work".

The allocation of a maximum of one PDA per group may have contributed to collaborative learning since the students who were given the devices had to co-operate in order to collect their data and then download it to lab PCs. They were also observed collaborating when learning how to use them, since PDAs were new to most of them.

5.3. Student Motivation

Motivation levels observed by teachers were extremely high, with most students putting in a lot more work than had been anticipated by the lecturer when designing the activity. In particular, student teams met between classes to organize their data and prepare the presentation, despite being given some time in class to do this and despite being advised that a "rough and ready" presentation was acceptable. Both in the teachers' eyes and from the point of view of some students in their subject evaluations, the effort was totally out of proportion to the allocated mark of 3% which went towards the student's final grade for participating in both weeks of the exercise: "too much work, too little mark".

Since the grade was apparently not the prime motivator (even though it was probably a useful incentive), the nature of the fieldwork itself seems to have contributed to the high motivational levels of the students. This accords with the fieldwork literature, which shows increased motivation levels as a key benefit from fieldwork [7]. The PDAs contributed to this, at least for the two student teams who noted that they were "fun to use/fun to play with", as well as for the majority who appreciated their multimedia capabilities (see Table 1). One student complained in the subject evaluation of the field study that "we never got to use the PDA's and the other class had gotten to", although another student saw them as "a bit gimmicky". A number of students noted in their subject evaluation that the field study as a whole was fun, although only three commented on the devices as such.

5.4. Usability of the Mobile Devices

Poor usability was the number one complaint of students regarding the PDAs, with over two-thirds of student teams reporting this (see Table 1). No doubt the sophistication of the device with multiple functionalities and several methods of activating some of these functions confused students and reduced the learnability of the devices in the short time allowed. As one team noted in their PDA evaluation, "to much unnesssecary Buttons + touch screen". In addition, one student noted this issue in their subject evaluation: "How we can make the system more user friendly where it is difficult to memorise". Only a proportion of the students found the usability of certain features acceptable, with comments like "Easy to connect to PC", 'The convenience of the camera button, it was easy to set it to camera mode instantly", "Easy to use – easy to take videos."

Most students' unfamiliarity with PDAs no doubt contributed significantly to the general dissatisfaction with their usability. An online survey (n = 442) of these and other students at the university taken at the time of the fieldwork by the authors showed that only 15% owned a PDA. This is in keeping with the results of another much larger study which showed that only 18.6% of surveyed university students born since 1980 (the "digital natives" generation) had access to a PDA [4]. Students' lack of familiarity with PDAs and

the problem they experienced with using those presented to them have obvious implications for the choice of mobile device by educators in fieldwork.

5.5. Ensuring Security of the Mobile Devices

It was anticipated that security would be a problem with issuing students such sophisticated, up-to-date and expensive technology (each PDA cost about Au$1,100). Because of this, a number of measures were taken to ensure the return of the devices at the finish of the class. In the end, no PDAs went missing.

The real issue was the logistics of keeping track of the devices and the amount of time and energy it consumed across this large number of classes and students.

5.6. Cost of Mobile Devices

A major issue with any m-learning at university is cost. A way of minimizing costs in this trial was limiting the number of PDAs to one per team, and collecting all PDAs at the end of each lab for passing on to the next. This was successful financially since it meant that only nine PDAs were required at any one time since there were three labs at most running concurrently. However, it created a big logistics nightmare.

Another method of avoiding hardware costs altogether might be to encourage students to use their own mobile devices. Some in fact did so in this trial. The online survey conducted by the authors at the time of the m-fieldwork trial showed that 94% of students surveyed owned a mobile phone. Many of these devices would be camera enabled and many with a video. This would also help solve the problem with usability since presumably most students would be able to use their own devices. Only one group in the evaluation of presentations reported a problem with not being able to get their video camera working on their mobile phone.

6. Future Directions

The m-fieldwork investigation of information systems in this subject next semester will attempt to minimize costs by replacing the PDAs with student owned devices and providing an incentive, for example through the marking scheme, for students to use them. This would solve the logistics problems of passing the small number of PDAs from class to class, and solve the security issue of tracking devices from co-ordinator to tutor to student and back again. It is believed that this will additionally remove the usability issues that students reported with the PDAs. It will then be interesting to re-evaluate the fieldwork activity and also to try to develop a more precise instrument for assessing the level of knowledge acquired by the students during the activity. Possibly, self and peer assessment might contribute to this review of knowledge and skills.

In addition, a precise evaluation of motivation levels and the impact on collaborative learning for fieldwork versus m-fieldwork would be desirable if we are to be in a position to claim that mobile devices increase these important dimensions of learning.

7. Conclusion

This paper reports on an attempt to embed m-fieldwork into a large core subject, rather than a short-term project with a limited life. It is also unusual in involving students from an information systems subject. The use of mobile devices to capture data in multimedia formats was greatly appreciated by the students and improved the interest level of subsequent class presentations. Additional benefits of the fieldwork were collaborative learning and high levels of student motivation, and there is some evidence to suggest that mobile technology contributed to this. However, students without mobile support still appeared to learn as much about IS using traditional means.

The major problem with the trial was the poor usability of the PDAs which made it hard for students to learn to use them quickly. It is interesting that, even for the generation of “digital natives”, to which most students belonged, and even for students choosing a course in IT, that time and help in learning to use sophisticated mobile devices is necessary. The logistics of tracking the PDAs as they were handed from one class to another was also a significant issue, although this was necessary for security reasons and also to keep costs reasonable.

The extremely high motivation levels observed by teachers, the large amount of work that the students invested in the m-fieldwork and their interest in the multimedia capabilities of mobile devices provide encouragement to continue the activity. Introducing mobile support into an active and real-world learning exercise can only make it more contemporary and of greater interest to students whose means of communication is now firmly centred on this technology. It will be interesting to note whether the enthusiasm

generated by this activity will assist in the retention of these students into the information systems major as they proceed into the second year of their degrees.

8. References

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