From Research and Development to Mobile Learning:
Tools for Education and Training Providers and their Learners

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Abstract

The m-learning project involved four years of planning, research and development plus reflection and large-scale trials of mobile learning systems and learning materials with hard-to-reach learners in diverse situations in three European countries. The findings from these trials and the lessons learnt during the research and development work are currently informing a project to develop a practical, easy to use mobile learning toolkit for teachers. The experience of the project and the lessons learnt can also inform the work of other research and development projects and those working to implement mobile learning systems or to embed mobile learning elements into education or training.

Keywords: mobile learning, staff development, personalised learning

1. INTRODUCTION

The independent evaluator's report described the m-learning project as:
 "large and complex, developing, exploiting and integrating a range of innovative technologies and devices, and delivering mobile learning to hard-to-reach youngsters who were economically and educationally marginal. The project culminated in large-scale trials, probably the largest to date, across a diverse set of situations, organisations and of learners."

The findings from these trials and the lessons learnt during three years of research and development can inform not only the work of other research and development projects but also those working to implement mobile learning systems or to embed mobile learning elements into education or training.

To-date they have inspired the development of several new mobile learning projects in the UK and in the wider world. Two of the m-learning project partners have also applied these findings and lessons to the development of a set of practical and easy to use tools for teachers which will be described in this paper.

2. THE LESSONS OF THE M-LEARNING PROJECT

2.1.   The m-learning project and the findings

The m-learning project was funded by the European Commission's Information Society Directorate General, the project partners and, in the UK, the Learning and Skills Council (LSC). The project developed learning materials and systems accessed on, or via, handheld mobile devices. These were intended to stimulate an interest in learning and to assist with improvement of literacy, numeracy and life skills. The project explored whether the enthusiasm of young adults for mobile phones can be harnessed to encourage participation

in education or training. One aim was to ascertain whether mobile learning can result in improved literacy, numeracy or changed attitudes or behaviour, including greater enthusiasm for learning and progression to further learning.

The m-learning project was a significant learning experience for all parties involved in the three partner countries (UK, Italy and Sweden) including not only the young people and their teachers and mentors but also the researchers and developers.

The findings from the work with young people, mentors and teachers in the learner research, systems and learning materials trials in the second year of the project are discussed in detail elsewhere (e.g. Attewell, 2005 and Attewell and Webster, 2005). Key findings indicated that mobile learning:

- allows truly anywhere, anytime, personalised learning
- can be used to enliven, or add variety to, conventional lessons or courses
- can be used to remove some of the formality which non-traditional learners may find unattractive or frightening and can make learning fun
- can help deliver and support literacy, numeracy and language learning
- can help learners and teachers to recognise and build on existing basic literacy skills which allow young people to communicate in notational form via text messages
- facilitates both individual and collaborative learning experiences
- enables discrete learning in the sensitive area of literacy
- can help to combat resistance to the use of ICT by providing a bridge between mobile phone literacy and PC literacy
- has been observed to help young disconnected learners to remain more focused for longer periods
- can help to raise self-confidence and self-esteem by recognising uncelebrated skills, enabling non-threatening, personalised learning experiences and enabling peer-to-peer learning and support

2.2.   Lessons for future projects and implementation

Other lessons resulting from four years of planning, carrying out and reflecting on the m-learning project relate to the mobile technologies and their use for learning as well as to the process of developing learning materials and systems for new and fast evolving technologies.

Planning for development with fast evolving technologies

In 2001 m-learning was one of a very small number of mobile learning projects worldwide and most other projects were focused on the use of palmtop computers for learning rather than mobile phones. Widespread use of mobile phones was still a relatively new phenomenon although the project partners' countries were early adopters and high percentages of young people across all socio-economic groups in the UK, Italy and Sweden owned mobile phones.

A major dilemma faced by the project team was whether to adopt a very inclusive approach by developing materials and systems for the lowest specification mobile phones to be found in the pockets of young people in 2001 or to future proof the findings of the project by attempting the predict the type of device which might be in their pockets, or readily available to them three of four years in the future. It was recognised that such prediction would be very difficult and that selecting specific delivery platforms, tools and technologies to develop with would not be easy. As the project began it had recently become clear that WAP was not going to provide the exciting mobile Internet service which had been widely predicted and

that phone buyers were mostly unimpressed. There was much excitement concerning future third generation (3G) networks but a lack of clarity around availability and cost of this.
At the same time, in the fast growing and evolving handset market, there was a constant stream of new models, each manufacturer used their own proprietary software and they were more interested in fighting for market share than agreeing standards.

In order to assist the process of selecting development tools and planning delivery technologies the project team developed a Technology Selection Roadmap and a process for carrying out roadmapping i.e. identifying, evaluating and selecting technologies and revisiting selection decisions frequently in the light of experience and the emergence of new technologies.

The roadmapping process was informed by initial desk research and experimentation to ascertain what technologies were available and how they might serve the projects aims and objectives.

Five broad categories of technology were identified, within which specific technologies would need to be selected, these were: transport, platform, delivery and media technologies plus development languages and are described in figure 1.
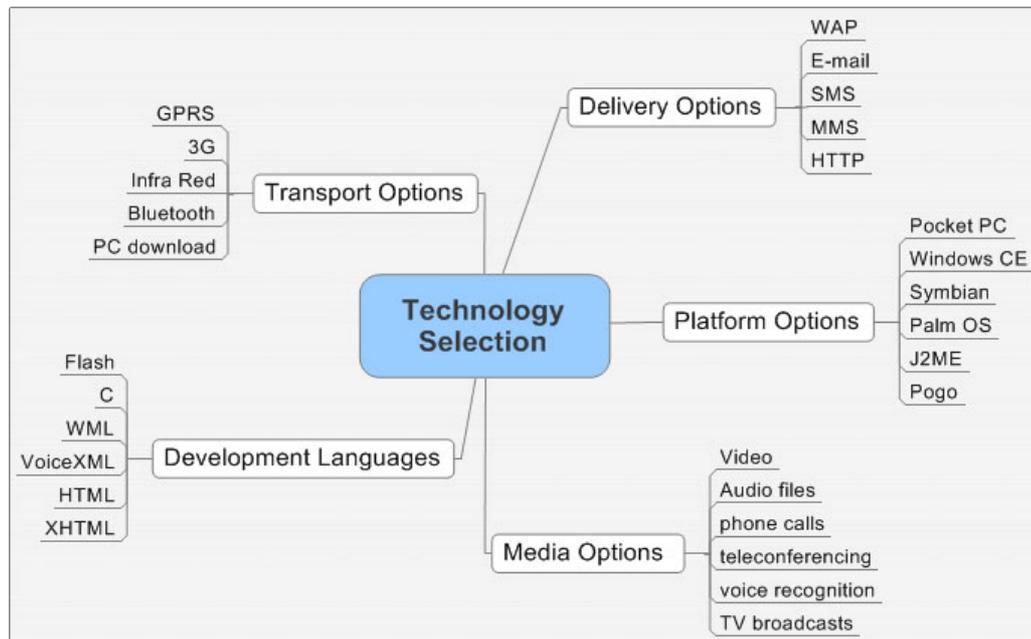

Figure 1

Discussions between project partners established seven criteria necessary to consider in selecting technologies to be used (see figure 2). These were: the usefulness of the features offered by the technology; cost issues, availability in the partner countries and patterns of availability within those countries (e.g. a service might only be widely available in urban areas); reliability; robustness; ease of use (for both users and developers); standardisation (and thus how portable materials developed might be); likely longevity in the market place and likely popularity (particularly with members of our target audience i.e. 16-24s).
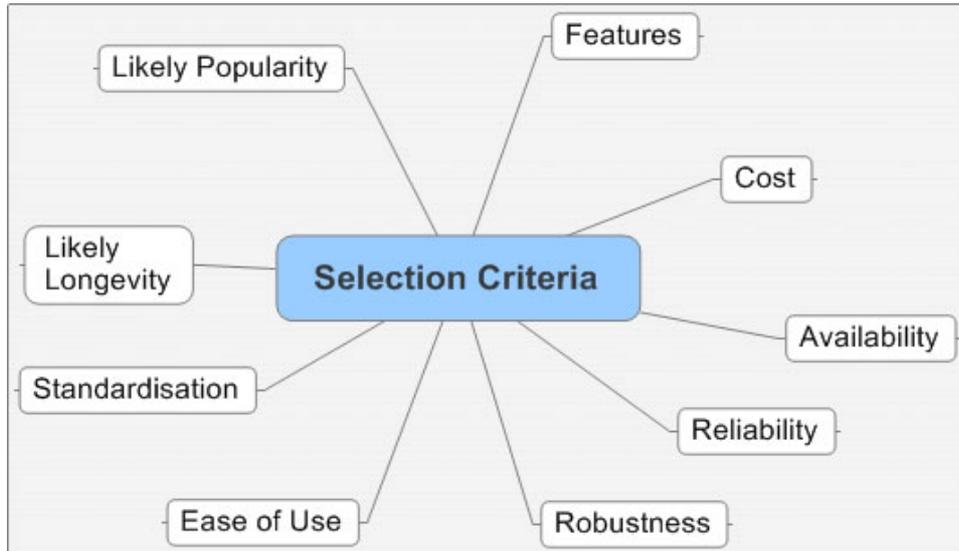
Figure 2

Each technology identified as potentially useful to the project was considered and allocated a score against each of the seven criteria. As not all criteria were considered equally important, and relative importance varied between different types of technologies, weightings were agreed for each of the criterion within each of the technology categories and applied to the scores. Members of a technology selection sub-committee each allocated scores to all technologies and then during discussion a common set of scores was agreed upon. This process was repeated several times during the project to take account of experience gained and to consider, or reconsider, new or improved technologies. Figure 3 illustrates how decisions concerning some technologies changed over the life of the project.
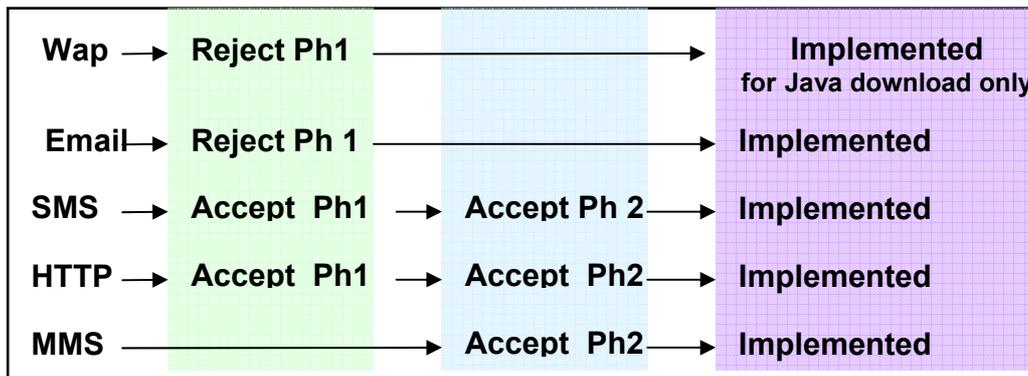
DELIVERY OPTIONS

Figure 3

The Technology Selection Roadmap process encouraged detailed discussion of the merits and problems of each technology and facilitated logical and thoughtful collaborative decision making with the aim of making the selection process as objective as possible.

Lessons for mobile learning developers and implementers
Some key lessons learned during the m-learning project were:

- A mixture of online learning and learning using materials previously downloaded onto handheld devices helps to reduce costs and the inconvenience of signal disruption whilst traveling or poor signal in some remote rural areas.

- The use of software layers to insulate learning materials from device-specific features and delivering learning materials in a browser helps overcome some lack-of-standards issues but does not offer full platform independence.

- Attempting to deliver a monolithic mobile learning system leads to inflexibility, limits ability to take full advantage of the heterogeneous mixture of hardware and services available and detracts from facilitating blended approaches to learning delivery.

- An iterative approach to development informed by learner feedback results in better learning materials and systems.

- Whilst it is possible to re-purpose learning materials developed for PC delivery to run on mobile devices, this approach may not make best use of the strengths of the mobile technologies.

- A flexible, collaborative and pragmatic approach to development works well in an environment where the technologies are new and standards are evolving. This is aided by working within a small consortium.

- It is important to be aware that, when delivering learning or offering support services to learners' mobile phones, one is encroaching on their personal space.

- For our target audience teacher/mentor enthusiasm and involvement seem to be very important for successful mobile learning.

- Sufficient training preceded by training needs analysis is important for teachers/mentors as mobile literacy and confidence varies.

- Fast response to mentor and learner problems is crucial to avoid disillusionment and stalling momentum and proactive support for those just starting to support mobile learning plus ongoing access to advice is helpful.

3. THE TEACHERS TOOLKIT

Two of the m-learning project partners (LSDA and Tribal-CTAD) are currently working on the development, piloting and evaluation of a mobile learning toolkit for teachers. The toolkit includes authoring tools which teachers use on a PC to create learning materials which are then accessed via learners' mobile phones or transferred onto learners' palmtop computers.

The tools include:
- An SMS (text message) quiz authoring tool
  this tool allows teachers to set up an automated response system for a multiple choice quiz. The quiz can be presented to the learners in any way e.g. a paper handout, a poster, a website or on a whiteboard or in a PowerPoint presentation. When the learners send the answers to the questions by SMS they receive almost instant feedback.

- A mediaBoard authoring tool
  this tool allows teachers to create interactive learning tasks and projects for groups of learners. Each mediaBoard a teacher creates is rather like an Internet message board but consists of a visual image. Learners can attach audio, text and images to areas of the image, sending these by e-mail, or by multi-media message (MMS) from a palmtop computer or a mobile phone.

- A Pocket PC authoring tool
  this tool allows teachers to author multiple choice quizzes, including pictures and text, for delivery via any device supporting the PocketPC operating system. They can also author simple Pairs or Snap card games and small pages of text.

Piloting and evaluation of these tools will include consideration of ease of use and usefulness to teachers as well as exploring the different uses teachers find for the tools, the contexts in which they use them and the learning materials they develop.

The development of this toolkit draws upon the experience of the m-learning project and is the next step in a process starting with research and development and resulting in practical easy to use tools which will allow teachers to develop mobile learning materials and experiences tailored to the needs of their particular learners in their specific context.

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From theory to practice, Mobile Learning explores how mobile devices are different than their technological predecessors, makes the case for developers, teachers, and parents to invest in the technology, and illustrates the many ways in which it is innovative, exciting, and effective in educating K-12 students. Explores how mobile devices can support the needs of students. Provides examples, screenshots, graphics, and visualizations to enhance the material presented in the book. Chapter 1 Changing Education with Mobile Learning 1. A Brief History of Educational Technology: What Will Revolutionize the System? 3. Developing Lifelong Learners 240. Bridging Formal and Informal Learning 241. Conclusion 251. Notes 252. Mobile Learning. Transforming the Delivery of Education and Training. Edited by Mohamed Ally. Issues in Distance Education series. Chapter 3 Mobile Distance Learning with PDAs: Development and Testing of Pedagogical and System Solutions Supporting Mobile Distance Learners Torstein Rekkedal and Aleksander Dye Norwegian School of Information Technology & NKI Distance Education, Norway. ix xi 1. 9 25. 51. vi Mobile Learning. Chapter 4 Using Mobile Learning to Enhance the Quality of Nursing Practice Education Richard F. Kenny and Caroline Park Athabasca University, Canada Jocelyne M. C. Van Neste-Kenny, Pamela A. Burton, and Jan Meiers North Island College, Canada. Learn more about e-learning content development from Day One on their website. LEO Learning. Multi-award winning provider of e-learning and mlearning solutions that incorporate the latest technologies, such as AR and gamification. Classroom education and training can evolve with access to endless additional materials on the fly. An instructor can signpost materials that the device makes more accessible to an individual due to customisation. Screen readers for example can convert any text to audio or change the size and contrast. Getting learner buy-in, creating mobile learning and rolling it out are just the start of the process. The best mobile learning strategies include plans for analysis and continuous improvement of content and its delivery. Mobile Learning Design Tips.