Premier's Logitech New and Emerging Technologies Scholarship

Examining Mobile Learning: varying perspectives

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Abstract

This report summarises a Study Tour undertaken by David Bartolo of Northern Sydney Institute of TAFE in late 2011 to examine current approaches to Mobile and Ubiquitous Learning - the use of mobile devices to help create a seamless learning experience for students across contexts and locations - interviewing key experts in the field and attending conferences in Beijing and San Francisco.

The Study Tour was sponsored by Logitech, and involved attendance at the International Association of Mobile Learning (IAMLearn) Annual Conference in Beijing (mLearn 2011), the Ubiquitous Learning Conference in San Francisco, and recorded interviews with key players at several universities in the UK and USA. Selected highlights of the tour are available on my [blog](https://davidbartolo.tumblr.com/).

Introduction

It is no coincidence that a study of Mobile Learning should involve a trip around the world, visiting scholars and conferences on 3 continents. The fact that such study tours are facilitated implies that learning by necessity involves mobility - as Dettori has stated, *Learning is an intrinsically mobile activity* (Dettori, 2007).

The term *Mobile Learning* means many different things to different people, and following discussion with experts around the world, it seems that even they have views that vary amongst themselves and change over time. As mobile technology has evolved from laptops to PDA’s to mobile phones and tablets with increasing functionality and interconnectivity, so too have the definitions, and yet as many of the interviewees kept reinforcing, it is not the technology that needs to be central to the issues, it is the educational requirements of the learner. It is the learner. It is the educational and cultural context. And also (but only also) the technology and infrastructure that facilitates delivery.

This report will examine many of the issues that are seen as important by researchers in mobile learning around the world, if we are to effectively engage students using the new technologies.

I was originally inspired to undertake this study tour because, as a teacher of digital media, although in class we provide our students with computers, many were bringing in their own laptops and pushing ours aside. They were also increasingly using their mobile devices to do tasks that assisted in their learning. I was finding that the device of preference for many of my students was becoming the mobile phone, and increasingly the tablet.

The rapid rise of the mobile tablet has the potential to turn education on its head. A seminal moment for me came at the annual AuSakai conference held in Canberra, where

* 1. I noticed that a significant number of attendees were using tablets to document the proceedings, and
  2. An inspirational talk by Josh Barron of Marist University (New York), postulated that the disruptions that occurred in both the music and film industries in recent years are now happening in education[[1]](#footnote-1)

Study Focus

To trigger conversation with interviewees I compiled a list of questions (Appendix 3), which served as a general guide. The main focus if this study tour was to examine learning as learners move across different devices and contexts, especially considering the proliferations of new devices that are appearing, most with *connectivity*, *collaboration* and *locative* capabilities[[2]](#footnote-2).

I also wanted to explore current practice in cross-platform delivery of educational material, in an area known as [Ubiquitous Learning](https://en.wikipedia.org/wiki/Educational_technology). Specifically, learners moving seamlessly from classroom computer to mobile to home computer/tablet whilst maintaining continuity of access to learning material. With a focus on mobile *learners*, not just mobile *learning.* (Jo Colley, MoleNet[[3]](#footnote-3)).

Learning has always been mobile - when and where we learn is not determined by timing or location of classrooms. Mobile technologies allow educationalists to explore the ‘mobility’ of learning even further. However, there is the risk of a ‘mobile-centric’ approach to learning (Winters, 2006). Kevin Walker (Walker, 2006) states that “*Mobile learning is not something that people do:* ***learning*** *is what people do*”.

The Journey

The Study Tour involved four main phases. Initially I travelled to Beijing for 6 days to attend the International Association of Mobile Learning’s Annual Conference at Beijing Normal University. At this conference there were participants from over 31 countries, giving presentations on mobile learning in the contexts of their cultures and populations.

Phase 2 involved travel to the UK, where I interviewed Mike Sharples, John Traxler, Agnes Kukuska-Hulme, Jocelyn Wishart, Norbert Pachler and Liz Fitzgerald, names that dominate the literature in Mobile Learning, at various Institutions in London, Wolverhampton and Milton Keynes.

In New York I met with Academics and Educational Technologists at both New York University (Lucy Appert, Robert Squillace) and Columbia University (Jonah Bossewitch), and looked at a number of projects that these institutions are involved in.

Finally, I attended the [Ubiquitous Learning Conference](https://ubi-learn.com/) in San Francisco, with participants from all over the world discussing ubiquitous and seamless learning[[4]](#footnote-4).

Mobile learning research around the world

Research into mobile learning worldwide tends to take on the flavour of the culture in which it is situated. At the mLearn 2011 conference, Mike Sharples reviewed the main areas that are being explored in various countries[[5]](#footnote-5):

|  |  |  |
| --- | --- | --- |
| **Country(ies)** | **Main Areas of Research** | **Focus** |
| Africa | M4D –Mobile Learning for Development | Focus on Access, emerging contexts, basic technologies |
| United States | Anytime, anywhere learning, corporate training, M4EDandDEV | Focus on delivery and relevance (device-centric) |
| US/Taiwan/Singapore/Chile | One to one (121) learning, MCSCL (Mobile Computer Supported Collaborative Learning) | Personalised learning in classrooms and field trips |
| Europe | Contextual and Connected learning | Context, Community, connecting formal and informal learning |
| Singapore | Seamless learning | The continuity of learning across different locations and contexts |
| Canada/Australia | Personalised distance education | Learning design, Open content and standards |
| Japan | Ubiquitous Learning | Availability and embedding in the everyday world |

The above is certainly not an exhaustive list – it is more a generalisation of some of the major research focuses internationally – however, there are significant projects being undertaken in all the above areas at individual institutions around the globe – for example: at [Abilene University](http://www.acu.edu/) in Texas, a pilot project was established to distribute mobile devices (iPads) to students and lecturers, to evaluate the possibility of their use as a learning device. This inspired a [similar project](mlearnproject.wordpress.com) that is currently underway at Charles Sturt University in Australia, where distance-learning students are being sent iPads. In New Zealand, Tom Cochrane’s group at the University of Auckland in New Zealand have coined the term [*iPadogogy*](https://prezi.com/jbq5zn-1zdn5/copy-of-ipadagogy/), looking at the iPad as a disrupter of teacher-centric learning environments – they are using existing iPad applications to assist with the teaching of Architecture, Music, Civil Engineering and Business.

John Traxler highlighted the main differences between the UK and US model – whereas the UK research had traditionally[[6]](#footnote-6) been focussed on the social and disenfranchised issues, the US model is largely driven by a need for corporate training.

The Mobile Device and its Affordances[[7]](#footnote-7)

Whilst many computing devices can be described as *portable*, the current definition of mobile takes into account the following factors:

* + Portability
  + Ubiquity
  + Connectivity
  + Locative Awareness
  + Multi-modality
  + Multifunctionality
  + Privately owned (personal)

We can expand on each of the above (note that Connectivity and Locative Awareness enable another affordance – *Contextuality* – The ability for the device to present information based on the user’s context – location, time, previous actions, etc):

**Portability**

Whereas the laptop computer heralded the concept of *computing anywhere*, the decision to carry a laptop is still a conscious one. Mobile devices such as phones and tablets, however, have the affordance of being truly portable, so that even without a conscious decision, they will be carried and hence be available for the user at any time. This, coupled with the fact that they are generally always on, leads to the next affordance, *ubiquity*.

**Ubiquity**

A ubiquitous technology is a technology that surrounds us. Mobile devices have achieved this status – it is rare to be in an environment where there is no access to these devices, and hence to all the connectivity that they provide.

For example there are 1 billion mobile phones in China alone (300 million smart phones)[[8]](#footnote-8). If a device is ubiquitous, we can design learning material assuming that a large percentage of people will be able to access it, *even if they were not intending to*. What this means, for example, is that it may be possible to create an art gallery tour, without providing a device to the visitor. This has implications for the way the tour is designed, needing to take account of both the wide array of possible devices, and the fact that the device, being privately owned, has an intimate relationship with its owner (see below).

**Connectivity**

Coupled with their ubiquity, mobile devices by their very nature are connected, increasingly to the Internet and World Wide Web. This factor allows educational designers to leverage into the **social** aspects of learning, rather than just providing “lecture notes on the device”.

**Locative Awareness**

Increasingly, the mobile devices we use are location aware. This has enormous implications for the types of educational experiences we can provide, and enables such abilities as [*Augmented Reality*](https://en.wikipedia.org/wiki/Augmented_reality), which many during the tour argued is the next major shift that will occur in our mobile experience.

**Multifunctionality**

The mobile device (especially the phone) has become the Swiss army knife of the information age. What isn’t built into the phone can often be downloaded as an App – one poignant example is the [*Mint Radiation Detector*](https://www.youtube.com/watch?v=9RHoj65PhXA), which allows an iPhone to be turned into a Geiger counter (developed by researchers after the Japanese Tsunami and subsequent nuclear disaster to enable Japanese citizens to test their fruit and vegetables).

**Multi-modality**

The mobile device can use many of its features simultaneously – for example, a student can be communicating with their peers, whilst reading data via the internet, monitoring temperature, and recording their findings by taking photos, all on the same device and at the same time. This facilitates collaboration using the mobile device.

**Privately owned (personal)**

This is possibly one of the more important factors, often overlooked by those wanting to implement mobile learning. The mobile device has become a kind of personal ecosystem (Sharples, mLearn, 2011), and when teachers engage with this effectively they are able to engage effectively with the student.

*“No one affordance stands out above the others, but the fact that it is personal in a deep sense, that it’s always on and with you everywhere, and that contextually it isn’t just about time and place, but also what you’re doing, what you’ve done - it adapts to your interests and needs, and also to your social environment…”*

*Mike Sharples, Open University (OU), Nov 2012*

Formal vs Informal Learning – Bridging the Gap

*Formal Learning* is described as the learning that takes place within the formal setting of a “class” – whether this is a classroom, lecture theatre, field trip or being logged onto a learning management system. It is the only learning that is recognised as being learning by institutions (and society). Since the rise of the educational institution, this view has predominated any discussion of education, and especially its measurement and assessment (and corresponding funding/infrastructure).

*Informal Learning* refers to the learning that takes place outside these formal environments. It is *incidental* learning, and happens in the canteen, at home, when we talk with our friends, when we are walking down the street. Ironically, whilst informal learning forms the majority of learning that we will do in our lives, it is not recognised by the institutions that assess learning, and does not form part of any assessment or evaluation – it is as if it does not exist.

One of the major themes that arose again and again during this study tour was the opportunity for mobile learning to *bridge the gap between formal and informal learning*.

Because of the affordances of mobile devices (particularly their portability and ubiquity), they enable us to record and evaluate informal learning, and give institutions the ability to provide resources that can be accessed by the learner wherever they are. One area where this is particularly obvious is in the provision of language learning. Language learning was the main area of mobile learning being demonstrated by many participants at mLearn 2011, and benefits particularly from mobile learning because when learning a language we need:

* + Constant practice
  + Audio cues to help with pronunciation
  + The ability to practice at any time or place
  + Being able to learn in context

Having a mobile device on us all the time gives us all of the above. In one striking example, *Urban Planet* run a project that provides a 3 minute ring tone download once a week to over one hundred thousand students – and the ring tone is a 3 minute English lesson.

In another, the BBC has launched [*Janala*](https://www.theguardian.com/media/pda/2010/feb/17/bbc-bangladesh-janala-lessons), a service that takes advantage of mobile devices to deliver English language instruction to a worldwide (mobilised) audience.

These were two of many examples, more of which can be accessed via the [blog](http://davidbartolo.tumblr.com) of this study tour.

All of the interviewees agreed that the most important potential benefit provided by mobile technologies was the opportunity to bridge the gap between formal and informal learning (one in particular refused to accept the definitions and insisted that *there is only learning[[9]](#footnote-9)* (Norbert Pachler, see Appendix 1)).

Security and Privacy

There is currently much discussion and debate in ubiquitous and mobile computing involving privacy and security, how much data we share and what happens to that data, especially in schools. It is the same debate that is occurring around social media sites such as Facebook, and incorporates issues like pornography and cyber-bullying. Around the world there are variations in school policies, for example in Britain there tend to be 3 schools of thought about mobile devices in the classroom:

* + Mobile devices are ok but just keep them out of sight and don’t use them in lessons,
  + Mobile devices are banned and confiscated if found, or
  + Mobile devices are to be embraced and used as part of the school intranet and to enhance the curriculum

Ironically, having a mobile on in the classroom can actually be less disruptive than otherwise. Jocelyn Wishart writes that getting a portable device out of their pocket, using it and then putting it away is less disruptive than turning away, looking for a book, or going to a laptop, etc. It is a much more socially constructive way of working (Wishart, J., [*ICT at your side and not in your face*](https://www.academia.edu/962635/PDAs_and_handhelds_ICT_at_your_side_and_not_in_your_face)).

In the most recent case of what Wishart calls an “alarming event”, the head of Britain’s Office for Standards in Education (Ofsted) has publically spoken out about the “dangers of mobile phones” ([*Ofsted chief inspector suggests outright ban on mobile phones in schools*](http://www.publicservice.co.uk/news_story.asp?id=19706)).

By contrast, in 2008 a geography teacher from New Zealand, Nathan Kerr, found that his students were finding it hard to motivate themselves to study. He began setting projects using mobile devices, and within one year found the pass rate increased from 40% to 80%. He had **the students themselves** come up with rules and etiquette for using mobiles in the classroom – for example, not talking to your girlfriend whilst in class - and had them write them on the wall. He won the Microsoft World Innovative Teaching Forum Award for that year (for [*Collaboration and Digital Learning Projects within a Multi-Cultural School*](http://www.microsoft.com/en-us/news/press/2008/nov08/11-06ITF08WinnersPR.aspx)).

Learning across Contexts

What mobile devices give us the opportunity to do is to learn in whatever context surrounds us. We may be on a bus, it may be night-time, we may be on holiday, at a lookout – and with a mobile device that has interconnectivity and locative awareness, we can access material about whatever is happening right now. Mike Sharples discussed research projects that could tap into the learners’ current state. For example in one study in an art gallery (using the CAGE system), as participants approach an artwork, they receive information on their mobile device about the artwork. If they linger, they are given more. If they return a bit later, they are further engaged – the study found that what would happen is that groups of people would cluster around and listen to the information, sparking off a conversation – the learning became social.

In another example discussed with Liz Fitzgerald (Appendix 1), users on geography field trips have access to a range of features including the use of “computer generated acetate” as a form of Augmented Reality to support their learning ([*Creating location based mobile learning experiences*,](http://www.slideshare.net/ejfitzgerald/newcastle-talk-may11alt) May 2011).

Incorporating Mobile Learning

In his keynote at mLearn 2011, Chee-Kit Looi, Head of the Centre of Learning Excellence at [Nanyang Technological University](https://www.ntu.edu.sg/Pages/home.aspx) in Singapore, listed the factors that allow for the successful incorporation of mobile devices into the formal learning environment:

* 1. Where students use technology all the time
  2. Where technology is truly powerful
  3. Where the curriculum leverages the affordances of the technologies
  4. Where it is easy for teachers or students to add to the repertoire of technology-enabled activities

Items 1 and 2, above, apply now to mobile devices. Items 3 and 4 depend on the institutions that are trying to provide educational opportunities for students, and enable teachers to facilitate those experiences.

More important than the issues of which technology, which tablet, which system to support, are the issues of the learners and the learning, the issues of ownership, of security and privacy, and particularly of the ways in which we hope to support learners and learning into the future.

True mobile learning will incorporate the ultimate in Cloud Computing[[10]](#footnote-10), with the end user being able to move between devices and locations and contexts over time with a continuous connection to their education, across both formal and informal settings.

It will incorporate what Mohamed Ally (Director of the Centre for Distance Education, Athabasca University, Canada) refers to as the 5R[[11]](#footnote-11) framework for location-based learning systems:

* + The right device
  + The right learner
  + The right contents
  + The right timing
  + The right location

According to Mike Sharples, we have seen 3 phases in the development of mobile learning:

* 1. **Hand Held Devices** – device centric, about how content is delivered or how devices are used devices as response mechanisms or delivery tools
  2. **Focus on mobile learner**, reorienting the focus from device to learner
  3. **Learning in a mobile world** – as we are surrounded by technology and expect it to be there (phones, smartboards, etc), and expect to be able to just walk up and use it, - if we are living in a technologically ubiquitous society, how do we develop that for learning?

Conclusion

There are two main schools of thought about the impact of mobile devices on education[[12]](#footnote-12):

* 1. They are going to be a powerful disruption with learners doing more powerful learning underneath the desk than on top of it
  2. Education systems have always had to cope with changes in technology (for example TVs, computers) and they’ve managed to incorporate them into education successfully without the education system changing greatly, and perhaps the same will occur with mobile devices

In many countries mobile learning is currently undergoing trials and is the subject of research grants at Universities, trying to work out how best to take advantages of the technology. And yet, as I discovered on this study tour, for a number of years real benefits have been provided already around the world with innovative educators already achieving results with the new technologies.

I went on this study tour thinking only about the technical aspects of mobile/seamless learning, and how it might be implemented. What I discovered was people all over the world that have considered these issues and experimented with them, and have found that the most important issues are the appropriateness of use of technology. Most of the leading players are now deeply considering ethical and cultural aspects of the technology. Mobile learning has the potential to revolutionise the way we teach and learn – taking us back to pre-classroom days, when learning was something that happened wherever we were. But as we move towards making full use of the technologies, we must be wary that we don’t place all our faith in new technology for the sake of it. The first question must always be why.

The Study tour enabled me to share knowledge with people in education, with a passion for teaching and learning, and also showed me how easy it is for a country that can be the world leader in mobile learning research one year to suddenly lose its funding because of one [political decision](https://www.theguardian.com/education/2010/aug/17/becta-schools-computers-technology-creative), resulting in the loss of research capability. This highlighted how important it is to share knowledge with others, to participate in conferences, and to be networked with others that share the same interests so that they can continue on their great work.

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Winters, N. (2006). What is Mobile Learning? In M. Sharples (Ed.), Big Issues in Mobile Learning. University of Nottingham.

Appendix 1 - Contacts

**Institutions visited:**

* + [Beijing Normal University](http://www.bnu.edu.cn/bnueng/index.html)
  + [University of Wolverhampton](http://www.wlv.ac.uk/)
  + University of London/London Mobile
  + [Learning Group](http://www.londonmobilelearning.net/)
  + [The Open University](http://www.open.ac.uk/)
  + Columbia University
  + [New York University](http://www.nyu.edu/)
  + [University of California](Berkeley%20-%20http:/berkeley.edu/)

**Key contacts/experts consulted:**

Mike Sharples, Professor of Learning Sciences and Director of the Learning Sciences Research Institute at the University of Nottingham (now at the Open University, Milton Keynes)

Andrew Litchfield, Co-ordinator Technology and Education Design and Development Research Group, UTS, Sydney

Liz Mackenzie, Research Fellow, Educational Technology, University of Nottingham (now at Open University), UK

Jocelyn Wishart, Acting Director, Higher Education Academy Subject Centre for Education, University of Bristol, UK

Agnes Kukulska-Hulme, Professor of Learning Technology and Communication and Associate Director (Learning and Teaching) in the Institute of Educational Technology, Open University, UK. She is President of the International Association for Mobile Learning

John Traxler, Professor of Mobile Learning, and Director of the Learning Lab at the University of Wolverhampton, UK

Norbert Pachler, Professor of Education, Director of International Teacher Education, Institute of Education, University of London,/London Mobile Learning Group, UK

Jonah Bossewitch, Technical Architect, Centre for New Media Teaching and Learning, Columbia University, New York

Lucy Appert, Associate Director of Educational Technology, New York University

Robert Squillace, Assistant Dean for Academic Affairs, New York University

Conference Participants at both mLearn Conference, Beijing and Ubiquitous Learning Conference, San Francisco

Appendix 2 - Definitions

These definitions are my own, developed from literature observed and interviews conducted during the study tour. Not all involve mobile devices, but all can be enhanced by these devices.

**Mobile Learning:** Learning that involves the learner not being in a particular place, and that may not be formal. It may take advantage of mobile technologies. This type of learning is often spontaneous, and the learner may not have intended to undergo learning, or may even not be aware that they are learning.

**Seamless Learning:** Learning that continues as the learner moves across space, devices, time and context.

**Ubiquitous Learning:** Learning that takes advantage of technologies that are embedded within the environment – these may involve mobile devices, or technology that has specific functionality, such as smartboards or QR codes or RFIDs embedded in physical objects.

**Contextual Learning:** Learning that takes account of the user’s context. This may be what they have previously studied, where they are, or where they have been.

**Connected Learning:** Learning that involves groups, that may be in different regions, connecting, often with the aid of technology, for the purpose of learning. Examples include video technology connections between schools, or connections via mobile devices.

**Collaborative Learning:** Learning that involves learners working together to achieve common educational goals.

Appendix 3 – Interview Questions

* 1. How would you define Mobile Learning/Seamless Learning/Ubiquitous Learning?
  2. What are some of the most interesting projects involving mLearning that have been run in the past few years?
  3. What kind of projects are best suited to mLearning?
  4. There seems to be a commitment from the UK and European Governments to mLearning – why do you think this is the case?
  5. What factor do you think is the most important in mLearning? (eg Connectivity, Locative Awareness, ability for Context awareness, Portability, Device ownership…)
  6. Do you think institutions will adopt mLearning for the right reasons, or just because they perceive it will save them money?
  7. There appears to be much being done in the area of English Language teaching, probably because portability, the ability to hear pronunciation, etc are very important in learning a language. Do you see another important direction in terms of Mobile Education?
  8. What kinds of technologies will best support cross-device learning? An App based model, Web based?
  9. What influence do you see the introduction of tablet devices will have as a whole?
  10. Are there any new devices or approaches to mobile learning that you are aware of?
  11. Do you think funding for mobile learning will grow, given the current cuts to Education spending in the UK and elsewhere?
  12. If the funding doesn’t grow, will mobile learning still grow?
  13. What is the most remarkable and innovative project you have been involved in or heard of involving mLearning or seamless learning in the past few years?
  14. What has changed in the 10 years mLearn has been running?
  15. How close do you think we are to the ideal ubiquitous or seamless learning scenario, where the distinction/transition between devices is blurred?

1. Josh Barron spoke of mashups, the empowerment of end-users, user-generated content and the fall of major publishers [↑](#footnote-ref-1)
2. *Connectivity*: The ability to connect to the Internet; *Collaboration*: The ability to incorporate tools that facilitate collaboration between users; *Locative*: Awareness of its own location (eg GPS capability) [↑](#footnote-ref-2)
3. [Mobile Learning Network](http://www.molenet.org.uk/), UK [↑](#footnote-ref-3)
4. The terms *Mobile Learning*, *Ubiquitous Learning*, *Seamless Learning* are often interchanged, and yet have subtly different meanings. Many disagree on precise definitions, but following my Study Tour I have decided on definitions I have outlined in Appendix 2. Another term, *Contextual Learning*, is also defined. [↑](#footnote-ref-4)
5. Mike Sharples, Keynote Presentation, mLearn 2011, Bejing [↑](#footnote-ref-5)
6. Note the past tense – as of this writing, the situation looks bleak for research in the UK, due to the cutting of funding from BECTA, the main funding body. [↑](#footnote-ref-6)
7. An *affordance* is a quality of an object, or an environment, which allows an individual to perform an action. For example, a knob affords twisting, and perhaps pushing, while a cord affords pulling (*http://en.wikipedia.org/wiki/Affordance*). [↑](#footnote-ref-7)
8. mLearn, 2011 statistics, Beijing Normal University [↑](#footnote-ref-8)
9. “I would personally not use terms like formal and informal learning – I would use learning - I might be persuaded to use learning in informal contexts and learning in formal contexts, but I would want to be persuaded that neurologically or otherwise there are any differences in the approaches to learning in those two contexts. I think we need to re-educate ourselves and start to take **all the learning that’s taking place all the time everywhere** much more seriously also in formal contexts, and I think these devices allow us to do that….learning is a conversation…” [↑](#footnote-ref-9)
10. In this context I refer to cloud computing as the provision of a service using a central storage/delivery mechanism – which can support moving across locations, time, devices and contexts. [↑](#footnote-ref-10)
11. Ally, M, mLearn 2011 Proceedings, p5 [↑](#footnote-ref-11)
12. Interview, Mike Sharples, Open University, Milton Keynes, UK, October, 2011 [↑](#footnote-ref-12)