



mLearning Devices

Performance To Go

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*Out in the woods
Or in the city
It's all the same to me
When I'm driving free
The world's my home
When I'm mobile
- Pete Townshend*

It's not about learning. That may seem like a strange way to start out talking about mLearning, but there are a number of ways you need to think different to get your mind around mLearning, and this is the first. The point being, we don't typically learn for learning sake; it's not about mental self-gratification. We learn to accomplish something: to get better at things we need to do, to better perform those things we want to do, to be more effective, more efficient, smarter, even wiser.

It's about doing. It's about ensuring we're as capable as we can be in our performance, whether in our office, at home, or out and about. It's ensuring all folks, whether novice, practitioner, or expert, have available the resources to perform. This includes mobile performance as well as learning augmentation.

Back in 2000 I was asked by LiNEzine's editor, Marcia Conner, if I would write an article on what she called mLearning (I had to ask what it was!). I hadn't really thought about mobile learning at the time, so I wrote a thought piece, including this line: "eLearning independent of location in time or space". I *did* have a richer picture of eLearning than just courses, and presented some thought examples that illustrated what I meant, but also talked a lot about tracking learning and so on. Overall, it was a bit naïve.

However, as it was one of the first articles about the potential for mobile learning, it got people to talk to me, and I went out on the stump for mobile learning with some similarly enthused colleagues, and actually got to do some mobile projects, attend some conferences, write a research report on it with some of those same colleagues, and in general think about it a lot more. And that's led me to where I realize there's a lot more potential than we're tapping.

I was also optimistic, stating that we were on the cusp of mobile learning. Eight years later, we're now beyond the cusp, though not as far as we could be. What we need, I think, are some frameworks, examples, some support in getting our minds around *Goin' mobile*. I did that in the mobile design piece I wrote for the eLearning Guild's first 360 Research Report on mLearning. So what I'm doing here is filling in a bit of structure around devices that I think you should also know.

But, why? (or, what the C-Suite needs to know)

Why be excited about mLearning? First, we need to be excited about supporting performance. Then we have to realize we're increasingly mobile. And we have to see that we have increasingly powerful and mobile technology. Then we can think about the opportunities for mobile learning.

Things aren't getting any easier: the rate of change is accelerating; the amount of information we have available is reaching astronomical proportions, everything's moving faster. As companies can produce faster, they are having to compete on their ability to create a customer experience, not just on product or features. Competitiveness comes from the ability to innovate. And innovation means learning.

In addition, jobs are increasingly mobile. What with tele-commuting, free-agent nationals, and more, workers are increasingly on the road. According to one report, 20% of employees say that 50% of their time or more they're out and about. Other estimates are as much as 40% of workers are at least partly mobile in their job. And their learning needs are harder to address in the office, what with meetings, tasks, whatever. There's lots of time available in other places: the car, waiting in line, at home, but it's not at the desktop at the workplace.

If you're at the desktop, we give you workflow learning or performance support, or eLearning. However, those aren't going to meet all needs, and they're not going to be everywhere you need them. The point is, mobile gives us a new channel to cover the space of learning needs.

Mythconceptions:

Before we get into the devices, let's briefly cover some of the classic unwarranted fears.

My employees don't have mobile learning devices

When I run sessions on mlearning, I start out by asking the audience "how many of you have already purchased a mobile learning device?" Very few, if any, raise their hands. Then I say "Sorry, let me restate the question: how many of you have a cell-phone, iPod or MP3 player, or PDA?" *Everyone* raises their hand. "Hello..." They laugh, getting the point: everyone's got 'em. Now you get it, too.

mLearning is just eLearning Lite™

It is (by and large) *not* about putting a course on a phone, even a boiled-down one. That's not what we mean 95% of the time. It's about a learning adjunct, or a performance support tool. Be very clear about that. There are times when you might put mini-courses on a mobile device, but that's not the way to bet (or think).

Those small screens are too limiting

Sure, those screens are small, and to be honest they are limiting. But not *too* limiting. There are lots of things you can do with a small amount of text, an image, or a video. Of course, you often have audio as well, and screens are getting larger fast. Yes, you'll have to rethink things a bit, but that's not a reason to abandon an increasingly valuable channel to support your people.

Too hard/costly to program these things

Two answers here. First, it's not particularly hard to program these things, it's not much harder than programming anything else. And, consequently, it's not that costly. But the second answer is, there're lots, and increasingly more solutions that don't require programming.

It's about content

It can be, but it's not always nor completely. Sometimes it's about interactivity, or communication. Content's the easy solution, but it's not the only one.

Always connected

Before the days of mobile data, I used to synch my PDA to my computer. In fact, I still do synch my smartphone to my computer when I'm near it. I can do lots over mobile data, but not (yet) sync the two when they're not in proximity. Yet, it proves hugely valuable to have that connection. And that's the point; there're lots of things you can preload that make you much more effective and/or efficient, regardless of being ubiquitously connected.

Always interactive

Interactive is hugely powerful, don't get me wrong. But there are lots of times when static content is useful, as well. I put copies of my diagrams on my phone to share with people if we're trying to solve a problem or communicate. You can't even usually read the labels, but it's enough structure for me to communicate.

Limited to (smart) phones

Smart phones increasingly have all sorts of capabilities, but there are lots of useful things being done with dedicated devices too, from non-smart phones, through media players, and traditional PDAs. Don't be limited!

I don't know what they have

This is one of the biggest problems we face, but it's not a barrier, as there are lots of things that can be done that will hit a large subset. And, in many cases, you can either control it or make reasonable guesses about what all or most will have.

They're not secure

I find it funny when people get all upset about how data could be insecure if put on these devices. The reason it's funny is that so often it's the same information they'll put into notebooks for learners to take home and travel with! Seriously, there are two types of ways information can go awry (intercepted devices or intercepted communications), and for each there are some solutions.

Ok, we're ready to move on. I hope you've seen that there are solid reasons to consider mobile learning, and are looking for a little more guidance.

The technology it's not about

So, you get the picture, and you're ready to start. The very first thing you should know is that it's not about technology. Seriously. There are very cool devices out there, and I've lusted after many and actually laid out my hard-earned dollars for some of them (I'm a late adopter; I won't spend a cent until I know the value I'll get from it). But it's not about the devices, it's about the capabilities. That said, the easy way to get to the capabilities is to talk about some devices, and then abstract from them. So let's talk technology.

Prototypical devices

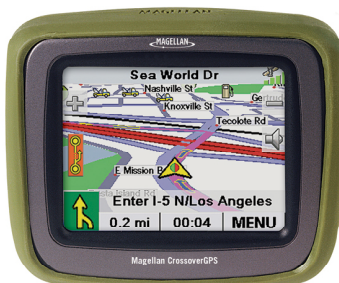
Cell (or, properly, mobile; cellular technology is long-gone) phones are the prototypical mobile device. They're portable, they have audio input and output, and a keypad, and some sort of screen. They may have many other things too, bridging the gap between the phone and other sorts of devices. And, of course, they have connectivity through the wireless phone system. As a note, while common parlance calls these phones *cell phones*, and occasionally I may use that term, more properly they're mobile phones, as the cellular technology used in the earliest versions is not really relevant.



Another relatively ubiquitous device, or at least one that many folks understand, is the media player. The most commonly known one is Apple's iPod and its more generic cousins, the MP3 player. They have audio or video output, some form of control (e.g. the clickwheel), and typically a screen. They typically don't have regular connectivity, but instead are synchronized (synched) with a computer where you actually gather or specify the information to be loaded. Spoken audio is typically referred to (from the iPod) as a *podcast*, while captured video can be a *vidcast* or *vodcast*.



An unusual offshoot is the GPS (Global Positioning System) system. Originally for tracking one's location and providing navigation directions, increasingly they're coupled with other systems and can identify addresses, assist with traffic, and provide information on nearby accommodation, meal, services, and even shopping opportunities. Greater integration allows them to serve as mobile phone 'hands free' units in cars. They also are including media players, contacts, and other capabilities.



Another ‘out of the box’ device is the game system. There are few, but they’re increasingly capable. From Nintendo’s GameBoy, through Sony’s PSP, to Nintendo’s DS, they’ve added or made available wireless capability, media playing capabilities, internet browsing and more. While they’re a bit hard to program, they have great media and interaction. The PSP, in particular, supports the internet as well as a variety of media and is a more open system, providing potential adaptability to learning needs. Nintendo is more proprietary, though it has added a web browser, but has available a personal learning support game, *BrainAge* which purportedly increases your thinking ability!



Then there’s the standard Personal Digital Assistant (PDA), such as Palm made successful (after Apple pioneered with the Newton). They typically have a touch-sensitive screen, though they can have a keyboard. They have Personal Information Management (PIM) software capabilities like calendars, ToDo lists, memos, and address books. Some of them are expandable, with 3rd party software of many varieties. Some need to be synched, while other can connect to a wireless network through one or another mechanism. And more...



At the other end of the spectrum is the traditional laptop. Many people tend to ignore laptops as a mobile device, but even when disconnected from the network they can hold data, and increasingly they can be connected in a variety of ways. You can have one at the park and be taking an eLearning course, or with you to a job site and access relevant data, either on hard drive or online. They have keyboards and screens, and can have audio (even stereo), and even cameras. And, as you can see, they can be quite small and light. The distinction between laptop and PDA is diminishing. That said, the subsequent discussion will largely discuss mobile devices *not including the laptop*. Implicitly, many of the things said will also apply to the laptop, but so also does pretty much everything true of a desktop when a laptop is wirelessly connected.



From here, the picture gets more complicated, as there are many combinations of these capabilities, and others. There are watch versions of PDA's, there are GPS devices, and there are additions of cameras both still and video, full keyboards, and more. That's not including the data capabilities and communication capabilities. Let's look at a prototypical smartphone, the Treo (I have one, so it's easy for me to talk about). It's a phone, with a camera and PDA built in. It can also connect to the Internet for email and web browsing through the phone connection. It can sync to your computer as well. It also has networking. Apple's forthcoming iPhone promises all this (except the large library of 3rd party software) and adds the other networking approach as well. And they're well integrated, so you can call a phone number from your address book, or click on a phone number in an email and dial it.



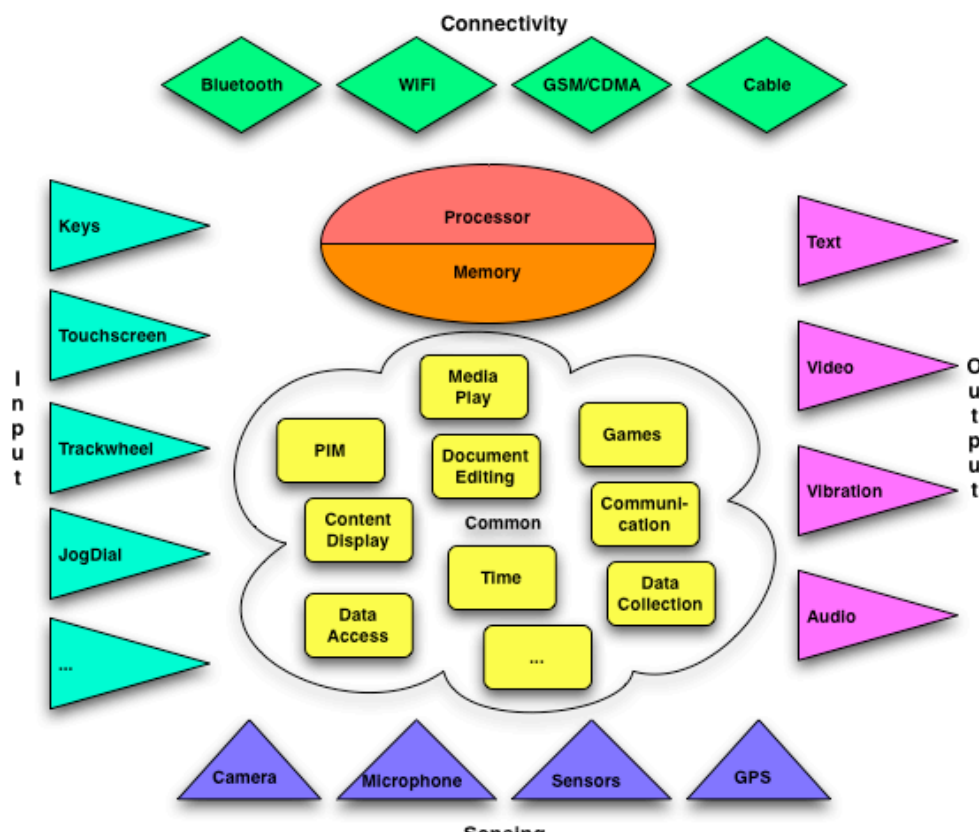
Mobile devices in themselves make us more effective, even before we start thinking about our learning opportunities. Our brains are great pattern matchers, but they're not good at remembering arbitrary details. These devices are the reverse, they can't do original pattern-matching but they're great at storing whatever they're told. Consequently, a person equipped with these devices is really smarter than a person who isn't supported in their tasks. I've deliberately pushed what I could either offload to a mobile device or what I could add to my capabilities through it. Consequently, I've got everything from a tea-timer to a PowerPoint presentation controller loaded onto my phone. And that's not counting what I can access through the web.

Before we go on to think about the learning applications, however, we've got to find a way to step above the individual devices and think about them in a more generic way.



The Mobile Heart

What do these devices have in common? In short, they're processors in a lightweight and small housing with connection, input and output, sensors, software, and data storage. That is, they're basically portable computers with interesting ways of being talked to by people and other computers. So let's explore the ways we can talk to them and them to us, and the ways they can connect.



Input/output

In human-computer interaction, we talk about input and output, I/O. That is the input to the device, and the ways the device can provide output to us (yes, it could be the other way around, but this is the standard). What are our input devices, and output devices?

Another way to think about it is what sensory channels are being used? Our usual channels are visual, auditory, or kinesthetic (smells have had limited success, and with taste, well, who *knows* where it's been?). At least for mobile.

So, we can consider a matrix of:

	Visual	Auditory	Kinesthetic
Input	Camera	Microphone	Keyboard, rotary (knob/dial), Touch or motion sensors
Output	Screen, projector	Speaker(s)	Vibration

So, as mentioned, most devices have screens, but some do not and your only feedback is what you hear or feel. Some have speakers (or headphone jacks, same thing). Most have switches or buttons or keyboards or keypads or 5-way navigator or touchscreens. Some even have motion sensors within them. And some devices have pretty much all of these!

Note that the most variety is in the kinesthetic input to the system. And my simple distinctions get more complex, so a touchscreen is context-sensitive as what your touch means can differ by what's on the

screen. For that matter, different buttons can mean different things depending on what's displayed on an adjacent screen. Finally, it's probably not too far off when the buttons themselves can have different labels (if we don't move entirely to touch screens).

However, it's useful to think about being able to deliver sounds or images and having users being able to interact with the system to distinguish between options or choices. There are lots of different ways to do it, but basically it's information coming in, and options for the users about what information they want next.

Connection

Another technical issue that distinguishes between devices is how they're connected. One of the issues is whether they're fully connected or only intermittently. If they're not fully connected, you may have issues of determining what needs to be ensured that it's available *a priori* instead of having the luxury of providing what's needed when it's needed. The primary way they can be connected is *wired*, where the device is connected via a cable to a laptop or desktop and *synchronized* (synched) so that the information you've specified manually or to be automatically loaded onto your device is downloaded (and whatever you've input can be uploaded).

Then there're ways that the devices can be connected *wirelessly*, using signals to communicate. While the distances can vary across the continuum, three major categories have become familiar. The first is so-called Personal Area Networks, that range from 1 – 30 feet. The next level is Local Area Networks, which range to as far as 200 feet. Finally, there are Wide-Area Networks that can range almost anywhere you can go. Note that either can be on essentially all the time, or only when available or deliberately asked for.

There are tradeoffs between the various technologies. Some require a fair bit of power, or a direct line-of-sight, or don't have much bandwidth, or can be interfered with, or have licensing fees attached. Also, some have managed to garner more support than others, or maybe a general standard versus a proprietary one. There's no one solution, different situations will require different approaches. There are lots of technical details, but the issue here is just to get you familiar with some of the names and the categories they fit in.

Personal-Area Networks

Technology	Characteristics
Cable	Direct wired connection. Least complicated, least flexible.
IR	Infra-Red light - Inexpensive, but increasingly out of favor as it requires line-of-sight.
Bluetooth	An increasingly common networking standard found in many devices. Costs continue to go down and capability goes up, but it does have power requirements.

There are lots of details, but the important thing to know is whether you have PAN capability or not. While it's got the lowest range, it also can provide the most detailed location data (though there are other ways to accomplish this).

The next level up, Local Area networks, are dominated by what is colloquially known as WiFi, and technically is based upon the IEEE 802.11 standards.

Local-Area Networks

Technology	Characteristics
WiFi	IEEE standard 802.11 for wireless networking, with several current or coming standards including b , g , and n .

There are several, so they started with **b**, with a reasonable bandwidth. The current standard is **g**, which has almost five times as much bandwidth. Currently **n** is beginning to show up, which is something like four to five times faster than **g**. 802.11 is the ‘wireless’ internet system that can be used in your house, power the ‘hotspots’ you find at coffeeshops hotels, and airports, and even the entire downtown section of certain cities.

Wide-Area Networks

Technology	Characteristics
GSM	Global System for Mobile - the major telephone and data standard used in Europe, and approximately half of the US.
CDMA	Code Division Multiple Access (aren't you sorry you asked?) - One of two major standards used in the US, with less penetration overseas.
WiMax	A promised wireless, broad-reach, broadband network. It's technically feasible, and several industry moves suggest that it will be coming.

Both GSM and CDMA are mobile phone technologies, and both also handle data. They have various technologies that continually push the bandwidth available for data, with various acronyms (EDGE, EVDO, etc), but the important thing to note is that they're available anywhere you can get mobile phone service. The available bandwidth will vary depending on carrier and location, however, with downtown areas of major metropolitan areas most likely to have the highest data capability (just as they're most likely to have a good signal). WiMax is a different approach that's not data piggybacking on voice technologies (though they are separate), but instead will be internet first, but capable of Voice over Internet Protocols (VoIP).

Wireless Data Standards

A few more TLAs (Three Letter Acronyms) you should know about include WAP (Wireless Application Protocol), WML (Wireless Markup Language, SMS (Simple Messaging Service, aka text-messaging), and MMS (Multimedia Messaging System, aka picture mail). The latter two, in particular, have a role to play in mobile learning.

WAP is a format that allows the creation of a web browser on a mobile device. It's a lightweight way of bringing in internet data into a readable form. WML was designed to accompany WAP, and provide a stripped-down form of XML suitable for mobile devices. As devices get more powerful browsers, these standards are being largely bypassed. Neither WAP nor WML is a top level issue, but it's worth having at least this much exposure to the terms.

SMS

SMS, or text-messaging, is a way to send 140 characters of text, a very brief message, to another phone or to an email address. This may sound limiting, but SMS is being greatly used in the US and many countries worldwide. More messages are sent per day than there are people in the world, according to the Did You Know 2.0 video (a worthwhile watch, BTW). Most phone providers make messaging a low cost option, and younger folks in particular have taken to this new medium.

In addition to interpersonal information, services can provide broadcasts of messages to lists of phone numbers, providing a way to deliver up-to-date, up-to-the-minute information, such as emergency information. . The messaging capability has led to new services, so mobile social networking sites like Twitter use this capability for people to ‘post’ what they're doing and allow interested others to track what they're doing.

MMS

MMS is a way to send not only text, but media such as audio, images, and video, from mobile devices (specifically, phones) in a way different than via email (though some may support that as well). Widely used in Europe, it's not as prevalent in the US where we have not conquered differences between providers.

In the future, being able to send a mediafile to share with other individuals may be a powerful support for collaboration.

Sensors

Mobile devices also increasingly have some awareness of the world around them, or can. They can see, feel, or even have a sense of place, as well as some more unique and idiosyncratic senses.

Microphone

One of the ways devices can detect the world is by microphone. Phones, obviously, collect data to broadcast to another, or even to store as voice memos. Sound could be used in more interesting ways as well, though little has been done about this to date.

Camera

One of the most common forms of sensor increasingly is the camera. Devices can take pictures and even video, and make it available for sharing through email or MMS. By the time you read this, new devices may actually incorporate two cameras, one for the front and one for the back. This allows not only taking pictures, but viewing the screen while sharing your own image, for video conferencing on the go.

Camera's open up a new data communication method as well QR (for Quick Response) codes are special tags that can be put out in the world and that camera and software equipped devices can read unambiguously and are optimized for quick delivery. So, for instance, a site could have a tag that if scanned, could provide relevant information about a particular place. They can support a URL, text, or a phone number. For instance, here's the QR Code for my blog, learnlets.com:



GPS

Another form of context-sensitive delivery can be accomplished through devices possessing a Global Positioning System. GPS triangulates location through a series of satellites above the earth, allowing precise location (within meters) as long as you have a reasonable line of sight to the sky. While triangulation between cell phone towers can yield location as well, GPS is more precise. If location is important, you want either a PAN telling you where you are if it's specific locations, or GPS if tracking things anywhere is important.

Other, more unique

Ways for the device to know where you are include reading information in the local area. Unlike the QR Code, which uses the camera sensor, bar-code readers and Radio Frequency Identification (RFID) require specialized hardware, but have been used in a variety of mobile applications around shipping.

Motion

Cameras are a visual sensor, but another form of sensors being seen are motion sensors. These can tell how a device is being held or being moved. The motion sensors have been seen in game platforms, and in unique interfaces, but are opening up new opportunities for ways to communicate to and through the device.

The technology ‘take home’

The point is to have a handle of the high-level capabilities: a device that can interactively deliver information wherever the user happens to be. There may be details about which connection method, what form of input and output, and how portable and how fast it can access and gain data, but the real issue is how we use that capability to provide learning.

From here, I highly recommend you get the eLearning Guild’s 2007 *Research 360° Report on Mobile Learning*. It’s available to members (associate membership is free, but you might need to take the survey), and includes my chapter on design that’s a complement to this piece as well as excellent articles by co-authors and mobile experts Judy Brown & David Metcalfe, research results by Steve Wexler, and resources compiled by Angela Van Barneveld.

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Acknowledgements

Along the path, I hooked up with several of the early experts including David Metcalf, Judy Brown, and Harvey Singh. In addition to appearing together in several different ways, we also ran a mobile workshop together. I’ve subsequently interacted with Ellen Wagner & Mark Oehlert about mobile learning. Some of what’s presented here I learned from them, and many discussions with other folks too numerous to mention, but certainly thank. I’m also indebted to my colleagues Jay Cross, who inspired me to get started on documenting this, and Jim Schuyler, with whom I’ve collaborated on several applications of his ubiquitous experience platform.

About Quinnovation

Quinnovation works with organizations looking to move up the eLearning ‘value chain’, strategically using IT to deliver performance improvement results. Quinnovation combines a deep cognitive background, strong technology experience, and sound business understanding to deliver innovative thinking, with a track record of insightful strategic analysis and pragmatic and successful solutions. Quinnovation services include eLearning ‘makeovers’ and ongoing strategic partnerships. Recognized as a thought leader through presentation publication, and results, Quinnovation has delivered cutting-edge designs for Fortune 500 companies, business, government, education, and not-for-profits.