July 2007

MOBILE LEARNING

What it is, why it matters, and how to incorporate it into your learning strategy

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The eLearning Guild Research Pledge

It is our goal to provide the best research based on the best data. Indeed, with well over 25,000 e-Learning professionals – designers, developers, managers, and executives who are passionate about the art and science of e-Learning – The Guild has an unmatched and enormously rich and varied pool from which to gather data.

But let us be very clear that this data represents one thing and one thing only: the preferences, opinions, loves, loathings, trials, and triumphs of eLearning Guild members. Does the information represent the e-Learning industry as a whole? Probably, but we cannot – and will not – make that claim.

And anyone else publishing articles or research that makes that claim – and makes it using a much smaller data set than we would ever consider using – is presumptuous at best.

Here are the five articles of practice that drive eLearning Guild Research:

1. **Live, interactive, always-up-to-date.** In addition to providing members with truly useful visual analytics tools, the underlying data is always up to date and displayed in real time.

2. **Number of respondents.** Our research reflects the opinions of thousands of e-Learning professionals. The Guild has more, and better, data than is available any place else. Indeed, we will never publish results from a survey unless we have received at least 750 fully-vetted responses.

3. **No reliance on outside sources that will bias our reports.** With thousands of members updating their profiles and completing surveys, the Guild does not need to rely on outside sources for contacts to complete surveys.

4. **Funding.** The eLearning Guild funds its own research. We do not accept any form of sponsorship from vendors and/or suppliers for public research activities.

5. **Guaranteed Fresh.** Every 90 days we remind members to update their profiles and survey information. If a member goes a year without updating information, that information is filtered out of our live reports.

For the Guild’s 360° Reports we carefully review respondents’ data for accuracy and consistency. If we detect an anomaly, we contact that respondent and ask that he/she clarify his/her responses. If any issue cannot be resolved, the data from this respondent is discarded and is not included in our report.

The Guild is truly an amazing organization and I feel privileged to be a part of it. It is my goal to leverage the depth, breadth, and spirit of the Guild’s members to produce the gold standard in e-Learning research.

Sincerely,

Steven S. Wexler
Director of Research and Emerging Technologies
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Report Overview

By Steve Wexler
The eLearning Guild

Think differently

If I had a nickel for every time my co-authors expressed the need to “think different” when trying to help me wrap my common sense around the concept of m-Learning I would have, well, around 20 nickels.

My colleagues were trying to get me out of the traditionalist’s trough and see how learning professionals can have an impact in more areas than they have now.

I suspect that many Guild members share my initial inability to see the enormous promise of m-Learning, let alone people who are still grappling with the term “e-Learning.”

So, just what do we mean by “m-Learning” and why will it be important to you? We will propose a working definition of m-Learning in a moment, but first you need to get the image of taking a “click-the-next-button” type of e-Learning course out of your head. Yes, you can offer that type of learning on a mobile phone (and especially on the new crop of smart phones) but you would be doing yourself, your learners, and your organization a great disservice if you think of m-Learning as just being what you are doing now, but on a tiny screen.

Think ahead

Think ahead six to 18 months. More than half of your learners now carry a device that they have with them all the time. They make phone conversation with it, browse the internet, send and receive e-mails and text messages, watch movies, and both listen and create Podcasts with it.
They love this device. And just as they would never think of leaving the house without their wallet and car keys, they make sure to take this with them as well.

So, what will you do to help these individuals interact with, create, and share information, using this device? That is, what will you, as a learning professional, do to help these people be more productive?

Remember, we’re not talking about ten years into the future, just a year or so. We’re just a few technological and mindset inches away from people having very powerful, small – and fun – devices that are with them all the time and that, well, work. We maintain that if your organization does not plan to take advantage of these devices, it will fall behind its competitors. And if you, personally, do not plan to take advantage of these devices, you risk having your department marginalized.

**Won’t the things we do today just work?**

A common concern expressed by the Guild members that completed our survey is that content developed for traditional media will not transfer well to portable devices. Indeed, that was members’ number one concern, followed closely by lack of a standard, and screen size, as shown in Figure 1.

![Figure 1 – Top three barriers to adopting m-Learning.](image)

**Can’t we just buy iPhones?**

One of the truly miraculous things about the iPhone is how many Web sites work – and work well – without any thought to redesigning them for a small screen. I’m not for one second saying that the phone, in its current incarnation, is the ultimate device, but it is the first small, portable, won’t-leave-home-without-it device where Web sites not designed with a small screen in mind
just work. Yes, I know, it doesn’t yet support Adobe Flash, but I was amazed at how many Web sites just work, and work really well.

Figure 2 – A screen shot of The eLearning Guild Web site as taken on a 1,024 x 768 resolution monitor.

Figure 3 – Photograph of The eLearning Guild Web site displayed on an iPhone. Almost everything on the site works, including the ability to take a survey and update a profile.
It isn’t just iPhones that get to boast that many interactive Web sites just work. Consider the Humentum TrackBuilder simulation running on a desktop in Figure 4, and running unmodified on a Pocket PC in Figure 5.

Figure 4 – A Humentum TrackBuilder simulation on a standard PC screen.

Figure 5 – The same application running on a Pocket PC running Windows Mobile 6.

This application will not run on an iPhone as the iPhone does not support Adobe Flash or Adobe Flash Lite ... yet.
So, given that these things just work, can we all go home early?

Think more

The fact that *some* applications written for desktop and notebook computers work on *some* mobile devices is wonderful, and certainly harkens the near future when many existing learning applications will work on many devices.

But isn’t there more you can do, outside of creating a course, immersive learning simulation, or other formal learning activity, that will help people be more productive? Isn’t there more that you, as somebody who has it in his/her DNA to share information, can do to help people be more productive (besides porting that course from a desktop to a mobile phone?)

Another way to look at this is to consider what Dr. Conrad Gottfredson calls the “Five Moments of Learning Need,” as enumerated below:

1. When learning for the first time
2. When wanting to learn more
3. When trying to remember
4. When things change
5. When something goes wrong

Is there a way to better meet some or all of these needs by combining learning expertise and mobile devices?

And beyond addressing these needs and making these mobile individuals more productive, what can you do to help these people *contribute* information and learning to the organization? As we move to a learning 2.0 paradigm, where we have people not just consuming learning but creating learning, what will you do to make this easier?

Let’s again jump ahead six to 18 months where more than half of your colleagues have a favorite mobile device with them all the time. It turns on instantly; it can connect when people need it to connect. Remember, people don’t just carry this device, they *like* using it. As learning torch-bearers, shouldn’t we try to deliver people what they need on a device they *want* to use, not on a device they *have* to use?
Blended learning in your pocket

Besides its ubiquity, this “device of the near future” has something else in its favor: It’s the ultimate blended learning machine. Imagine somebody is on a long flight and wants to prepare for a big presentation. This person can listen to a Podcast, read background information on the people who will attend the meeting, engage in an immersive learning simulation, and, 30 minutes before the meeting, have any new information that will make the upcoming presentation more effective be “pushed” to the device.

And, the person can deliver that presentation from his/her mobile device; no need to bring a notebook.

A major portion of this report centers on how to do these things, but before we get into the particulars of examples, business considerations, design considerations, and the like, let’s first define what we mean by “m-Learning” and let’s get a handle on where we are today.

What is Mobile Learning (m-Learning)?

The eLearning Guild defines Mobile Learning (m-Learning) as follows:

Any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse.

Note: By “reliable connectivity” we mean connectivity that you expect given shortcomings of your travel area’s mobile and broadband infrastructure. The Guild recognizes that individuals may not have persistent nor fast connectivity (especially in the U.S.), but if these shortcomings are expected, then corporations and learning professionals can work around them. We will explore this in depth later on.
Do laptops count?

Now if I had a nickel for every time my co-authors and I debated this issue, I would be a wealthy man!

Perhaps the question should be “When do laptops count?” for although our definition explicitly mentions “fits in a pocket or purse” the issue is more about convenience and availability than size. If an individual is out and about and is a “learning target” (meaning that either this person wants or needs information, or somebody wants to push information to them), if the laptop facilities this type of exchange, it counts.¹

Do Guild Members think laptops count

When we first fashioned the survey that fuels this report we were still coming to blows as to whether or not laptop computers should be included in our report. Indeed, when we asked members’ what types of devices they would consider targeting, we included laptop computers (see “Devices you use, or are considering using, for m-Learning” on page 36.)

To clarify the issue we followed up with all respondents who indicated that they had or were planning to implement an m-Learning solution, and asked them if they were targeting laptops, smaller devices, or both. Our findings are in Figure 6.

Figure 6 – Responses indicate that for the most part they will be targeting smaller devices for their m-Learning initiatives.

¹ My personal experience suggests laptops don’t “count” as I find their size cumbersome and the boot-up time tiresome. Up until recently I used to bring my laptop to the gym, and after a workout I could check e-mail, surf the Internet, and settle bets among my breakfast companions. Now one device, my iPhone, handles my workout audio and subsequent breakfast browsing.
Think now – from innovation to implementation

So far, much of our discussion has centered on what you will be able to do down the road. We’re going to shift our focus and take a look at more immediate concerns as m-Learning moves with speed and conviction beyond clever innovations to concrete implementations.

Where members are today and what they plan for the next 12 months

Figure 7 shows where member organizations are today in terms of deploying m-Learning. Notice that 16.4% of members have either implemented or are designing the first offering.

![Figure 7 – Adoption of m-Learning for all member organizations.](image)
Members outside the U.S. are even further along in their adoption of m-Learning, as shown in Figure 8.

**Figure 8 – Adoption of m-Learning broken down by country. The U.S. and Canada lags behind.**

If we look at members’ plans for the next 12 months we see that a very large percentage of Guild members plan to do more m-Learning (see Figure 9).

**Figure 9 – M-Learning plans for the next 12 months broken down by country.**
Is m-Learning working?

For the 9% of Guild members that have implemented it, m-Learning appears to be working, as evidenced by results shown in Figure 10 and Figure 11.

![Figure 10](image)

Figure 10 – Members that have implemented m-Learning report on ROI.

![Figure 11](image)

Figure 11 – Members that have implemented m-Learning indicate the extent to which they believe it has helped or hurt their organizations.
### Barriers both anticipated and real

As with any endeavor worth doing there are hurdles to surmount, and the ones associated with m-Learning are challenging. It is encouraging to see that those who have implemented m-Learning report that the hurdles are not as high as one might think.

In Figure 12 we see a list of barriers to adopting m-Learning as expressed by survey respondents who have not yet implemented m-Learning.

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<th>Element</th>
<th>Not applicable</th>
<th>Not a barrier</th>
<th>Small barrier</th>
<th>Large barrier</th>
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</thead>
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<td>49.9%</td>
<td>34.4%</td>
<td>9.2%</td>
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</tr>
<tr>
<td>Lack of standard</td>
<td>50.0%</td>
<td>32.8%</td>
<td>10.6%</td>
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<tr>
<td>Screen are too small</td>
<td>37.5%</td>
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<td>15.4%</td>
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</tr>
<tr>
<td>Cost</td>
<td>44.8%</td>
<td>34.3%</td>
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<tr>
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<tr>
<td>User interface is cumbersome</td>
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<td>44.7%</td>
<td>17.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Inputting text is too cumbersome</td>
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<td>22.1%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Don't know how to integrate with LMS</td>
<td>34.6%</td>
<td>34.3%</td>
<td>19.4%</td>
<td>11.7%</td>
</tr>
<tr>
<td>We don't know how to design it</td>
<td>27.2%</td>
<td>40.7%</td>
<td>24.3%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Learners will resist</td>
<td>28.0%</td>
<td>41.6%</td>
<td>23.9%</td>
<td></td>
</tr>
<tr>
<td>Management will resist</td>
<td>37.2%</td>
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<td>23.4%</td>
<td>7.3%</td>
</tr>
<tr>
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<td>37.8%</td>
<td>25.0%</td>
<td>8.4%</td>
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<tr>
<td>Battery life is too short</td>
<td>18.7%</td>
<td>40.9%</td>
<td>31.2%</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

Figure 12 – Anticipated barriers among members that have not yet implemented m-Learning.
In Figure 15 we see the same barriers as through the eyes of those that have implemented m-Learning.

**Please indicate which elements below are, or you believe will be, a barrier to your organization adopting mLearning?**

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<th>10%</th>
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<tr>
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</tbody>
</table>

*Figure 13 – Barriers as reported by members that have actually implemented m-Learning.*
What members want

As part of our survey we asked Guild members to tell us what things they want and how much they want them, as shown in Figure 14.

![Figure 14](image)

Some of these capabilities are in the collective hands of the vendors and solution provider community, but The Guild will attempt to offer some assistance in regards to the request for great examples that show how m-Learning can benefit organizations. We also offer our assistance by providing a case study that explains how you can integrate m-Learning with a Learning Management Systems (LMS).
Think how

At this point you may find yourself wondering any or all of the following:

- My organization has standardized on one type of mobile device for all of our employees. Is there something I can do now to support them with m-Learning?

- The people in my organizations use many different types of mobile devices from different manufacturers. Is there something I can do now to support all these people using different devices?

- We’re not ready to do m-Learning yet, but is there something I can do now to be prepared?

The answer to all of these questions is “yes,” so in addition to providing a full analysis of the survey data we’ve received, the Guild has tapped some of the industry’s most knowledgeable and passionate experts on m-Learning to share their expertise. In this report it is our goal to

- Help you see what you can do with m-Learning today
- Show you how to design m-Learning
- Show you where to find the tools and resources to build m-Learning
- Help you (and your organization) see the business potential for m-Learning
- Prepare you for the future of m-Learning
Survey results

In this section we review and analyze responses we received to the Guild’s Mobile Learning survey. Key findings include:

- 66% of Guild members are at least researching m-Learning initiatives and 9% have actually implemented m-Learning in their organizations.
- 44.8% of Guild members plan to do more m-Learning in the next 12 months.
- The U.S. and Canada lag beyond other countries in both current implementation and plans for m-Learning. 24% of Guild members in other countries have either implemented or are designing m-Learning offerings vs. 14% in the U.S. and Canada. Plus, 57% of International
members plan to do more m-Learning in the next 12 months vs. 41% for the U.S. and Canada.

- The top three barriers to the adoption of m-Learning are concerns over content built for traditional media not working on the new devices, the lack of a standard for mobile delivery, and concern that screens are too small.

- The iPhone, and iPhone-influenced products coming out, are expected to allay the concerns over compatibility and screen size, and have a significant impact on the adoption of m-Learning, as many learning activities developed for the Web will work with little or no change on this new crop of portable devices.

- Members who have implemented m-Learning report a 52% improvement in user performance and an 85% increase in making learning available to users.

- Of members who have implemented m-Learning, and who are able to evaluate return on investment, 88% report a positive ROI.

**Embracing m-Learning**

Judy Brown, former director of the Academic ADL Co-Lab in Madison, WI, and a fervent believer in the benefits of m-Learning, presents a buffet of different m-Learning examples with the hopes that at least one will whet your appetite for what you and your organization can do with m-Learning.

**Point-and-Shoot learning**

Renowned learning researcher, analyst, and consultant David Metcalf shares some of the truly innovate approaches to m-Learning he’s seen in his travels among his clients and colleagues.

**Don't dream it, do it: m-Learning by design**

At this point we believe that you will no longer be asking “Why should I do this?” but will instead be asking “How do I do this?” Clark Quinn, expert in immersive learning simulations and sought-after learning consultant, takes you through how to design effective m-Learning interactions.
Tools for m-Learning

With Clark Quinn having covered how to design m-Learning, Judy Brown returns to discuss where you can find tools and resources to build m-Learning.

The Business-value proposition of mobile learning

David Metcalf explores business drivers for m-Learning, and arms you with information to help you sell m-Learning into your organization.

iPhone: Is your e-Learning ready for m-Learning?

Recognizing that we could not do the subject of m-Learning justice without discussing Apple’s iPhone, Brent Schlenker, The eLearning Guild’s research and technology evangelist, explains why an iPhone (not the one he has, but either the next-generation version or perhaps a similar device from another company) will truly bring an era of mobile learning.

The future of mobile learning

David Metcalf shares his insights as to why the U.S. and Canada lags behind other countries, and what we can expect in terms of connectivity, bandwidth, pricing, and availability in the near future.

Notes from the field – interviews with practitioners

In this section Angela van Barneveld, Program Manager at a global Business Intelligence and Corporate Performance Management solutions company, summarizes insights from various practitioners who have shared their trials and triumphs with m-Learning.

Case study: Integrating m-Learning with a Learning Management System

Tristan Evans, President of Perago Learning Solutions, Inc. explains how his company integrated m-Learning with a Learning Management System, and how you can do the same.
**Case study: A Look at mobility within the walls of Tyco International, Ltd.**

Tyco’s history with Mobile Learning tracks longer than many other organizations. Don McDougal, Director of Learning Technology at Tyco International shares a view into his company’s mobility strategy, and provides us with a unique opportunity to see their progression from pioneers to accomplished experts.

**Resources**

This section contains links to Web sites, books, examples, organizations, and conferences that will help you navigate the m-Learning world.
Survey Results

By Steve Wexler, Director of Research and Emerging Technologies,
The eLearning Guild

Steve brings to the Guild a passion for learning, and for teaching, and over 20 years experience in electronic performance support systems, software development, and technology-enhanced learning systems. He has consulted to, and developed training and learning systems for, major corporations including Microsoft, Chase, American Express, and Citigroup Global Markets Holdings. He has also written several best selling computer books, was chief architect for *Microsoft Windows 95 Starts Here*, the official learning companion to Microsoft Windows 95, and is a top presenter at trade shows and conferences.

Previously, Steve was founder and president of WexTech Systems, where he pioneered the development and use of single-source publishing software and embedded help systems. Steve was also instrumental in the creation of AnswerWorks®, a natural language search engine embedded in scores of commercial products that are used by millions of people every day. Steve attended Princeton University, and the University of Miami awarded him a fellowship.

You can reach Steve at swexler@elearningguild.com
Introduction

In preparing the questions for our survey, my co-authors and I solicited feedback from other Guild members, as well as from vendors and solution providers. We tested the survey for several weeks before going live in June 2007, and at the time of this writing (late July, 2007), we’ve received 940 responses.

In addition to reviewing answers to each question in the survey, we explore correlations among questions (e.g., what are the real hurdles to implementing m-Learning, as expressed by members who have done it, vs. the anticipated difficulties, as expressed by members who are just starting out.)

Note: As with any printed report, the charts in this section represent a snapshot of results as of a certain day. To avoid working with stale data we strongly encourage you to view up-to-the-minute, real-time results using the Guild’s Direct Data Access portfolios. In addition to viewing up-to-date information, you will also be able to find answers to your specific needs by filtering the information based on your specific requirements.

Direct Data Access is readily available for purchasers of this report from the “My Reports” menu at http://www.elearningguild.com/.
Background Information

Training Modalities: Use of m-Learning and Podcasts

In addition to the dedicated Mobile Learning survey that we posted in June, 2007, The eLearning Guild also maintains information about which training modalities members use most often. Of the over 5,000 Guild members that have submitted this information, 19.37% use Mobile Learning sometimes or often, and 16.98% use Podcasts sometimes or often, as shown in Figure 15.

![Figure 15 – Prevalence of Mobile Learning and Podcast use among eLearning Guild members.](image1)

In Figure 16 we see m-Learning and Podcast use among selected industries. Note that these modalities enjoy the most use in the higher education and e-Learning tool and services industries.

![Figure 16 – Prevalence of Mobile Learning and Podcast use in selected industries.](image2)
Survey Respondents' Demographics

Here is a demographic summary of the 940 eLearning Guild members who have completed the survey, as of this writing.

### Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Member count</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>75.6%</td>
</tr>
<tr>
<td>Canada</td>
<td>5.8%</td>
</tr>
<tr>
<td>Int'l</td>
<td>18.6%</td>
</tr>
</tbody>
</table>

**Figure 17 – Survey respondents broken down by Country.**

### Age

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Member count</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) 30 and younger</td>
<td>11.3%</td>
</tr>
<tr>
<td>B) 30+ to 40</td>
<td>30.2%</td>
</tr>
<tr>
<td>C) 40+ to 50</td>
<td>30.8%</td>
</tr>
<tr>
<td>D) 50+ to 60</td>
<td>22.4%</td>
</tr>
<tr>
<td>E) 60+</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

**Figure 18 – Survey respondents broken down by Age.**

### Company Size

<table>
<thead>
<tr>
<th>Company Size</th>
<th>Member count</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 1-20</td>
<td>14.3%</td>
</tr>
<tr>
<td>b) 21-50</td>
<td>4.2%</td>
</tr>
<tr>
<td>c) 51-100</td>
<td>4.2%</td>
</tr>
<tr>
<td>d) 101-500</td>
<td>8.6%</td>
</tr>
<tr>
<td>e) 501-1,000</td>
<td>7.1%</td>
</tr>
<tr>
<td>f) 1,001-2,000</td>
<td>7.8%</td>
</tr>
<tr>
<td>g) 2,001-5000</td>
<td>14.0%</td>
</tr>
<tr>
<td>h) 5,001-10,000</td>
<td>11.6%</td>
</tr>
<tr>
<td>i) 10,001-49,999</td>
<td>16.6%</td>
</tr>
<tr>
<td>j) 50,000+</td>
<td>11.6%</td>
</tr>
</tbody>
</table>

**Figure 19 – Survey respondents broken down by Company Size.**
Figure 20 – Survey respondents broken down by Learners Impacted.

**Learners Impacted**

<table>
<thead>
<tr>
<th>Category</th>
<th>Count of Number of Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 999</td>
<td>24.0%</td>
</tr>
<tr>
<td>1,000 - 4,999</td>
<td>27.0%</td>
</tr>
<tr>
<td>5,000 - 9,999</td>
<td>13.8%</td>
</tr>
<tr>
<td>10,000 - 24,999</td>
<td>13.1%</td>
</tr>
<tr>
<td>25,000 - 49,999</td>
<td>8.3%</td>
</tr>
<tr>
<td>50,000 - 99,999</td>
<td>4.7%</td>
</tr>
<tr>
<td>100,000+</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

Figure 21 – Survey respondents broken down by Job Level.

**Job Level**

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Count of Number of Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practitioner</td>
<td>39.0%</td>
</tr>
<tr>
<td>Manager</td>
<td>26.9%</td>
</tr>
<tr>
<td>Owner/Principal/Executive (CEO, CIO, EVP, SVP, etc.)</td>
<td>8.9%</td>
</tr>
<tr>
<td>Supervisor</td>
<td>8.5%</td>
</tr>
<tr>
<td>Academic Faculty/Professor</td>
<td>7.5%</td>
</tr>
<tr>
<td>Director</td>
<td>7.0%</td>
</tr>
<tr>
<td>Intern</td>
<td>1.1%</td>
</tr>
<tr>
<td>Student</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
## Industry Breakdown

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (University/College)</td>
<td>15.6%</td>
</tr>
<tr>
<td>E-Learning Tool/Service Provider</td>
<td>12.2%</td>
</tr>
<tr>
<td>Healthcare</td>
<td>8.7%</td>
</tr>
<tr>
<td>Financial/Banking/Accounting</td>
<td>7.3%</td>
</tr>
<tr>
<td>Computer Manufacturing</td>
<td>6.2%</td>
</tr>
<tr>
<td>Insurance</td>
<td>5.9%</td>
</tr>
<tr>
<td>Consulting/Business Services</td>
<td>5.8%</td>
</tr>
<tr>
<td>Consulting (Computer)</td>
<td>4.4%</td>
</tr>
<tr>
<td>Manufacturing (non-computer)</td>
<td>3.7%</td>
</tr>
<tr>
<td>Non-Profit/Trade Association</td>
<td>3.3%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>3.2%</td>
</tr>
<tr>
<td>Retail/Wholesale/Distribution</td>
<td>3.1%</td>
</tr>
<tr>
<td>Education (K-12)</td>
<td>2.9%</td>
</tr>
<tr>
<td>Government (Federal including Military)</td>
<td>2.5%</td>
</tr>
<tr>
<td>Media/Marketing/Advertising</td>
<td>1.9%</td>
</tr>
<tr>
<td>Aerospace/Defense</td>
<td>1.8%</td>
</tr>
<tr>
<td>Government (State)</td>
<td>1.8%</td>
</tr>
<tr>
<td>Pharmaceuticals/Biotech</td>
<td>1.7%</td>
</tr>
<tr>
<td>Travel/Hospitality</td>
<td>1.7%</td>
</tr>
<tr>
<td>Automotive/Transportation</td>
<td>1.3%</td>
</tr>
<tr>
<td>Energy/Utilities</td>
<td>1.1%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>1.1%</td>
</tr>
<tr>
<td>Government (Local)</td>
<td>0.9%</td>
</tr>
<tr>
<td>Construction/Architecture/En.</td>
<td>0.6%</td>
</tr>
<tr>
<td>Legal</td>
<td>0.6%</td>
</tr>
<tr>
<td>Retail/Wholesale/Distribution (Computer)</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

*Figure 22 – Survey respondents broken down by Industry.*
How many mobile devices (phone, media player, etc.) do you personally use?

Figure 23 shows personal mobile device use for all members that completed the survey.

As mobile devices become more and more capable we expect that the number of people using one device will increase and the number using two or more will decrease.²

<table>
<thead>
<tr>
<th>How many mobile devices do you personally use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5 or more</td>
</tr>
</tbody>
</table>

Figure 23 – Number of mobile devices members use.

² Personal note: When we started this report I carried two devices (a mobile phone and an MP3 player). I now just carry a single device (yes, an iPhone.)
Indicate the extent to which you use the following features with a mobile device

There are significant differences in frequency of use when we filter the results by country and age. Figure 24 shows feature use for all members.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Never</th>
<th>A few times a year</th>
<th>Several times a month</th>
<th>Several times a week</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-Mail</td>
<td>4.1%</td>
<td>4.9%</td>
<td>5.6%</td>
<td>26.3%</td>
<td></td>
</tr>
<tr>
<td>Web access</td>
<td>5.7%</td>
<td></td>
<td>8.3%</td>
<td>8.0%</td>
<td>24.9%</td>
</tr>
<tr>
<td>Audio (e.g. Podcasts)</td>
<td>15.6%</td>
<td>17.5%</td>
<td>22.2%</td>
<td>15.6%</td>
<td>29.2%</td>
</tr>
<tr>
<td>SMS Text Messaging</td>
<td>26.1%</td>
<td>16.1%</td>
<td>12.1%</td>
<td>18.4%</td>
<td>28.3%</td>
</tr>
<tr>
<td>Video</td>
<td>8.4%</td>
<td>16.3%</td>
<td>21.4%</td>
<td>16.6%</td>
<td>37.3%</td>
</tr>
<tr>
<td>Instant Messaging (M)</td>
<td>24.5%</td>
<td>10.9%</td>
<td>9.9%</td>
<td>12.0%</td>
<td>42.7%</td>
</tr>
<tr>
<td>Custom applications</td>
<td>9.2%</td>
<td>10.8%</td>
<td>11.2%</td>
<td>12.6%</td>
<td>56.2%</td>
</tr>
<tr>
<td>Coaching/Mentoring</td>
<td>6.8%</td>
<td>9.7%</td>
<td>16.3%</td>
<td></td>
<td>63.8%</td>
</tr>
<tr>
<td>mLearning</td>
<td>8.6%</td>
<td>17.2%</td>
<td></td>
<td>67.6%</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 24 – Frequency of feature use for all members.*
Figure 25 shows feature use frequency broken down by country. Notice that members living outside the U.S. and Canada use all features more often, and use SMS Text Messaging very frequently.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Personal Use/Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS Text Messaging</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>128</td>
</tr>
<tr>
<td>Canada</td>
<td>12</td>
</tr>
<tr>
<td>International</td>
<td>102</td>
</tr>
<tr>
<td>e-Mail</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>413</td>
</tr>
<tr>
<td>Canada</td>
<td>30</td>
</tr>
<tr>
<td>International</td>
<td>104</td>
</tr>
<tr>
<td>Web access</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>368</td>
</tr>
<tr>
<td>Canada</td>
<td>25</td>
</tr>
<tr>
<td>International</td>
<td>88</td>
</tr>
<tr>
<td>Instant Messaging (IM)</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>158</td>
</tr>
<tr>
<td>Canada</td>
<td>16</td>
</tr>
<tr>
<td>International</td>
<td>53</td>
</tr>
<tr>
<td>Audio (e.g. Podcasts)</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>107</td>
</tr>
<tr>
<td>Canada</td>
<td>9</td>
</tr>
<tr>
<td>International</td>
<td>33</td>
</tr>
<tr>
<td>Video</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>138</td>
</tr>
<tr>
<td>Canada</td>
<td>11</td>
</tr>
<tr>
<td>International</td>
<td>56</td>
</tr>
<tr>
<td>Custom applications</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>62</td>
</tr>
<tr>
<td>Canada</td>
<td>4</td>
</tr>
<tr>
<td>International</td>
<td>19</td>
</tr>
<tr>
<td>Coaching/Mentoring</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>43</td>
</tr>
<tr>
<td>Canada</td>
<td>2</td>
</tr>
<tr>
<td>mLearning</td>
<td></td>
</tr>
<tr>
<td>United Stated</td>
<td>62</td>
</tr>
<tr>
<td>Canada</td>
<td>4</td>
</tr>
<tr>
<td>International</td>
<td>9</td>
</tr>
</tbody>
</table>

Members living outside the U.S. and Canada use all features more often, especially Text Messaging.

As one might expect, age also plays a role in feature use frequency, as shown in Figure 26. While the number of members age 60 and older use mobile de-
services less often than their 50-and-younger counterparts, feature use among older members is still noteworthy.

<table>
<thead>
<tr>
<th>Personal Use/Age</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SMS Text Messaging</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A) 30 and younger</td>
<td>55</td>
<td>35</td>
<td>22</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B) 30+ to 40</td>
<td>90</td>
<td>38</td>
<td>35</td>
<td>55</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>C) 40+ to 50</td>
<td>63</td>
<td>40</td>
<td>39</td>
<td>48</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>D) 50+ to 60</td>
<td>25</td>
<td>29</td>
<td>28</td>
<td>49</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>E) 60+</td>
<td>15</td>
<td>16</td>
<td>14</td>
<td>11</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

| **e-Mail** |
| A) 30 and younger | 63 | 10 | 4 | 2 | 8 | 28 | 28 | 28 | 28 | 28 |
| B) 30+ to 40 | 106 | 10 | 10 | 10 | 11 | 68 | 68 | 68 | 68 | 68 |
| C) 40+ to 50 | 170 | 15 | 15 | 15 | 16 | 71 | 71 | 71 | 71 | 71 |
| D) 50+ to 60 | 122 | 8 | 8 | 8 | 3 | 58 | 58 | 58 | 58 | 58 |
| E) 60+ | 24 | 11 | 11 | 11 | 11 | 19 | 19 | 19 | 19 | 19 |

| **Web access** |
| A) 30 and younger | 55 | 7 | 10 | 8 | 25 | 25 | 25 | 25 | 25 | 25 |
| B) 30+ to 40 | 106 | 10 | 10 | 10 | 10 | 64 | 64 | 64 | 64 | 64 |
| C) 40+ to 50 | 151 | 24 | 24 | 24 | 24 | 69 | 69 | 69 | 69 | 69 |
| D) 50+ to 60 | 109 | 13 | 13 | 13 | 13 | 56 | 56 | 56 | 56 | 56 |
| E) 60+ | 20 | 3 | 3 | 3 | 3 | 17 | 17 | 17 | 17 | 17 |

| **Instant Messaging (IM)** |
| A) 30 and younger | 21 | 12 | 10 | 10 | 42 | 42 | 42 | 42 | 42 | 42 |
| B) 30+ to 40 | 88 | 24 | 28 | 41 | 99 | 99 | 99 | 99 | 99 | 99 |
| C) 40+ to 50 | 151 | 11 | 11 | 11 | 11 | 64 | 64 | 64 | 64 | 64 |
| D) 50+ to 60 | 109 | 13 | 13 | 13 | 13 | 56 | 56 | 56 | 56 | 56 |
| E) 60+ | 20 | 3 | 3 | 3 | 3 | 17 | 17 | 17 | 17 | 17 |

| **Audio (e.g., Podcasts)** |
| A) 30 and younger | 31 | 24 | 24 | 24 | 24 | 21 | 21 | 21 | 21 | 21 |
| B) 30+ to 40 | 46 | 57 | 57 | 57 | 57 | 75 | 75 | 75 | 75 | 75 |
| C) 40+ to 50 | 36 | 39 | 39 | 39 | 39 | 86 | 86 | 86 | 86 | 86 |
| D) 50+ to 60 | 31 | 43 | 43 | 43 | 43 | 66 | 66 | 66 | 66 | 66 |
| E) 60+ | 19 | 19 | 19 | 19 | 19 | 25 | 25 | 25 | 25 | 25 |

| **Video** |
| A) 30 and younger | 17 | 22 | 22 | 22 | 22 | 30 | 30 | 30 | 30 | 30 |
| B) 30+ to 40 | 27 | 55 | 65 | 42 | 91 | 91 | 91 | 91 | 91 | 91 |
| C) 40+ to 50 | 23 | 35 | 69 | 35 | 103 | 103 | 103 | 103 | 103 | 103 |
| D) 50+ to 60 | 14 | 23 | 23 | 23 | 23 | 95 | 95 | 95 | 95 | 95 |
| E) 60+ | 4 | 4 | 4 | 4 | 4 | 20 | 20 | 20 | 20 | 20 |

| **Custom applications** |
| A) 30 and younger | 12 | 17 | 17 | 17 | 17 | 49 | 49 | 49 | 49 | 49 |
| B) 30+ to 40 | 30 | 33 | 33 | 33 | 33 | 146 | 146 | 146 | 146 | 146 |
| C) 40+ to 50 | 27 | 31 | 31 | 31 | 31 | 165 | 165 | 165 | 165 | 165 |
| D) 50+ to 60 | 15 | 19 | 19 | 19 | 19 | 129 | 129 | 129 | 129 | 129 |
| E) 60+ | 7 | 7 | 7 | 7 | 7 | 32 | 32 | 32 | 32 | 32 |

| **Coaching/Mentoring** |
| A) 30 and younger | 15 | 20 | 20 | 20 | 20 | 61 | 61 | 61 | 61 | 61 |
| B) 30+ to 40 | 12 | 17 | 17 | 17 | 17 | 173 | 173 | 173 | 173 | 173 |
| C) 40+ to 50 | 15 | 19 | 19 | 19 | 19 | 186 | 186 | 186 | 186 | 186 |
| D) 50+ to 60 | 14 | 20 | 20 | 20 | 20 | 139 | 139 | 139 | 139 | 139 |
| E) 60+ | 3 | 3 | 3 | 3 | 3 | 32 | 32 | 32 | 32 | 32 |

*Figure 26 – Frequency of feature use broken down by age.*
Frequency of use: Accurate measure or skewed by early adopter ebullience?

One concern voiced by my co-authors was whether the responses we’ve received accurately reflect the Guild, or are the members that take this survey pre-disposed towards “Mobile Device-ness.”

As with all Guild surveys, the members who are passionate about a subject will be among the first to complete a survey on that subject, and our first week of data gathering is usually skewed towards people who have some type of vested interest in the subject matter. So although the first week to ten days of a survey may be skewed, as more and more members fill out the survey we start to see results that are indicative of the Guild as a whole, and as we publish this we are confident that our results are statistically significant.³

³ The Guild does not publish survey results unless we achieve at least 95% confidence that our results are plus/minus 3.5%.
How do you personally use the following devices?

In Figure 27 we map device and feature use among Guild members for various devices.

<table>
<thead>
<tr>
<th>Device</th>
<th>mLearning</th>
<th>e-Mail</th>
<th>Text messaging</th>
<th>Entertainment</th>
<th>Games</th>
<th>PIM</th>
<th>Reading documents</th>
<th>Web browsing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile phone / Smart phone</td>
<td>9.63%</td>
<td>34.94%</td>
<td>64.39%</td>
<td>20.83%</td>
<td>25.76%</td>
<td>28.89%</td>
<td>15.90%</td>
<td>34.83%</td>
</tr>
<tr>
<td>Media Player</td>
<td>10.64%</td>
<td></td>
<td>45.80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDA</td>
<td>7.61%</td>
<td></td>
<td>18.92%</td>
<td>10.75%</td>
<td>12.77%</td>
<td>22.51%</td>
<td>21.05%</td>
<td>16.13%</td>
</tr>
<tr>
<td>Laptop / Tablet computer</td>
<td>41.43%</td>
<td>42.11%</td>
<td>57.22%</td>
<td>44.79%</td>
<td>44.12%</td>
<td>81.63%</td>
<td>87.91%</td>
<td>87.46%</td>
</tr>
</tbody>
</table>

Figure 27 – Mapping feature to device for all members.

Some of my colleagues could not believe that over 64% of members use Text Messaging on their mobile phones. Indeed, my co-authors encouraged me to check and re-check the data. We’ll see in a moment that while there is a drop off in use among older members, the truth is that Text Messaging belongs to
all of us, and not just to teenagers. Consider this tidbit of information from an AT&T press release that Ernie Thor, one of my co-authors, sent me:

“...At the end of the second quarter, AT&T's wireless operations had nearly 37 million active data users, up 39 percent over the past year. During the quarter, these customers sent 277 million multimedia messages and nearly 18 billion text messages, with both volumes more than double totals from a year ago.”

So, what does Text Messaging have to do with learning? My co-authors explore this in depth in their essays as they encourage people to think about what things you can do to support employees who are out and about. So while you certainly will not offer a day-long course using simple text messaging, you may want to use it to quickly deliver a small piece of critical information (that would then lead to just-in-time learning, that would lead to improved performance.)

And while text and multimedia messaging is popular in the U.S., it’s even more prevalent outside the U.S., as shown in Figure 28.

**Phone and Feature use broken down by country**

<table>
<thead>
<tr>
<th>Device/Use/Country</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-Mail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>80</td>
<td>211</td>
</tr>
<tr>
<td>Canada</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Text messaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>388</td>
<td>162</td>
</tr>
<tr>
<td>Canada</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>mLearning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>43</td>
<td>3</td>
</tr>
<tr>
<td>Canada</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>120</td>
<td>71</td>
</tr>
<tr>
<td>Canada</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>PIM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>176</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Reading documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Web browsing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>218</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 28 – Phone and feature use broken down by country. We explore why the U.S. lags behind in some of these areas in “The Future of Mobile Learning” on page 141.*
### Phone and Feature use broken down by age

<table>
<thead>
<tr>
<th>Device/Use/Age</th>
<th>A) 30 and you..</th>
<th>B) 30+ to 40</th>
<th>C) 40+ to 50</th>
<th>D) 50+ to 60</th>
<th>E) 60+</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-Mail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>107</td>
<td>95</td>
<td>56</td>
<td>11</td>
</tr>
<tr>
<td>Text messaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>86</td>
<td>193</td>
<td>164</td>
<td>109</td>
<td>23</td>
</tr>
<tr>
<td>mLearning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>32</td>
<td>23</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Entertainment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>78</td>
<td>45</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Games</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>98</td>
<td>56</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>PIM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>97</td>
<td>82</td>
<td>35</td>
<td>9</td>
</tr>
<tr>
<td>Reading documents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>49</td>
<td>41</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>Web browsing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 30 and you..</td>
<td>B) 30+ to 40</td>
<td>C) 40+ to 50</td>
<td>D) 50+ to 60</td>
<td>E) 60+</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>110</td>
<td>91</td>
<td>52</td>
<td>12</td>
</tr>
</tbody>
</table>

**Figure 29 – Phone and feature use broken down by age.**

In Figure 29 we see what features people have at least tried with their mobile phones (for frequency of use, see “Indicate the extent to which you use the following features with a mobile device” on page 26.)
Note: In the previous examples we mapped feature use and age/country for mobile phones and smart phones. If you need to see how this data maps to other devices (e.g., PDAs, Media Players, and so on), you can do so using the Guild's Direct Data Access system (DDA). For information on DDA see “Appendix – Working with Direct Data Access” on page 201.

At what stage are you with mobile learning in your organization?

Figure 30 shows how far along member organizations are with embracing m-Learning. It's important to note that adoption of m-Learning varies widely in different countries and in different industries.

### Please select the option that best describes at what stage you are with mobile learning in your organization.

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have implemented m-Learning</td>
<td>9.0%</td>
</tr>
<tr>
<td>We are designing our first offering</td>
<td>7.4%</td>
</tr>
<tr>
<td>We are building a business case for it</td>
<td>9.7%</td>
</tr>
<tr>
<td>We have started researching how other organizations are using it</td>
<td>40.5%</td>
</tr>
<tr>
<td>We have no plans to do m-Learning</td>
<td>33.4%</td>
</tr>
</tbody>
</table>

Figure 30 – Adoption of m-Learning for all member organizations.

### Adoption of m-Learning broken down by Country

<table>
<thead>
<tr>
<th>Current Stage/Country</th>
<th>Int'l</th>
<th>United Stated</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.6%</td>
<td>9.0%</td>
<td>9.3%</td>
</tr>
<tr>
<td>We have implemented m-Learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We have started researching possible use</td>
<td>12.7%</td>
<td>10.1%</td>
<td>11.1%</td>
</tr>
<tr>
<td>We are building a business case for it</td>
<td>7.5%</td>
<td>39.7%</td>
<td>40.7%</td>
</tr>
<tr>
<td>We are designing our first offering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We have no plans to do m-Learning</td>
<td>43.4%</td>
<td>35.2%</td>
<td>37.0%</td>
</tr>
<tr>
<td>% of Total Count of Number of Records</td>
<td>24.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 31 – Adoption of m-Learning broken down by country. The U.S. and Canada lags behind.
Adoption of m-Learning broken down by selected Industries

<table>
<thead>
<tr>
<th>Current Stage/Industry</th>
<th>E-Learning Tool/Service Provider</th>
<th>Education (University/College)</th>
<th>Telecommunications</th>
<th>Healthcare</th>
<th>Financial/Banking/Accounting</th>
<th>Insurance</th>
<th>Consulting (Computer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have no plans to do m-learning</td>
<td>15.0%</td>
<td>14.5%</td>
<td>23.3%</td>
<td>8.6%</td>
<td>9.8%</td>
<td>12.7%</td>
<td>9.6%</td>
</tr>
<tr>
<td>We have started researching possibilities for m-learning</td>
<td>14.2%</td>
<td>10.3%</td>
<td>10.0%</td>
<td>9.9%</td>
<td>8.6%</td>
<td>49.1%</td>
<td>43.9%</td>
</tr>
<tr>
<td>We are building a business case for it</td>
<td>13.3%</td>
<td>47.6%</td>
<td>33.3%</td>
<td>28.4%</td>
<td>47.1%</td>
<td>49.1%</td>
<td>43.9%</td>
</tr>
<tr>
<td>We are designing our first offering</td>
<td>32.7%</td>
<td></td>
<td></td>
<td>33.3%</td>
<td>47.1%</td>
<td>41.5%</td>
<td></td>
</tr>
<tr>
<td>We have implemented m-learning</td>
<td>24.8%</td>
<td></td>
<td></td>
<td>44.4%</td>
<td>36.8%</td>
<td>30.9%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 32 – Adoption of m-Learning broken down by selected industries. E-Learning solution providers, Higher Education, Telecommunications, and Healthcare are leading the way.

Plans for the next 12 months

In Figures 33, 34, and 35 we show 12-month plans for all members, members broken down by country, and members broken down by selected industries.

As with The eLearning Guild’s report on Immersive Learning Simulations, we acknowledge that people looking 12 months ahead tend to be optimistic about their plans (vs. the reality of a year from now). That said, the fact that almost 45% of members completing the survey plan to do more m-Learning should be encouraging to wireless providers throughout the world.
Figure 33 – M-Learning plans for the next 12 months.

Figure 34 – M-Learning plans for the next 12 months broken down by country.

Note: For a discussion on why the U.S. and Canada lags behind other nations, see “The Future of Mobile Learning” on page 141.
Figure 35 – m-Learning plans for the next 12 months broken down by selected industries.

**Devices you use, or are considering using, for m-Learning**

In Figure 36 we see which devices members use or are considering using for m-Learning.

In Figure 37 we break this information down by country and see that targeted devices are pretty much the same across all groups with the exception of Mobile phones where members outside of the U.S. and Canada anticipate a lot of use.
### Which devices do you use, or are considering using, for mLearning?

<table>
<thead>
<tr>
<th>Device Type</th>
<th>United States</th>
<th>International</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptops</td>
<td>62.8%</td>
<td>34.1%</td>
<td>34.1%</td>
</tr>
<tr>
<td>Media players (e.g., iPods)</td>
<td>28.6%</td>
<td>61.0%</td>
<td>10.3%</td>
</tr>
<tr>
<td>PDAs (e.g., Palm Pilots, Pocket PCs)</td>
<td>24.4%</td>
<td>56.7%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Smartphones (e.g., Treo, Blackberry)</td>
<td>24.2%</td>
<td>57.2%</td>
<td>18.6%</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>23.9%</td>
<td>49.8%</td>
<td>26.3%</td>
</tr>
<tr>
<td>Tablet PC</td>
<td>24.0%</td>
<td>33.4%</td>
<td>42.6%</td>
</tr>
<tr>
<td>Ultratportable device (larger than a PDA/smaller than a laptop)</td>
<td>11.5%</td>
<td>37.8%</td>
<td>50.7%</td>
</tr>
</tbody>
</table>

**Figure 36 – Which devices do you/will you target for m-Learning?**

**Members living outside the U.S. and Canada use all features more often, especially Text Messaging.**

### Targeted m-Learning delivery devices, broken down by country.

<table>
<thead>
<tr>
<th>Device Plans/Country</th>
<th>United States</th>
<th>International</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptops</td>
<td>62.8%</td>
<td>34.1%</td>
<td>34.1%</td>
</tr>
<tr>
<td>Media players (e.g., iPods)</td>
<td>28.6%</td>
<td>61.0%</td>
<td>10.3%</td>
</tr>
<tr>
<td>PDAs (e.g., Palm Pilots, Pocket PCs)</td>
<td>24.4%</td>
<td>56.7%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Smartphones (e.g., Treo, Blackberry)</td>
<td>24.2%</td>
<td>57.2%</td>
<td>18.6%</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>23.9%</td>
<td>49.8%</td>
<td>26.3%</td>
</tr>
<tr>
<td>Tablet PC</td>
<td>24.0%</td>
<td>33.4%</td>
<td>42.6%</td>
</tr>
<tr>
<td>Ultratportable device (larger than a PDA/smaller than a laptop)</td>
<td>11.5%</td>
<td>37.8%</td>
<td>50.7%</td>
</tr>
</tbody>
</table>

**Figure 37 – Targeted m-Learning delivery devices, broken down by country.**
What is an “Ultraportable” device

Notice that not only do members target Ultraportable devices least, but the smaller number of responses suggest that many members planning to engage in m-Learning probably are not sure what such a device is (let along plan to develop for it.) Indeed, some of my co-authors had not heard either the term “ultraportable” or “ultramobile.”

Sascha Segan, in his July 2007 PC Magazine column, refers to this as “the middle thing.” Examples include the Samsung Q1 Ultra, The QOQ Ultraportable, and the Palm Foleo. The idea is to combine the power of desktop machine (full operating system, ability to edit desktop applications, keyboard, etc.) with the convenience and portability of small devices.4

4 Certainly Microsoft, (with its “Origami” Windows Vista Ultra Mobile operating system) and others are putting time and attention into this type of hybrid device. Check out www.umpc.com, the ultra mobile community Website that Intel sponsors.
# Type of m-Learning Content

The types of content members offer, or plan to offer, through m-Learning differs significantly depending on industry and company size. For example, in Figure 38 we see results from members from all industries except education.

| What type of mLearning content are you developing or do you anticipate developing? | 
|---|---|
| On-demand access to information | ![Graph](image1.png) 70.63% |
| Training modules | ![Graph](image2.png) 65.97% |
| Job aids/checklist | ![Graph](image3.png) 64.34% |
| Procedures (e.g., step-by-step instructions on how to repair a machine) | ![Graph](image4.png) 58.28% |
| Presentations | ![Graph](image5.png) 49.18% |
| Examples | ![Graph](image6.png) 44.52% |
| Immediate updates | ![Graph](image7.png) 41.72% |
| Simulations, games, scenarios, and immersive learning simulations | ![Graph](image8.png) 35.66% |
| Articles / whitepapers | ![Graph](image9.png) 32.17% |
| Lectures | ![Graph](image10.png) 29.84% |
| Stories | ![Graph](image11.png) 20.75% |

![Figure 38 - Content type for all industries except education.](image12.png)
Contrast this with the members that work in education, as shown in Figure 39.

**What type of mLearning content are you developing or do you anticipate developing?**

<table>
<thead>
<tr>
<th>Content Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training modules</td>
<td>62.38%</td>
</tr>
<tr>
<td>Lectures</td>
<td>61.39%</td>
</tr>
<tr>
<td>Presentations</td>
<td>58.42%</td>
</tr>
<tr>
<td>Examples</td>
<td>56.44%</td>
</tr>
<tr>
<td>On-demand access to information</td>
<td>51.49%</td>
</tr>
<tr>
<td>Procedures (e.g., step-by-step instructions on how to repair a machine)</td>
<td>46.53%</td>
</tr>
<tr>
<td>Simulations, games, scenarios, and immersive learning simulations</td>
<td>42.57%</td>
</tr>
<tr>
<td>Job aids/checklist</td>
<td>39.60%</td>
</tr>
<tr>
<td>Immediate updates</td>
<td>32.67%</td>
</tr>
<tr>
<td>Articles / whitepapers</td>
<td>23.76%</td>
</tr>
<tr>
<td>Stories</td>
<td>16.83%</td>
</tr>
</tbody>
</table>

*Figure 39 – Members working in education plan to offer less of everything.*

So, while members working in education plan to engage in more m-Learning, they plan to offer a smaller variety of content types to learners. Contrast this further with members that work in large companies (over 10,000 employees) where we see a larger variety of content type (Figure 40).
Figure 40 – Content type for corporations with more than 10,000 employees.

**Audience**

Examining the target audience of m-Learning reveals few surprises when we compare responses from members who work in corporations and government settings with those who work in education, as shown in Figure 41 and Figure 42.
### Who is or will be your audience for mLearning?

<table>
<thead>
<tr>
<th>Audience Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>77.88%</td>
</tr>
<tr>
<td>Managers</td>
<td>58.82%</td>
</tr>
<tr>
<td>Sales reps</td>
<td>44.47%</td>
</tr>
<tr>
<td>Executives</td>
<td>37.41%</td>
</tr>
<tr>
<td>Partners/Customers</td>
<td>36.24%</td>
</tr>
<tr>
<td>Support reps</td>
<td>32.00%</td>
</tr>
<tr>
<td>Instructors/teachers</td>
<td>27.29%</td>
</tr>
<tr>
<td>Students in education programs</td>
<td>21.88%</td>
</tr>
<tr>
<td>Engineers</td>
<td>13.88%</td>
</tr>
</tbody>
</table>

Figure 41 – Target audience of members working in corporate and government organizations.

### Who is or will be your audience for mLearning?

<table>
<thead>
<tr>
<th>Audience Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students in education programs</td>
<td>86.21%</td>
</tr>
<tr>
<td>Instructors/teachers</td>
<td>63.79%</td>
</tr>
<tr>
<td>Employees</td>
<td>43.97%</td>
</tr>
<tr>
<td>Managers</td>
<td>24.14%</td>
</tr>
<tr>
<td>Partners/Customers</td>
<td>15.52%</td>
</tr>
<tr>
<td>Executives</td>
<td>13.79%</td>
</tr>
<tr>
<td>Support reps</td>
<td>10.34%</td>
</tr>
<tr>
<td>Sales reps</td>
<td>8.62%</td>
</tr>
<tr>
<td>Engineers</td>
<td>4.31%</td>
</tr>
</tbody>
</table>

Figure 42 – Target audience of members working in education.
Approaches among m-Learning Implementers

In Figure 43 we see the approaches that m-Learning implementers in the U.S. and Canada use. (These are results from the approximately 9% of respondents that have implemented m-Learning).

Contrast this with responses from m-Learning implementers from other countries where we see a significantly greater user of audio, instant messaging, and text messaging (Figure 44).

Figure 43 – Approaches to m-Learning among implementers in the U.S. and Canada.

Figure 44 – Approaches to m-Learning among implementers outside the U.S. and Canada.
Percentage of learning that is m-Learning

While we are not surprised that 62.5% of members using m-Learning use it 10% or less of the time (at least so far), we were surprised to see that over 20% of members that engage in m-Learning use it more than one quarter of the time, as shown in Figure 45.

![Figure 45](image)

This larger number may be due to the ambiguity among respondents as to whether we should take laptops into account (see “Do laptops count?” on page 7). But even if we allow for notebooks we’re surprised to see that some organizations are embracing m-Learning to such a large extent.

Content specifically developed for mobile devices

![Figure 46](image)

These responses mirror those found in “Percentage of learning that is m-Learning” above.
Barriers to adopting m-Learning

With this question we see a huge difference among the people who have implemented m-Learning, those that have not, and those that have no plans to do so.

In Figure 47 we see responses from all members (those that have, those that have not but plan to, and those that won’t).

Please indicate which elements below are, or you believe will be, a barrier to your organization adopting m-Learning?

| Content developed for other media does not transfer well to .. | 49.3% | 34.8% | 9.4% |
| Lack of standard | 49.4% | 33.0% | 11.3% |
| Screen are too small | 37.0% | 41.3% | 15.7% |
| Cost | 42.8% | 35.3% | 16.0% |
| Security (vulnerable transmission) | 44.0% | 33.6% | 16.0% |
| Security (loss of device) | 33.8% | 41.1% | 19.2% |
| Limited bandwidth | 35.6% | 37.0% | 20.2% |
| User interface is cumbersome | 28.8% | 44.3% | 18.6% |
| Inputting text is too cumbersome | 28.7% | 40.4% | 22.5% |
| Don't know how to integrate with LMS | 33.4% | 34.3% | 20.8% |
| We don't know how to design it | 26.0% | 39.2% | 26.0% |
| Learners will resist | 26.4% | 41.5% | 26.1% |
| Management will resist | 35.3% | 32.2% | 25.3% |
| Connectivity is not reliable | 27.7% | 37.9% | 26.3% |
| Battery life is too short | 18.7% | 41.3% | 31.3% |

Figure 47 – Members cite many barriers to adopting m-Learning.

If we filter out the members that have implemented m-Learning, the anticipated barriers grow a little larger, as shown below.
Please indicate which elements below are, or you believe will be, a barrier to your organization adopting mLearning?

<table>
<thead>
<tr>
<th>Element</th>
<th>Not applicable</th>
<th>Not a barrier</th>
<th>Small barrier</th>
<th>Large barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content developed for other media does not transfer well to ..</td>
<td>49.9%</td>
<td>34.4%</td>
<td>9.2%</td>
<td></td>
</tr>
<tr>
<td>Lack of standard</td>
<td>50.0%</td>
<td>32.8%</td>
<td>10.6%</td>
<td></td>
</tr>
<tr>
<td>Screen are too small</td>
<td>37.5%</td>
<td>41.4%</td>
<td>15.4%</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>44.8%</td>
<td>34.3%</td>
<td>14.7%</td>
<td></td>
</tr>
<tr>
<td>Security (vulnerable transmission)</td>
<td>45.2%</td>
<td>32.7%</td>
<td>15.6%</td>
<td></td>
</tr>
<tr>
<td>Security (loss of device)</td>
<td>34.6%</td>
<td>40.6%</td>
<td>18.7%</td>
<td></td>
</tr>
<tr>
<td>Limited bandwidth</td>
<td>36.4%</td>
<td>37.2%</td>
<td>18.9%</td>
<td></td>
</tr>
<tr>
<td>User interface is cumbersome</td>
<td>29.8%</td>
<td>44.7%</td>
<td>17.5%</td>
<td></td>
</tr>
<tr>
<td>Inputting text is too cumbersome</td>
<td>29.4%</td>
<td>40.3%</td>
<td>22.1%</td>
<td></td>
</tr>
<tr>
<td>Don't know how to integrate with LMS</td>
<td>34.6%</td>
<td>34.3%</td>
<td>19.4%</td>
<td></td>
</tr>
<tr>
<td>We don't know how to design it</td>
<td>27.2%</td>
<td>40.7%</td>
<td>24.3%</td>
<td></td>
</tr>
<tr>
<td>Learners will resist</td>
<td>28.0%</td>
<td>41.6%</td>
<td>23.9%</td>
<td></td>
</tr>
<tr>
<td>Management will resist</td>
<td>37.2%</td>
<td>32.2%</td>
<td>23.4%</td>
<td></td>
</tr>
<tr>
<td>Connectivity is not reliable</td>
<td>28.9%</td>
<td>37.8%</td>
<td>25.0%</td>
<td></td>
</tr>
<tr>
<td>Battery life is too short</td>
<td>18.7%</td>
<td>40.9%</td>
<td>31.2%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 48 – Anticipated barriers among members that have not yet implemented m-Learning.

The anticipated barriers increase even more if we focus on members who have no plans to implement m-Learning, as shown in Figure 49.
Please indicate which elements below are, or you believe will be, a barrier to your organization adopting mLearning?

<table>
<thead>
<tr>
<th>Element</th>
<th>Not applicable</th>
<th>Not a barrier</th>
<th>Small barrier</th>
<th>Large barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content developed for other media does not transfer well to ..</td>
<td>54.7%</td>
<td>27.3%</td>
<td>12.6%</td>
<td></td>
</tr>
<tr>
<td>Lack of standard</td>
<td>52.5%</td>
<td>26.8%</td>
<td>14.4%</td>
<td></td>
</tr>
<tr>
<td>Screen are too small</td>
<td>49.1%</td>
<td>31.7%</td>
<td>8.0%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Cost</td>
<td>56.0%</td>
<td>23.0%</td>
<td>7.4%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Security (vulnerable transmission)</td>
<td>50.9%</td>
<td>24.6%</td>
<td>11.9%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Security (loss of device)</td>
<td>40.1%</td>
<td>35.5%</td>
<td>12.4%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Limited bandwidth</td>
<td>40.5%</td>
<td>30.5%</td>
<td>15.1%</td>
<td>14.0%</td>
</tr>
<tr>
<td>User interface is cumbersome</td>
<td>37.8%</td>
<td>37.1%</td>
<td>10.4%</td>
<td>14.7%</td>
</tr>
<tr>
<td>Inputting text is too cumbersome</td>
<td>36.5%</td>
<td>36.5%</td>
<td>12.1%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Don't know how to integrate with LMS</td>
<td>33.0%</td>
<td>31.9%</td>
<td>13.1%</td>
<td>22.0%</td>
</tr>
<tr>
<td>We don't know how to design it</td>
<td>37.7%</td>
<td>29.9%</td>
<td>18.3%</td>
<td>14.1%</td>
</tr>
<tr>
<td>Learners will resist</td>
<td>41.9%</td>
<td>31.0%</td>
<td>15.1%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Management will resist</td>
<td>46.6%</td>
<td>30.6%</td>
<td>10.7%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Connectivity is not reliable</td>
<td>33.9%</td>
<td>31.8%</td>
<td>19.5%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Battery life is too short</td>
<td>21.1%</td>
<td>38.4%</td>
<td>23.7%</td>
<td>16.8%</td>
</tr>
</tbody>
</table>

Figure 49 – Anticipated barriers among members that have no plans to implement m-Learning.

Implementing m-Learning – It doesn’t have to hurt

In Figure 50 we see what people who have actually implemented m-Learning believe.

The barriers are still there, but all are smaller and some are significantly smaller (and remember, we completed these surveys during the pre-iPhone era).

These responses lend credibility to ROI responses we examine on page 50 as we are not seeing unrealistic early-adopter euphoria (e.g., “everything was so easy!”). That is, these people acknowledge that barriers exist. The Guild ex-
pects these barriers to decrease over the next 18 months, and we will be tracking this information closely.

**Please indicate which elements below are, or you believe will be, a barrier to your organization adopting mLearning?**

<table>
<thead>
<tr>
<th>Barrier Description</th>
<th>Not applicable</th>
<th>Not a barrier</th>
<th>Small barrier</th>
<th>Large barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content developed for other media does not transfer well to ..</td>
<td>43.4%</td>
<td>38.6%</td>
<td>12.0%</td>
<td></td>
</tr>
<tr>
<td>Lack of standard</td>
<td>43.2%</td>
<td>34.6%</td>
<td>17.3%</td>
<td></td>
</tr>
<tr>
<td>Screen are too small</td>
<td>31.7%</td>
<td>40.2%</td>
<td>18.3%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Cost</td>
<td>23.5%</td>
<td>45.7%</td>
<td>28.4%</td>
<td></td>
</tr>
<tr>
<td>Security (vulnerable transmission)</td>
<td>32.1%</td>
<td>42.0%</td>
<td>19.8%</td>
<td></td>
</tr>
<tr>
<td>Security (loss of device)</td>
<td>25.6%</td>
<td>46.3%</td>
<td>24.4%</td>
<td></td>
</tr>
<tr>
<td>Limited bandwidth</td>
<td>26.0%</td>
<td>35.4%</td>
<td>32.9%</td>
<td></td>
</tr>
<tr>
<td>User interface is cumbersome</td>
<td>19.5%</td>
<td>40.2%</td>
<td>29.3%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Inputting text is too cumbersome</td>
<td>22.2%</td>
<td>40.7%</td>
<td>25.9%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Don't know how to integrate with LMS</td>
<td>22.9%</td>
<td>33.7%</td>
<td>33.7%</td>
<td>9.6%</td>
</tr>
<tr>
<td>We don't know how to design it</td>
<td>13.8%</td>
<td>25.0%</td>
<td>42.5%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Learners will resist</td>
<td>11.3%</td>
<td>40.0%</td>
<td>47.5%</td>
<td></td>
</tr>
<tr>
<td>Management will resist</td>
<td>17.5%</td>
<td>32.5%</td>
<td>43.8%</td>
<td></td>
</tr>
<tr>
<td>Connectivity is not reliable</td>
<td>17.1%</td>
<td>39.0%</td>
<td>39.0%</td>
<td></td>
</tr>
<tr>
<td>Battery life is too short</td>
<td>18.5%</td>
<td>44.4%</td>
<td>32.1%</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 50 – Barriers as reported by members that have actually implemented m-Learning.*
Has m-Learning helped or hurt?

In this question we ask members to indicate the degree to which m-Learning has helped or hurt their organizations.

<table>
<thead>
<tr>
<th>Please indicate the degree to which the adoption of mLearning has helped/hurt your organization?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase learner/user access and availability</td>
</tr>
<tr>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Accommodate learner/user needs</td>
</tr>
<tr>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Increase speed of content delivery</td>
</tr>
<tr>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Improve learner/user performance</td>
</tr>
<tr>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
<tr>
<td>Reduce costs</td>
</tr>
<tr>
<td>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</td>
</tr>
</tbody>
</table>

Figure 51 – Members that have implemented m-Learning indicate the extent to which they believe it has helped or hurt their organizations.

We acknowledge that the responses come from a small number of organizations and that these organizations are early adopters and have a bias towards new programs succeeding. That said, we are encouraged by the positive reviews.

It’s also interesting to note that cost savings is not enjoying nearly the accolades that we’ve seen in our previously published reports (and in particular, the Guild’s 360° report on Synchronous Learning Systems,5 where sync tools were universally praised for their ability to save on costs). There are several factors that contribute to not citing cost savings as being a benefit of m-Learning, including:

5 See
• The need to purchase new mobile devices (outfitting an entire sales force with shiny new gizmos can be expensive)

• The short amount of time m-Learning programs have been in place (especially if you’ve only just purchased shiny new gizmos).

As with implementation barriers, the Guild will closely track m-Learning implementations over the coming months, and we will report on any changes in impact, cost savings, and productivity.

Return on Investment

In this question we ask members that have implemented m-Learning if they believe they received a good return on their investment. Figure 52 shows their responses.

<table>
<thead>
<tr>
<th>Do you believe you have received a good return on investment in mLearning?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good ROI</td>
</tr>
<tr>
<td>Modest ROI</td>
</tr>
<tr>
<td>It is too early to tell</td>
</tr>
<tr>
<td>We did not get a return on investment</td>
</tr>
</tbody>
</table>

Figure 52 – Members that have implemented m-Learning report on ROI.

As with “Has m-Learning helped or hurt?“ on page 49, these are early responses from early adopters, but the responses are very encouraging.
What have you emphasized to get people to embrace m-Learning?

In this question we ask members that have implemented m-Learning to tell us what they did to get learners and management to embrace m-Learning.

Please indicate which items below you have emphasized in order to get learners and management to embrace mLearning.

<table>
<thead>
<tr>
<th>Item</th>
<th>No emphasis</th>
<th>Slight emphasis</th>
<th>Some emphasis</th>
<th>Significant emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endorsement from upper management</td>
<td>40.8%</td>
<td>33.8%</td>
<td>14.1%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Good content available from system</td>
<td>38.4%</td>
<td>37.0%</td>
<td>11.0%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Pilot groups to help promote advantages</td>
<td>37.1%</td>
<td>24.3%</td>
<td>18.6%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Marketing within the organization</td>
<td>30.0%</td>
<td>35.7%</td>
<td>15.7%</td>
<td>18.6%</td>
</tr>
<tr>
<td>Change management</td>
<td>19.7%</td>
<td>33.8%</td>
<td>18.3%</td>
<td>28.2%</td>
</tr>
<tr>
<td>Internal advertising campaign</td>
<td>27.1%</td>
<td>22.9%</td>
<td>22.9%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Tutoring on system</td>
<td>20.0%</td>
<td>31.4%</td>
<td>28.6%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Help desk</td>
<td>21.4%</td>
<td>27.1%</td>
<td>15.7%</td>
<td>35.7%</td>
</tr>
<tr>
<td>Learner pre-assessment and readiness preparation</td>
<td>18.1%</td>
<td>26.4%</td>
<td>23.6%</td>
<td>31.9%</td>
</tr>
<tr>
<td>Testimonials from respected individuals (e.g., colleagues, experts, etc.)</td>
<td>21.4%</td>
<td>27.1%</td>
<td>20.0%</td>
<td>31.4%</td>
</tr>
</tbody>
</table>

Figure 53 – Things members emphasized in order to get their organizations to embrace m-Learning. Endorsement from upper management, Good content, and Pilot groups promoting success lead the way.
Opinions and Beliefs

As with “Barriers to adopting “ on page 45, the responses to this question varied widely among those that have, those that have not, and those that will not implement m-Learning.

**Those that have not**

Figure 54 shows the beliefs and opinions of those that have not implemented m-Learning, but plan to do so.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our employees are increasingly mobile</td>
<td>34.0%</td>
<td>45.0%</td>
<td>15.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m-Learning is a user choice, not something that should be mandated</td>
<td>32.3%</td>
<td>44.3%</td>
<td>12.7%</td>
<td>7.9%</td>
<td></td>
</tr>
<tr>
<td>m-Learning will have to be part of our offerings</td>
<td>29.4%</td>
<td>43.4%</td>
<td>13.1%</td>
<td>20.7%</td>
<td></td>
</tr>
<tr>
<td>Security is a huge issue with m-Learning</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>m-Learning is truly useful (it really helps people learn/perform better)</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>m-Learning allows us to better align learning with business and strategic initiatives</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>m-Learning is better suited for younger people</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>It’s too hard to integrate with an LMS</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>m-Learning is mostly hype</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>People won’t use mobile devices for learning</td>
<td>20.7%</td>
<td>44.1%</td>
<td>13.5%</td>
<td>17.6%</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 54 – Responses from those that have not implemented m-Learning.*
Those that will not

In Figure 55 we see responses from people that do not have plans to implement m-Learning. Notice how much higher the percentages are for people that agree with the statements that m-Learning is mostly hype and that people won’t use mobile devices for m-Learning, compared to those that disagree with the statement that m-Learning is truly useful.

<table>
<thead>
<tr>
<th>15) Please indicate the degree to which you agree/disagree.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Our employees are increasingly mobile</strong></td>
</tr>
<tr>
<td>- Do not know: 26.1%</td>
</tr>
<tr>
<td>- Somewhat disagree: 35.5%</td>
</tr>
<tr>
<td>- Agree: 23.2%</td>
</tr>
<tr>
<td>- Strongly agree: 7.7%</td>
</tr>
<tr>
<td>- Not for distribution: 7.4%</td>
</tr>
<tr>
<td><strong>mLearning is a user choice, not something that should be mandated</strong></td>
</tr>
<tr>
<td>- Do not know: 39.4%</td>
</tr>
<tr>
<td>- Somewhat disagree: 40.3%</td>
</tr>
<tr>
<td>- Agree: 9.7%</td>
</tr>
<tr>
<td>- Strongly agree: 7.1%</td>
</tr>
<tr>
<td><strong>mLearning will have to be part of our offerings</strong></td>
</tr>
<tr>
<td>- Do not know: 23.5%</td>
</tr>
<tr>
<td>- Somewhat disagree: 28.1%</td>
</tr>
<tr>
<td>- Agree: 22.9%</td>
</tr>
<tr>
<td>- Strongly agree: 21.9%</td>
</tr>
<tr>
<td><strong>Security is a huge issue with mLearning</strong></td>
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<tr>
<td>- Do not know: 27.7%</td>
</tr>
<tr>
<td>- Somewhat disagree: 30.3%</td>
</tr>
<tr>
<td>- Agree: 18.7%</td>
</tr>
<tr>
<td>- Strongly agree: 20.3%</td>
</tr>
<tr>
<td><strong>mLearning is truly useful (it really helps people learn/perform better)</strong></td>
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<td>- Do not know: 22.3%</td>
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<td>- Agree: 39.7%</td>
</tr>
<tr>
<td><strong>mLearning allows us to better align learning with business and strategic initiatives</strong></td>
</tr>
<tr>
<td>- Do not know: 21.9%</td>
</tr>
<tr>
<td>- Somewhat disagree: 23.5%</td>
</tr>
<tr>
<td>- Agree: 14.8%</td>
</tr>
<tr>
<td>- Strongly agree: 34.5%</td>
</tr>
<tr>
<td><strong>mLearning is better suited for younger people</strong></td>
</tr>
<tr>
<td>- Do not know: 14.5%</td>
</tr>
<tr>
<td>- Somewhat disagree: 38.4%</td>
</tr>
<tr>
<td>- Agree: 24.5%</td>
</tr>
<tr>
<td>- Strongly agree: 11.3%</td>
</tr>
<tr>
<td>- Not for distribution: 11.3%</td>
</tr>
<tr>
<td><strong>It’s too hard to integrate with an LMS</strong></td>
</tr>
<tr>
<td>- Do not know: 24.5%</td>
</tr>
<tr>
<td>- Somewhat disagree: 18.7%</td>
</tr>
<tr>
<td>- Agree: 45.5%</td>
</tr>
<tr>
<td><strong>mLearning is mostly hype</strong></td>
</tr>
<tr>
<td>- Do not know: 9.0%</td>
</tr>
<tr>
<td>- Somewhat disagree: 33.5%</td>
</tr>
<tr>
<td>- Agree: 27.7%</td>
</tr>
<tr>
<td>- Strongly agree: 10.0%</td>
</tr>
<tr>
<td>- Not for distribution: 19.7%</td>
</tr>
<tr>
<td><strong>People won’t use mobile devices for learning</strong></td>
</tr>
<tr>
<td>- Do not know: 9.0%</td>
</tr>
<tr>
<td>- Somewhat disagree: 32.9%</td>
</tr>
<tr>
<td>- Agree: 31.9%</td>
</tr>
<tr>
<td>- Strongly agree: 14.5%</td>
</tr>
<tr>
<td>- Not for distribution: 11.6%</td>
</tr>
</tbody>
</table>

Figure 55 – Responses from those that do not have plans to implement m-Learning.
Those that have

Contrast the responses above with those found in Figure 56, where we see results from people that have actually implemented m-Learning.

![Figure 56](image)

**Figure 56** – Responses from people who have actually implemented m-Learning vary significantly from those who have not (and even more so from those who will not.)

What members want

In Figure 57 we see which capabilities members want and how much they want them.

We hope we’ve addressed some of these issues by providing examples (see “Embracing m-Learning” on page 16) as well as an LMS integration case study.
(see “Case Study: Integrating m-Learning with a Learning Management System” on page 157). To some extent the iPhone addresses the “auto-adapt to different devices” request as many learning activities developed for larger screens will just work without modification on the iPhone (see “iPhone: Is Your e-Learning ready for m-Learning?” on page 155).

As for the remaining items, this is an opportunity for some industrious vendors to address the needs of many e-Learning professionals.

| 16) Please indicate which of these things you would like to have, and how much you want it |
|---------------------------------|-----------------|-----------------|-----------------|
| A standard set of tools with which we can build good mLearning | 63.5% | 28.6% |
| Auto-adapt to different devices | 56.4% | 33.9% | 7.4% |
| Great examples that show how mLearning can benefit our organization | 55.2% | 30.9% | 10.2% |
| Integration with LMS | 60.2% | 26.8% | 8.1% |
| Single Content Development for all devices (i.e., single sourcing) | 51.2% | 33.3% | 8.7% | 6.8% |
| One click data transfer | 45.2% | 36.3% | 14.7% |

Figure 57 – What members want and how much they want it.

**Member Comments**

Members of The eLearning Guild are not shy. Over 160 of the 940 responses we’ve received so far took the time to share their thoughts on m-Learning.

Here are some of those comments.

**Targeting Devices**

A big problem in developing content for mobile devices is the difficulty in determining what device will play the content. Therefore, it is imperative that developed content can be adapted automatically for any device using it.
I’d like to have m-Learning content available in a variety of formats so that learners can choose the device they wish to use to view the content. This will allow all users to see the same content in the format of their choice.

**Single-Sourcing**

I’d like to see current tools (e.g., Camtasia, Flashform) with the ability to publish to a multitude of formats including sizeable content for mobile or ultraPC devices.

I’d like to see documented standards/suggestions for handling the vast range of devices – especially screen resolution, browser support, Java versions, Flash versions etc.

**Adobe Flash**

We need the ability to deliver Flash via mobile phones more easily – all phones with Web browsing capability with same Flash plug-in.

**Security**

Ability to secure content once you have downloaded it to a mobile device so that it is only playable by authorized users. Better tools to build interactivity into m-Learning.

Digital rights management such that content can “expire” if it hasn’t been sync’d sufficiently recently. This provides some assurance that content is current and a means to control content when staff or devices are lost/transfered.

**Marketing and Examples**

Better marketing around how current e-Learning development tools can be used for m-Learning... There is not a great deal of information available on content development for multiple devices.

Good m-Learning examples in the corporate world are hard to find. Generally, you can only find examples from the professional educational world. The “white papers” that are available are mostly from vendors who produce “page turners” for m-Learning and not anything really useful (ie, convert CBT to mobile device instead of capitalizing on mobile’s strengths and uniqueness.)
Most of the e-Learning and m-Learning I have worked with has been “behind closed doors” Corporate stuff. And this is probably true for most of us. Tools manufacturers need to recognize this and make available real-world examples that we can show publicly to clients/managers so they can truly understand what solutions are possible.

LOVE Adobe’s new Device Manager! This product may just open the door to developing for cell phones and Blackberries for my company.

**Question for Adobe:** Are you marketing this to e-Learning professionals?

### Development tools that target mobile devices

Development tools are the most important. If we could have tools like Captivate and Articulate customized to m-Learning, with multiple options for smart phones, PDAs, and iPods, we can get the ball rolling. These devices would need to come with automated wrapper programming options that make deployment easy.

### Open Source

I would like to see how open source is involved in m-Learning.

Editor’s note: See “Handheld Learning” in the resources section on page 177.

### SMS Text Messaging and RSS

I’m glad to see text messaging (SMS) mentioned here, because I think that will grow to become the primary medium for m-Learning, given its immense popularity, and its ability to be both a broadcast and two-way medium.

I would like to see the use of RSS feeds and other means of informing learners about new material or schedules that they should be following incorporated in this discussion. Auto-Text messages and FeedBlitz might be two examples of this technology. The devices are important, but developments that engage and improve relationships are the important drivers for these devices.
**Depends on the Industry**

I think m-Learning will work better in some industries than in others. I think it is a really important development for sales-based learners who are on the road, and for executives who travel frequently. I work in law, which is a very traditional industry (especially here in Australia), and I expect more user resistance than would occur in some other industries.

<table>
<thead>
<tr>
<th>Modalities (two measures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Learning</td>
</tr>
<tr>
<td>Podcasts</td>
</tr>
</tbody>
</table>

Figure 58 – Mobile Learning and Podcast use in the Legal industry. We’ll look at this again when we get responses from more members in this field.

**It’s Hype**

It seems that with every new technology people are always trying to add learning to it, or use it for learning. It’s hyped for a while, then fades away. Mobile learning is a nice idea, but I don’t think it deserves so much attention. Basically it is e-Learning on a smaller device. Not a big deal. E-Learning is just training in a different package. It’s like someone is marketing m-Learning like it’s a product. It’s just another delivery platform – that’s it.

My personal opinion is that m-Learning is just a bunch of hype with very little use for the majority of the training industry. A desktop or laptop computer could present the content in a much more usable way that would limit m-Learning to just content that absolutely must be delivered at a location that is not convenient for computer access.

**Good for some things but not for others**

Good for performance support duties. There is not much need to use a small screen for formal training where good interactivity and connectivity is important. I think the use of video in training is going to increase as well, which points to the need to improve the handheld mobile experience (e.g. bandwidth, reliability, and predictability).
You raised the issue of integrating to an LMS in a few questions above, but I don’t know that LMS tracking is that important for m-Learning. Mobile Learning is going to be about performance support and newly-available content. Any kind of quick technical procedure will be coming soon to a video iPod near you – device operation, engine maintenance, anything where an OJT trainer would say, “Look, this is how you do it.”

The latest information

When I first started writing this section a few days ago we had received 940 responses. As I write this paragraph we have 950 responses. By the end of September we’ll probably have around 1,100 responses.

Equally important is the fact that members will update their responses as they have more experience in m-Learning. The Guild keeps track of this information, and makes it available through its real-time Direct Data Access system (DDA). DDA also allows you to filter the information by specific industry, company size, job level of survey respondents, and so on.

For information on how DDA works and how you can use it, see “Appendix – Working with Direct Data Access” on page 201.
Embracing m-Learning

By Judy Brown

Judy Brown recently retired as Analyst: Emerging Technology for the University of Wisconsin System. Judy conducted research and consulted on new computer directions and related technologies for all campuses in the 15 institution UW System. She focused on partnerships for improving learning with corporate, government, and educational institutions and was the Founder and Executive Director of the Academic ADL Co-Lab in Madison, WI.

Brown has been involved with learning technologies for over 25 years and has been involved in online learning since writing CBT applications on the mainframe in 1984. McGraw Hill’s Open Computing magazine named her one of the Top 100 women in computing. For six years she wrote a technology column for the Milwaukee Journal Sentinel, and she has written for the Higher Education Cooperative Purchase Consortium and The College Magazine. Judy helps coordinate eWEEK’s Corporate Partner Program and participates in several advisory boards.

Since 1996, Judy has been involved in using mobile devices in learning and has participated in test deployments with both Palm and Pocket PC devices. In 2003, she set up the m-Learning Technology Center in conjunction with the government and military Job Performance Testing Center located at the ADL Co-Lab in Alexandria, VA. Working with faculty and graduate students, her work focused on the use of GPS enabled devices in augmented reality and with mobile phone delivery of learning and job performance support. Judy is a frequent presenter at education and training conferences on mobile learning and has led training, tracks, and sessions on both current and future directions in the mobile learning industry.

You can reach Judy Brown at judy@judybrown.com.
Overview

As you have undoubtedly gathered if you read the first part of this report, my co-authors and I steadfastly maintain that you must think differently if you are to see how m-Learning can benefit your organization. But before you can think differently, it would probably help for you to see examples of m-Learning in action.

Indeed, over 86% of members surveyed indicated that seeing great examples of m-Learning was important (30.9%) or very important (55.2%) as shown below.

![Figure 59 – Members want to see examples of m-Learning.](image)

In a moment we will explore examples in this section (and there are examples in “Point and Shoot Learning” on page 75 as well as two case studies starting on page 157). Let’s first examine issues concerning devices, preconceptions, and the huge variety of possible approaches to m-Learning.

**Trying to separate the learning from the device**

Although the team tried to stay away from discussion about specific hardware devices, we found ourselves discussing whether notebook computers should be included in the study. In my opinion they should not, as I see a notebook computer as simply a variation of a desktop computer, but there was no consensus among the team. Putting the notebook aside, we all agreed that m-Learning devices comprise ultraportable computers (what *PC Magazine* calls “The In-Between Thing”), cell phones, tablet PCs, audio or video players, PDAs, Internet tablets, wearable devices, game devices, e-Book readers, USB drives, or combination devices.

Over the past couple of years the mobile phone has turned into a capable computer. Vendors such as Nokia and Motorola claim that they are no longer selling phones, but miniature computers. Today, with billions of mobile phones in use, hundreds of millions of people are walking around with reasonably high-powered connected computers. In the U.S. there are 200 million phones in use, and more than 100 million users who have used text messaging and a Web...
browser on phones. And this is only the beginning. The numbers of U.S. mobile Internet users will probably more than triple by 2011, according to Sterling Market Intelligence and Opus Research.6

The bottom line is that our life-styles are changing to become a much more mobile society. Our access to information experts is changing. Time demands dictate that learning should often be in smaller time slots. In many cases learners may already be accessing our e-Learning on mobile devices without our knowledge. It is often driven by choice – theirs.

I have been following and exploring the use of mobile devices in learning since the Palm Pilot came out in 1996, and have found that their use opens potential opportunities that we have only begun to explore. Their capabilities enable true life-long learning.

I encourage you to explore the following examples without a preconceived notion of what m-Learning might be today, but instead how you could apply it in your organization and industry, both today and tomorrow. Begin by looking at this as a new opportunity in your learning toolbox.

My standard definition of a mobile device is that it is one you have with you almost all the time – or accessible at no more than an arm’s reach away. It fits into your pocket or purse, turns on instantly, and has enough power to last through a normal work day.

Ideally it also has one or more modes of connectivity.

What m-Learning is not

Mobile learning is not e-Learning on a small screen, although, there are examples of successful learning delivery as such in Asia, Africa, and Europe.

M-Learning does not replace e-Learning, but it can reinforce, enhance, and enrich it.

For those who have developed their e-Learning courses in small chunks by outcomes or competencies, you may already be well on your way to making those materials available to your learners on the devices of their choice.

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6 According to a July, 2007 AT&T press release, “At the end of the second quarter, AT&T’s wireless operations had nearly 37 million active data users, up 59 percent over the past year. During the quarter, these customers sent 277 million multimedia messages and nearly 18 billion text messages, with both volumes more than double the totals in the year-earlier second quarter.”
some of those materials available to your learners on the device of their choice. It may very likely be mobile.

Wide variety

There are examples available from the very complex to the very simple.

At a recent workshop I was giving on mobile learning, one of the attendees confidentially shared an application they had developed in Europe. They were an equipment manufacturer who had a sophisticated tracking system for service calls. When the request came in, the system would match the service person with the service order by their training qualifications, and assign the task. They received the assignment on their mobile device, along with any updates in the training and a link to a training video to refresh their memory. Upon completion of the assignment, they logged their experiences into the system through their mobile device.

Contrast that integrated system on the high end to the simple distribution of a PDF checklist sent to a mobile device for referral while on site, or to a quiz or flash cards distributed to a mobile phone for review for an upcoming certification test.

Examples

Today, organizations use variations of m-Learning for performance support, review or reinforcement, knowledge acquisition, coaching or mentoring, receipt of updates, data collection, audio and/or video instruction, and decision support. The length of the materials is generally short. It can be individualized, or delivered based upon the location of the learner. Learning content is readily available in most areas. (For a discussion of m-Learning design considerations, see “Don’t dream it, do it: m-Learning by design” on page 87).

Although you can find examples in many organizations, whether corporate, academic, non-profit, or governmental, the largest number of examples I have seen today are from the medical field or in language and culture training.

Other areas of interest for m-Learning include agriculture, journalism, sales training, new employee orientation, and behavior change.

Using mobile devices, learning can occur between the learner and the expert, among learners in collaboration, or between the learner and the digital con-
tent. Creation of digital content using mobile devices is becoming more common place.

Some of your current e-Learning content may already be ready for mobile access. Before recreating any materials, check out your content using a mobile browser, or check it through dev.mobi at [http://mr.dev.mobi/](http://mr.dev.mobi/).

Let’s look at some specific examples of m-Learning in performance support, review and/or reinforcement, coaching, receipt of updates, data collection, audio/video instruction, decision support, and more.

**Performance Support**

*Sify eLearning* transformed Cisco configuration training to a mobile device. Cisco Systems Quick Learning Module (QLM) demonstration of how they created this mobile training using a customized Macromedia Flash tool can be viewed at [http://www.sifyelearning.com/cisco_intro/qlm-pda-video.html](http://www.sifyelearning.com/cisco_intro/qlm-pda-video.html).

![Figure 60 – Sify 1 Cisco QLM training module](http://www.sifyelearning.com/cisco_intro/qlm-pda-video.html)

*SonoSite* offers video refresher modules for clinical applications of ultrasound delivered on a video iPod. SonoSite made the initial videos free for downloading, but has moved to a charge model. View examples of their instructional videos at [http://sonositelearning.com/](http://sonositelearning.com/).
Review or Reinforcement

The Defense Medical Readiness Training Institute (DMRTI) has made their Combat Casualty Care Course (C4) reference modules downloadable for Palm and Windows CE devices. Topics include Biological Agents and Codes of Conduct and are available at http://dmrti.us/ADL/ADL%20Page.htm.

StudyCell offers a free site where you can create your own flashcards for downloading to a cell phone. StudyCell takes advantage of the way people use cell phones in their daily lives – in between appointments, on the run, during brief windows of time – to help them memorize words, facts, and concepts. See http://studycell.com/home.html.

Figure 61 – StudyCell flashcard

In addition, FlashcardExchange at http://www.flashcardexchange.com/ claims over 8 million flashcards in categories including early education, higher education, medicine, elementary school, science, trades and occupations, high school, information technology, and languages that you can synchronize to a mobile device.

Kaplan Test Prep and Admissions now offers three interactive SAT prep programs on critical reading, mathematics, and writing skills that students can purchase for $4.99 and download from iTunes® (http://www.itunes.com), enabling them to practice for the college entrance exam on an iPod. Among the key features of the programs are that students receive detailed analyses of each completed quiz they take, as well as feedback and an option for tracking quiz score progress.

Trans Asia Airways has integrated Pocket SCORM from Tamkang University in Taiwan with their LMS to deliver learning content to pilots while they are waiting for weather or maintenance delays. Tested every 30 days, the pilots use
this mobile capability to review their specific learning content to improve their test scores.

Figure 62 – Pilots using Pocket SCORM training

Knowledge Acquisition

C-Shock Mobile Game was created to help international students cope with “culture shock” and to get accustomed to U.K. university life. According to the author, Nipan Maniar, the Head of Advanced Interactive Multimedia Research Group at University of Portsmouth in the U.K., “The aim of the game, called C-Shock/e-mummy/e-mother, is to reduce the character’s culture shock rating from 100 to zero by successfully performing a series of tasks. A new mobile-phone computer game helps foreign students to overcome the culture shock of studying in the U.K. The game gives tips on going down to the pub, socializing with fellow students, and dealing with touchy subjects such as whether it is acceptable to show affection publicly. The students control an imaginary student arriving in the U.K. for the first time, and have to guide them through a series of made-up scenarios they may face in real life.” For additional information see the article at http://news.bbc.co.uk/2/hi/uk_news/education/6598943.stm.

Figure 63 – Screen from C-Shock prototype game
Compliance training: A new anti-money-laundering course recently released in Singapore helps banks meet growing local compliance requirements covering the detection and prevention of money laundering and terrorist financing. Their announcement states that “The course can also be customized to include financial organizations’ in-house procedures for preventing money laundering, and can be completed online or by mobile device, enabling employees to complete the tutorial whilst on the move. All courses are fully trackable, allowing organizations to ensure their staff members are always up-to-date with AML compliance requirements.” You can find additional information at [http://www.bobsguide.com/guide/news/20089.html](http://www.bobsguide.com/guide/news/20089.html).

Mobile Panflu Prep created for Public Health workers provides a good example for other mobile learning. This is billed as the first interactive cell phone application with pandemic flu preparedness information. Mobile Panflu Prep is free to download on select cell phones from Cingular, Sprint, and T-Mobile. Download at [http://www.publichealthgames.com/games/panflu/](http://www.publichealthgames.com/games/panflu/).

![Figure 64 – Public Health worker preparation training](image)

Podclass.co.uk takes iTunes U one step further. Their Podcast learning content connects to their own learner management system that manages which learner gets what content. It then reports on the learner’s completion rates and test scores, and delivers rewards of music downloads on iTunes. See details at [http://podclass.co.uk/](http://podclass.co.uk/).
**iPhone Resources**

At the time we wrote this report, the iPhone did not support third-party application development tools, other than standard Web content development tools. However, we are seeing mobile learning content released specifically for the iPhone Safari browser. A few examples include:

**Unbound Medicine** ([http://www.unboundmedicine.com/iphone.htm](http://www.unboundmedicine.com/iphone.htm)) enables medical professionals to consult a wealth of continually updated information on diseases, drugs, or tests, and keep up with the medical literature on their iPhone.

**lastminute.com** ([http://www.coolgorilla.com/](http://www.coolgorilla.com/)) Talking iPhone Translator can now translate phrases and speak in foreign languages – French, Spanish, Portuguese, Italian, and German (with a Greek translation version to follow shortly).

**This Day in History** ([http://www.mackiev.com/iphone/index.html](http://www.mackiev.com/iphone/index.html)) is now available for the iPhone.

Web content that does not contain Flash or Java should work through the iPhone browser. This is just the start of mobile learning content specifically directed to the iPhone. Additionally, iPod apps also work for the iPhone.

**Coaching or Mentoring**

**Instant messaging** is available on many mobile devices, making communications with experts or co-workers easy. Users can control who can see their availability.

**iPods in Baseball:** A June 2006 AP story reported about the Colorado Rockies pitcher Jason Jennings reviewing videos of the upcoming Florida Marlins batters on his video iPod from the dugout. “It’s a good way to refresh yourself on how you got guys out,” Jennings said. “It’s an amazing concept.” Rockies pitching coach Mike Hamilton was quoted as saying “They can do it on their time, they don’t have to be here, or they don’t have to be behind a desk watching a laptop. They can be at home, on the airplane, or even in their locker.”

Think about it: what reminders would be valuable for your learners to easily access and review before taking the next step in their performance?
Receipt of Updates


DailyLit sends books in installments via e-mail or RSS (http://www.dailylit.com). This includes Berlitz offering five-minute daily language lessons.

Data Collection

On July 5th, 2007, Stanford International Outreach Program, in collaboration with Ericsson and Sony Ericsson, launched a mobile learning project in Africa. The project gives scientists and students the ability to access environmental-science course materials and interact with each other using high-tech mobile phones. In Africa students have better access to cell phones than they do to computers and internet connections, so the project offers course materials via cell phones. Students will use the phones to access the course materials, send text messages, and post media to mobile blogs. “We're experimenting with a new model for distance learning that incorporates both local and global perspectives,” says Shelley Goldman, Stanford professor of education. “We’re looking at how mobile technologies can be used to give people access to information and education.”

Various blogging, picture and video sharing, and GPS location applications are readily available for sharing content with co-workers or team members while mobile.

Audio and/or Video Instruction

Homewood Suites is providing video iPods to “Communicate and reinforce key messages and skills, as well as provide hotel managers the ability to implement continuous coaching in a non-invasive manner.” The video iPod’s portability and user-friendly technology were the reasons given for choosing this relatively low-cost training at the hotels.
ChinesePod is a language training service available through the iPod or other audio player. It also provides a community of practice: teachers, lively discussion with fellow students, and a shared learning experience. Lessons are delivered automatically through an RSS feed. Available at http://www.chinesepod.com.

In addition to iTunes U, (http://www.apple.com/education/itunesu/), LearnOutLoud.com (http://www.learnoutloud.com/) and NotePods (http://www.notepods.com/) are among a large number of compilations of other audio training modules.

Decision Support

Mayo Clinic InTouch is a mobile service provided to individuals for $2.99 per month. The Mayo Clinic has repackaged their Web information into a format convenient for the mobile phone. Subscribers receive first-aid tips and health videos, and can easily find the closest emergency room.

For the professional medical practitioner, there are numerous medical reference publications available for mobile devices. One of the first iPhone product announcements was from Unbound Medicine for their manuals, guides, and drug interaction reference materials for mobile devices. See http://www.unboundmedicine.com/.

Other

The mobile version of Willitfly? is designed to give you the upper hand when you really need it. The idea is to let you find out instantly if you are up to the latest standard for important business tasks. If you are not, you can use the Will-it-Fly® technology to get up to speed on the spot. With the mobile version of Willitfly.com, it doesn’t matter how thorny your audit becomes, or how tough the sales negotiations might be. Now you are ready for it all, even if you just need a quick reminder on how to stay cool and best handle a critical challenge – anytime, anywhere. Go to http://mobile.willitfly.com, or http://wap.willitfly.com on a mobile device.

In partnership with Encyclopedia Britannica, AskMeNow, will text an answer right back when a question is sent by text messaging to A-S-K-M-E (27563). You can use this for access to information for safety, speed, accuracy, or knowledge.
English Gym is a Japanese training course for learning international business English, delivered on a PSP mobile game device. See http://www.jp.sonystyle.com/Nws/Mob/Mov/e-gym/index.html for details (in Japanese.)

Figure 65 – Japanese training for international business English

Winksite (http://www.winksite.com/site/index.cfm), mob5 (http://mob5.com), or mobiSiteGalore (http://www.mobisitegalore.com/) are tools to easily build home pages for mobile devices. With the editor from mob5 you can easily create a mobile homepage with images, links, or other information. The address to your homepage is mob5.com/yourusername. Within minutes you can also set up your own free mobile site in The WINKsite Mobile Community. Each mobile site comes fully outfitted with easy-to-use mobile channels including chat, blog, mobile feed reader, surveys, journal, forum, calendar, guestbook, bookmarks, e-mail, and more. The new version of mobiSiteGalore is fully conformant to W5C Mobile Web Standards, easy to use, and full-functioned.

Figure 66 – Tailored mobile menu
More Examples

In addition to the other examples throughout this report, please check out the mLearnopedia site at http://www.mlearnopedia.com for ongoing news, examples, and references on mobile learning.

As evidenced by the number of organizations who have already implemented m-Learning, this is a new, rapidly growing area with excellent opportunities for continuous learning.
Point-and-Shoot Learning

New Techniques for Delivering on the Promise of Mobile Learning

By David Metcalf

As a researcher, analyst and consultant, Dr. David Metcalf combines business sense and technology efficiencies to provide effective results. His approach has saved companies millions of dollars while guiding business transformations for learning organizations. Specific areas of focus include: learning business strategy, performance measurement, operational excellence, outsourcing, blended learning and mobile learning.

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Overview

One of the biggest issues we face with the delivery of learning, knowledge, and performance content to handheld and portable devices is the difficulty with small user interfaces, difficult key manipulations, and the hassles of accessing information while in a mobile setting. Many techniques have come to alleviate the situation and many have gone. In recent years, and particularly in the preceding months, a new promise for yet another way to solve this problem has emerged.

With over two billion cell phones in use in the world today, the potential of mobile devices as a way to access knowledge and content of all sorts has never held greater promise. But with the limitations on interfaces, it seems that promise is often overstated, or will never be delivered. Another startling statistic from that same Merrill Lynch study is that there are over 700 million camera phones in use across the globe. At first, I thought the camera phones were merely a gimmick – something that people would seldom use, and which provided little practical purpose other than photographing your friends, and taking a few really poor-quality still images. With the advent of high-resolution cameras, video, and easier integration with the computer, it’s now possible to do much more sophisticated data operations with the camera phone than this researcher ever imagined.

AMULETS

To really showcase the promise of this new technology, we need to explore some concrete examples. The first example is from a program by Dr. Marcelo Milrad at Växjö University in Växjö, Sweden called the Advanced Mobile and Ubiquitous Learning Environment for Teachers and Students (AMULETS).

The AMULETS program incorporates the following elements:

- Integration of outdoor learning in the classroom
- Outdoor learning activities involving competition
- Integration with actual curriculum
- Positioning technologies
- Contextual metadata
- Digital maps as spaces for reflection
- Ubiquitous learning
The Scavenger Hunt

In this experiment, middle school children received mobile devices for an ecological virtual scavenger hunt. They were to proceed into a woodland setting with these devices, and use the GPS capability to move between waypoints or stations that consisted of a barcode attached to a tree, and some simple mapping they could follow. One of the nice features in this was the use of semi-code that allowed the student teams to point and shoot with the camera on a Nokia 6600 series phone and, with 80% plus accuracy, receive information downloaded directly to their phone about that particular waypoint. So, for instance, a Flash movie might start playing with a Swedish girl cartoon character that would play back information about an ecological experiment. From there they’d receive clues to get to the next waypoint or station to conduct their next experiment.

The Ramifications of Barcode Reading

The promise of using this to access barcoded information could have great implications, not only for this contrived woodland setting, but for anything that has a barcode on it that is readable by a mobile device – any product that you are curious about with detailed information on it in a store. You can point and shoot with your camera phone and get immediate, instant access to any type or form of support, warranty information, related processes, fun facts to know, marketing materials, or any other information coded to that particular barcode. You could even do your own price scans, and maybe even conduct a quick quality check on that particular product using some of the collaborative filters, like those found at Amazon.com for their book search feature and product ratings. My team at RWD did a similar project using barcodes in 2004 for Symbol University. Just point and shoot at a product barcode and receive performance support directly on the device.

Introducing Mobile Learning into Corporate Workflow

Opportunity

Symbol commissioned RWD Technologies to develop a prototype module that could make use of advanced features such as built-in Microsoft’s Pocket Internet Explorer Web browser, Macromedia Flash support, barcode scanning, image processing, Wi-Fi, and next generation RFID (Radio Frequency Identifier)
support. These features enable some of Symbol’s top clients to modernize work processes and enable their workforces through mobile technology. Adding an element of learning and performance support further enhances skills and efficiencies of people involved in complex business processes.

**Setting**

To provide the broadest example of use, Symbol University selected a work flow from the pharmaceutical manufacturing and distribution industries. Wes Wisham, Senior Business Development Manager for Symbol Technologies EMEA, states, “It is important for us to provide a realistic scenario to show how the advanced device capabilities could be used to promote learning integrated with the work that is typically completed using our world-class handheld devices.” The prototype module centers on three distinct task groupings in an overall process flow. Integrating the learning into the workflow is a critical element in this leading-edge solution.

*Figure 67 – Symbol University*
The sections are as follows:

1. Access control
   a. Real-time training certification
2. Quality inspection learner support
3. Inventory and shipping
   a. Product info and performance support
   b. RFID tracking and task automation

Figure 68 – Symbol University

Imagine walking into a pharmaceutical manufacturing and storage environment. You scan your badge with the barcode reader, and the handheld unit “knows” who you are. Next, you scan a small barcode on the door frame or enter a serial number and the system looks up and determines your access levels. If you are certified to work in the environment, you may enter; if not, you must complete a real-time certification process to bring your records into compliance (an example of which is shown in Figure 69). Access control is only the beginning of a learning-integrated workflow environment.
Figure 69 – If the system has not certified you it initiates a test.

Understanding how location-aware learning integrates into other business processes can speed up work processes and improve performance. For example, you can enhance quality inspection reports by providing integrated performance support and an easy-to-use workflow that is human-centered rather than system-centered, as shown in Figure 70.

Figure 70 – Human-centered workflow
Another step in the workflow is the task of reviewing inventoried items and shipping them. As an item’s UPC code, or other warehouse tracking code, is scanned or inputted, the worker now has access to a full database of information about each product. This depth of content guarantees that a worker can make decisions based on much more information. Having this product information at your fingertips is performance support at its best.

![Figure 71 – Product information](image)

Once you have selected the product from inventory, shipping can begin. Currently, the system can provide information about an item’s physical location at each transfer station along the way. With the newest RFID capabilities, it is possible to track packages at any point, in real-time if needed. Access to information and knowledge immediately begins to link learning to the real world of work and operations in exciting new ways.

**Results**

Based on the encouraging feedback of both Symbol Technologies management and key customers, the demonstration module provides a design framework for integrating learning into the real world of work through leading-edge research like augmented reality. “Understanding the potential for the technology and the location-aware learning processes will open new uses for our devices and help our customers do their jobs better,” states Wes Wisham of Symbol.
University. “Based on our initial reference design, we look forward to what the future of mobile learning holds.”

Point, Shoot, Learn

Another example which takes us even further is the notion of not just being able to take a picture of a bar code but to be able to take a picture of any text, or even images. Let’s explore this further by way of example. The best example that I was able to see firsthand to know that this truly works is from a company, ABBYY, which has a software developer’s kit that allows you to use a camera phone of medium resolution or better to do the same thing that your desktop business card scanner does. When someone hands you a business card, you point the camera at it and shoot. It captures not only the image of the business card but also all of the associated text. When you send this info either through a local application or up to a server that has OCR (optical character recognition) technology running on it, it’s possible to read the text from the business card just like you would on a desktop scanner or on a card scanner made specifically for business cards.

Figure 72 – ABBYY

At first, I thought this was too good to be true and I didn’t even believe the demos that I saw with cards that they laid out. So I handed them my business
card; in this case from the University of Central Florida. It had all of my text in a fairly small font size and also had the UCF logo which has a very small “University of” and a very large “Central Florida” on it. Sure enough, they pointed, they shot, and within just a matter of seconds we had my business card showing on the screen. Two more button presses, and they were automatically able to send it to a server that read the card and sent the information back to the device in the appropriate “contacts” fields and format. It guessed at what the appropriate fields were based on name, on typical title positions, on typical address locations, and on typical formats, and accurately read every single thing on my business card except for the “University of” which it applied to the “notes” field and thought the name of the organization was just “Central Florida.” This is perhaps the largest size of “Central Florida” on a typical business card from UCF. At this point, I had to say I was impressed. Because with just one single click of a button and a photo, the productivity increase of getting information from a business card directly into my phone bypasses all need for a desktop and gives immediate access to the information within a matter of just a few seconds.

The applications for this include productivity increases, speeding up work processes, and perhaps even reducing errors due to miskeying information from the mobile device. After all, being a mobile consumer of information is only half of the equation. Being a mobile producer of information is, perhaps, even more likely to increase productivity and be the model for active learning using the mobile device simply as a gateway to learning activities.

**Mobile Producer vs. Mobile Consumer**

Personally, being a mobile producer rather than a mobile consumer is much more the way that I learned by doing, and I also reached real productivity gains that are measurable as outcomes. As if this text reading and optical character recognition from the camera phone weren’t enough, I then was able to see and demo directly something that was even more compelling. There’s been a long body of research in the area of image recognition from scanned images or from pictures. The technical term for this is “Query by Image Content” (QBIC). Up until six months ago, I had never seen QBIC and mobile applications tied together. Apparently though, they’ve been doing it in Europe for several years now. Several companies had demonstrations of this technology. Most notably, a company called mobot (sic) based in the U.S. in Boston is doing similar things. Marketing campaigns use mobot’s technology to have an image
of, say, a fashionable dress inside a magazine. You take a picture of it with your mobile phone, and you can then get product details on it. You might be able to register for a special or a coupon, or enter a contest.

The demo that I saw was with a Starbucks cup; a physical object sitting on a desk. When you shoot the image of the Starbucks logo, which, by the way, is on a rounded surface so the image isn't flat or straight on, you can trigger any information to come back to your device that you have programmed in. In this case, a search-like list is returned of the closest five locations of Starbucks outlets. This is impressive because it combines point and shoot learning with another developing trend of Location Awareness and Location Aware Learning and Services. But let's take this a step further. I asked a few questions to see if my next proposition would be possible. If I were a tourist, or if I were in a location I didn't know very well, certainly having the top five locations of Starbucks would be compelling and useful. However, if I were a financial analyst and wanted top financial news on Starbucks Corporation it would be even more helpful if I not only had the information on location, but before that on my list I also had top financial news for the day relating to Starbucks based on my profile; who I am, what job I do, and what my preferences are.
This is the true promise of expert location and access to expert knowledge linked to a profile, fulfilling the promises of early knowledge management. All with just a couple of clicks of your camera phone and sending that picture up to a server that's pre-programmed to accommodate and review this particular type of image and send you back the result automatically.

So, while I used to think picture phones and camera phones were frivolous and wouldn't really be useful for anything other than crummy little pictures, and while I used to think that Multimedia Messaging to send messages to friends is something that wouldn't really catch on because of price and lack of utility, I think I may have to eat my words. I have seen so many examples now of useful applications for automating data flow and data processing.

What other applications can you dream up for these new capabilities, tools, and technologies? There are many other possibilities to explore and I, for one, look forward to the promises of the future.
Don’t dream it, do it: m-Learning by design

By Clark Quinn

Clark N. Quinn, Ph.D., is a passionate advocate for the potential of technology to facilitate learning and performance. His work has been at the cutting edge in areas such as games, adaptive, mobile, and performance support systems. With a particular focus on learning, he has designed and developed innovative solutions for community agencies, schools, industry, and government. The author of Engaging Learning: Designing e-Learning Simulation Games, Clark has led the design of award-winning online content, educational computer games, and more.

Currently working through Quinnovation, Clark provides strategic analysis of organizational learning as well as knowledge-system design to Fortune 500 companies and universities in areas as diverse as medical, financial, telecommunications, information technology, and publishing. Clark previously led research and development as Director of Cognitive Systems for Knowledge Universe Interactive Studio, and held executive positions at Open Net and Access CMC, two Australian initiatives in Internet-based multimedia and education.

A recognized thought leader, Clark has an extensive publication record and numerous invited presentations at national and international conferences. He has held academic positions at the University of New South Wales, the University of Pittsburgh’s Learning Research and Development Center, and San Diego State University’s Center for Research in Mathematics and Science Education. Clark received his doctorate in applied cognitive science from the University of California, San Diego, after working for DesignWare, an early educational game software company.

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Introduction

So, you’re all excited about the mobile potential (or should be), but what do you do?

Well, as you should’ve gathered by now, you have to think differently. Not just strategically, but tactically. So let’s talk about some ways to think different. Then we’ll go through the design process, and along the way I’ll throw in some hints and tips. Fair enough? So let’s go.

It’s not about learning

As with any e-Learning you design, to really take advantage of mobile learning you have to take another look at what learning is, and realize it’s not about learning, it’s about **doing**. That is, we invoke learning to support people being able to do things: new things, doing things a better way, doing them with updated information, or doing them when something goes wrong.

In this model, we consider learning to be broader than just courses, and start thinking about helping people accomplish their goals. We have a number of ways to do this beyond courses. Think for a minute: how do people support themselves accomplishing goals? We’ll explore this again later.

Performance Support

When we move beyond learning to supporting doing, we move into a space called “performance support.” The notion here is moving beyond full courses for all learning needs, and beginning to take a richer look at the types of learning needs and ways we can add value to what people need to accomplish.

Sometimes someone just needs a reference, sometimes they need a decision aid, sometimes they need an example, and sometimes just some motivation.

Now, this isn’t new, but you need to place it higher on the agenda. As Jay Cross tells us, when we’re spending 80% of our resources on formal training, and reports show that informal learning meets 80% of workplace needs, we need to start rethinking where we’re spending our investment.

I want to take this a wee bit further. Several years ago, Marcia Conner asked a group of us whether there was a model of informal learning. I remembered a model which talks about how we act in the world in our known ways, until we have a breakdown and can’t proceed. At this point we have to actively solve the
problem, and when we do we reflect, so that the next time we don’t have to solve the problem again (in an ideal world, of course).

Figure 74 – Action in the world

I modified this model to focus on how technology might support performance needs, moving to stages of information need (when we just want the answer), problem-solving (when we can’t find the answer or it doesn’t yet exist), and information update, when we’ve figured it out and want to make sure no one else has to solve it again (again, idealized).

Figure 75 – Supporting Action

The point here is to elaborate those two top boxes, information need, and problem-solving, as we can and should support both. Information need unpacks into the case where we ask someone, access some information, or actually take a full course. For each of these options, there may be many ways to deliver the learning, so people to talk to might be peers, mentors, or a Subject Matter Expert (SME). Similarly, options exist for information resources and courses. This is not an exhaustive coverage of the options, by the way, but is instead indicative of how we should be re-thinking support.
Similarly, when the answer doesn’t exist, there are still things we can do. For example, when solving problems, people may often need data to look for patterns. They may need people, but note that the people are now possibly different; as there is no expert to find the answer from, instead we might need collaborators from other areas (e.g. a statistics whiz), or a process facilitator. And, of course, we might need models (like these).

With this perspective, we rethink what people are trying to accomplish, and what support we can provide.

Allison Rossett’s framework of planners (information before an event) or side-kicks (information during an event) is a useful one. And it doesn’t have to be static; it can be relevant to where they are and what they’re doing! And it doesn’t have to be a lot.

**Minimalism**

Another perspective shift is to focus on minimalism. Here I’m not talking just about a lifestyle, but specifically about John Carroll’s work on a minimalist instructional design. His work was driven at least in part by his observations of individuals working for hours to solve problems in a computer-based adventure game, while giving up almost immediately on learning a word-processing system that would be of considerable value to them.

As a consequence, he tried a different approach to training for the word-processing system. He made a commitment to get all the necessary training on 25 cards (to replace 96 pages of instructionally designed manual). He did this

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**Insight:** One of the exercises I do when I run a mobile design workshop is to give attendees a 3 x 5 card, and ask what they could put on it and have in the hands of any person in a particular role that would make the biggest difference in their organizational effectiveness. It’s that sort of thinking that we’re talking about here.
by focusing on the learner’s goals (not on the system), by leveraging their existing knowledge of the world, and focusing on the least amount of guidance necessary to get the job done.

In a head-to-head comparison, his approach beat the instructionally designed manual. The point being that when you have motivated and knowledgeable individuals, the full course may be overkill. Good instructional design recognizes this and will suggest job aids instead of courses, but it’s hard to break old habits to develop training. However, we need to do that here. When learners are in a context facing a situation, they’re motivated and just need what will get them past this hurdle.

The “Least Assistance” Principle is an extension of minimalism for mobile design. Translated to our mobile devices, the principle is “what small amount could we make available to a person that would make them more, or most, effective?” One of the ways you need to think different is to start thinking about the small things you can do that will make a big difference.

**Slow learning**

There will be times when we want or need people to learn, not just meet the immediate performance objective. Even then, it’s not the m-Course (or, as I call it, eLearning Lite™) we should be thinking of. Instead, we should be thinking of a more distributed version of the learning experience. We know that massed practice (the typical bunch of learning in a short period of time) and the learning “event” typically don’t lead to long term learning outcomes, but that’s been what’s been manageable. That is, the way we’ve had access to learners is to have a learning event where we can get them away from their context and grab their attention (and the e-Learning equivalent, the online course or Webinar).

However, we know that learning works better when we reactivate the learning and space practice over time. With mobile learning, we can make that process much more effective. That’s not to say that we deliver the whole course via a mobile device, but instead we may present the introduction and concept via regular delivery (online or face-to-face [F2F]), maybe even with some examples and practice. We can then supplement initial traditional learning with streamed examples and practice delivered over time to reactivate the knowledge and vary the practice. The learning benefits are to improve retention by reactivating the knowledge and strengthening the relationships, and to im-

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**Insight: The “Least Assistance” Principle**

A brilliant and consequently very busy colleague of my acquaintance also is very kind. Lots of people could use his help, and he wants to help, so he created the “least assistance” principle, where he figures out what the least he can do to help the person move on is. That way he gets to help as many people as possible just as much as they need. Lest you think this is idealistic or simplistic, he’s risen to be the director of one of the research labs for one of the largest software firms in the world.
prove transfer by providing a broader suite of contexts across which to abstract and recognize applicability.

In fact, we can even wrap a real-world experience where the knowledge is required with some material before, during, and after to turn one’s life experiences into learning practice. This is a real opportunity.

**Learning Adjunct**

David Metcalf, in his book *mLearning*, mentions thinking of a mobile device as his learning *adjunct*. It’s not about delivering the entire learning experience through the mobile device, but instead about using the mobile device to support various parts of the learning experience. Thus, it can be a tool for perusing concepts or experiencing examples, or for note-taking or reflecting. It can access information, or collect it through a camera or various data ports. It can share information, such as pictures or text.

One of my favorite models of learning is Cognitive Apprenticeship. Most learning and instructional theories aren’t static but are evolving, and I’ll suggest they’re also converging. Where they’ll end up, I believe, is where Cognitive Apprenticeship already is. In my admittedly mutated version I have an initial introduction, (multiple) concept presentations, annotated examples, scaffolded practice (with feedback), guided reflection, and an emotionally satisfying summary.

![Figure 78 – Cognitive Apprenticeship](image_url)
From this basis, I can elaborate aspects we might want to consider. We might present a motivating example before a learning experience, take the concept diagrams or examples and use them as tools when problem-solving, space our practice out, make job aids available, we might bring people in to reflect, and we can reactivate the knowledge over time.

**Insight:** Elliot Soloway has been a pioneer in learning technology from his early days in intelligent tutoring systems to more recent work helping kids learn. Early on, he realized that the form-factor of a laptop wasn’t suitable for school kids, and that a PDA made a lot more sense. Consequently, he developed a suite of applications to run on PDAs, for use in the classroom (and out in the field). These include concept mapping tools and drawing tools, supplemented with networking to share and upload to the teacher.

GoKnow (http://www.goknow.com/) has licensed his software and are marketing these tools. It may be that one of these is useful to you or the individuals in your organization.

Figure 79 – Elaborating Cognitive Apprenticeship for Mobile Opportunities
The point is not to look at a mobile device purely as a delivery device, but think of all the different components of the learning experience and how you can use a mobile device to deliver and augment particular components.

So far we’ve mostly been serendipitous, but we can go further.

**Because I can versus because I’m here**

“The vision of the future of learning is to be able to get just the right stuff to just the right person at just the right time and place in just the right way and with just the right context on just the right device and through just the right medium.” – Wayne Hodgins

The first way to think about mobile devices is as a tradeoff of bandwidth for convenience. That’s most of what we see in mobile uses so far. So, for instance, calling on a mobile phone (despite the typically lower call quality) but it’s now. Or listening to music through a player, which may not have the addition of the deep bass of a sub-woofer like we have at home (or at a live performance), but it’s good enough and it’s here. And so on: listening to a Podcast in a car, or reading a document on a PDA, because it’s a convenient time or place, etc.

More importantly, for performance, reading a PDF on a PDA might not be optimal, but it’s easier to carry around a binder full of data on a PDA than the binder itself. Also, learners can download the data they need when they need it. It may not be the quality available on a large screen, but it’s good enough.

There’s an alternative to this initial tradeoff that’s fundamentally more interesting, but as yet relatively unexplored, and that’s context-sensitivity. This means that your mobile device knows where you are, or what you’re scheduled to be doing, and does something unique and appropriate for you where you are (see “Setting” on page 78). And this context-sensitivity is, I’ll suggest, the real potential opportunity for m-Learning. E-Learning as whole may know what you’re doing and be useful (which was the concept behind performance support systems and workflow learning), but with mobile learning the context is richer, knowing where you are, when you are, and what you’re doing, so we can use personalization to deliver custom information. Or, as Hodgins (again) puts it, not m-Learning, nor e-Learning, but me-Learning.

Say, for instance, you work for a computer-networking hardware manufacturer. As you approach a client site, you could have specific information routed to you depending on your role. If you were a sales person, the device might provide an overview of current installations, or new corporate initiatives of the
client’s that would indicate a need for new capability, or new products that would complement their existing situation. On the other hand, if you were an engineer on a trouble call, it might provide the overview of the current installations, and not only indicate the type of problem, but also the location of various device installations, and repair manuals for the installed hardware.

**Push versus pull**

Another tension is the distinction between push and pull. In this case, “pull” means the user specifically downloads data or an application onto their device, whereas in “push” a central system determines what to send to the user’s device. The latter takes a lot more information, but can be much more specific and current. This is the underlying model behind the context-sensitivity seen earlier. It can be reactive, in that it optimizes what’s available when a learner asks, but if we have sufficient information, we can actually proactively deliver what may be useful.

Pull examples include using a mobile browser to navigate to a specific piece of information (like I might use Google Maps to locate a nearby restaurant when I’m out and about), or accessing information about how to fix the device you’re staring at that’s broken. Push would be when the system sends you a message before your mentoring meeting to remind you that your current focus on meetings of this sort is to ensure you stress the issues and not personality.

Don’t assume that just making information available is the only option. Also consider whether and how to proactively put information (or more) to the learner.

**Content versus connection**

A necessary perspective shift is to realize it’s not just about content. Designing content is what many of us are familiar with, but connecting people to communicate and collaborate may be more important at particular points in time.

For example, when we’re in information-searching mode, we’d like someone with the answer, whether a more experienced peer, a mentor, or ideally a SME (preferably with pedagogical training). We can make them available by phone, SMS, or however else makes sense.

At other times, when we’ve moved into problem-solving, we’re more likely to need a collaborator. We might need a richer channel, bringing in video of the

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*It’s not just about content. Designing content is what many of us are familiar with, but connecting people to communicate and collaborate may be more important at particular points in time.*
current context, or a wiki where we can collaboratively work together on understanding. While this scenario seems better suited today for a desktop or notebook, learners will determine which devices get used and when, and we’re already seeing more people use smaller devices for doing this type of thing.

**Design “right” versus design reuse**

Designing for reuse is another principle we can consider. So, for instance, let's say we create an example that demonstrates the application of a concept to a context. We can make that example available after the learning experience to serve as a reference example someone could use in problem-solving. Similarly, if we developed a diagram as part of a concept presentation, we might also make it available to serve as a problem-solving tool (I put many of my diagrams on my Treo to share when talking with folks).

It may take a bit of extra thought to make these available independently and to serve multiple purposes, but it’s worth considering. For instance, as you develop a step-by-step example (and you should), ensure that you link it to the concept, to facilitate use as a problem-solving guide. Similarly, as you develop your concept presentation, ensure you have a good diagram to serve as a reference.

**Strategy**

Finally, we also need to consider the overall context in which this fits. When you’re looking at the broad picture of e-Learning strategy, where does m-Learning fit? Figure 80 represents my overall picture of e-Learning strategy.
Figure 80 – Strategic e-Learning

What Mobile Learning gives you are several things that matter in the big picture. The first is meeting the convenience preference of your entire workforce by repurposing materials for delivery when and where desired. Another opportunity is providing specific support to your mobile workforce, making them more capable, by specifically designing mobile tools to meet their performance needs. More is possible, such increasing the effectiveness of all e-Learning by extending the learning experience through time, supplementing “event-based” learning with reactivation and elaboration. We should strive to increase access, effectiveness, and efficiency of learning and performance interventions. So how do we make this happen?

Back to Basics

Moving from principles to practice, what do you actually need to do? We’re going to start with some overarching frameworks and give you some templates. In some cases it’s not about designing solutions, but rather, adding background actions that complement what you’re already doing.
Frameworks

There are three frameworks that should guide our approach:

- Reactive
- Proactive
- Custom

Each serves a role in mobilizing your learning and performance.

Reactive: Support Self Service

Here the goal is to take what you’re already doing, and make it mobile-accessible. You want your learners to be able to access your Webinars, your documents, presentations, etc., at their convenience. Ideally, they should be downloadable and accessible through a Web-browser, if you truly want to support the diversity of devices that may be in use. If you provide, and hence control, the devices, you can choose to support either downloading or browsing, otherwise you’ll need to accommodate diversity and support both.

We come to a critical decision point here, where we need to separate out content from interactivity. Content traditionally comprises static pieces that are user-initiated and only require navigation (e.g. scrolling through a document). Interactivity is when there’s some fundamental choices made by the user that alter the outcome, and it’s more than just clicking to the next page, following a link, or scrolling. Essentially, interactivity involves programming.

Within content, there are differences between media, so text and static images are relatively easy, audio and video are more complex. All can be stored, and most can be seen on multiple devices, but the more complex the media, the greater the overhead in storage. With text and images, a common media format such as PDF has readers on many devices, or a browser can usually render HTML. Of course, some processing may be required to make it in a format that all the readers can support, but the investment pays off in freer access. Similarly, you can capture interviews and speeches as audio, and capture presentations or film as video.

The strategy requirement is to make a determination on what formats you’ll support, and build that into the production process so that when the materials are available, they’re available across all supported devices.
tensible Markup Language) that separates out content from display, which simplifies writing once and populating different formats.

Thinking ahead of time about how you will capture and make available live events like Webinars or even face-to-face sessions similarly makes it subsequently easier to make it available. Increasingly, tools to support technology-mediated communication have recording capabilities built in, so planning around the capture and storage up front becomes easy and systematic.

**Proactive: What have you missed?**

While reactive is low-hanging fruit, a more strategic consideration, and the next step, is to start thinking about what you might specifically design to empower your workforce. More specifically, what can you do to empower your mobile workforce, the ones who are inherently, strategically or tactically, on the road as part of their job?

These are people who go out and face customers, gather data, service clients, distribute product, and more. We do equip them with documents and communication, and they can certainly benefit from the reactive approach, but can we do more? It’s worth thinking about.

First, think about what they’re doing, where they are, and what information could make them more productive. What tool could they use when they’re in front of a customer? What media might help an executive on the road? What person could you make available to a field engineer? I use a table with different roles as the row heads, and different content types (e.g. document, media, interactive, or person) as a way to spark thinking about different support ideas that might be valuable.

<table>
<thead>
<tr>
<th>Role/Format</th>
<th>Document</th>
<th>Media</th>
<th>Interactive</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Engineer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery Personnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Researchers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Insight: Security**

One issue that may have occurred to you is the issue of security. If we make it available, what should we make available and how do we secure it? At the time of this writing, 78% of respondents cited transmission vulnerability as a barrier to acceptance, and 75% cited device loss as a barrier. See “Barriers to adopting m-Learning” on page 45.
Another idea is taking advantage of “downtime,” where your learner is cooling his or her heels in an airport, in a shuttle or taxi, or even waiting in line. How about a game to drill some information, or practice a critical skill? We know learning works better when it’s extended over time, so reactivating knowledge is a powerful tool, as is providing practice in new contexts. Even providing motivating examples in the form of stories can help; for instance showing how an employee showed the organization’s mission in action.

The point here is to think about who is on the road and might need particular help. What roles are out in the field? What is the particular information or tool that would make a big difference? How can they have access to that which will help them excel?

**Contextualized: Where’s the magic?**

The final framework is to start considering customized, contextualized performance support. What does this person (not this role, or this job title, but this person), need? Here’s where we start trying to be smart about individuals and their particular immediate context. There are four key models to making this happen: a model of the user, a model of the content available, a model of the task, and a model of the context.

Often (e.g. if we have an LMS), we know what our users competencies are (and aren’t), and what their current learning goals are. You might already have information about roles, as many organizations are categorizing employees by role or task. To be context sensitive, you will have to model the context as well: where they’re at, what’s available there (perhaps at what times), etc. That information may well already exist in some form having to do with customer or client information, but you may need to systematize it. Then, you’ll need to actually keep track of what content you have. This is a relatively new idea, logging the semantic meaning of the different roles, but it’s important. Increasingly we do this with things like XML schemas (e.g. DocBook), or DITA (Darwin Integrated Type Architecture), a new approach to defining information about information. We’ll talk more about content models later. Finally, we use rules to take context information about who is where, what they know, and what they need to do, so we can pull together specific recommendations of information.
**Insight:** You don’t have to do all of it. With a (non-mobile) performance support system, we only had access to a content model and a context model (of the state of a complex instrument), but with that we were able to present an optimized list of choices when help was requested, and that’s an improvement over a generic help system. The principles carry over.

**Figure 81 – Models for Custom Delivery**

With these models we can do a number of things. We can do context-sensitive performance support, such as providing a diagram of the misbehaving hardware to the engineer. We can do context-sensitive learning support such as providing information about setting agendas to an individual who’s got a learning goal of being better at running meetings, and who has a meeting next week. There’s no reason you can’t mobilize this. So, you could automatically present a sales person on a site visit not only with the customer’s current licenses or installations, but also analysis on their recent strategic moves and stock performance.

I admit, this is cutting edge and not many are doing this yet even for e-Learning, let alone m-Learning, but it’s doable, now, and you should be thinking of it.

**Basic Templates**

Mostly within the category of being proactive above, there are some basic forms of support that you can consider as templates for design. These include

- Electronic Performance Support Systems
- Media Files
• Learning Follow-on
• Communication

Electronic Performance Support Systems

Electronic Performance Support Systems (or EPSS), as originally proposed by visionary Gloria Gery, captured the notion of software that would accompany a computer application to accomplish a task and proactively work with users to help them perform. This was more than just good interface design, but would know the decision you need to make, and would bring in guidance, often intelligent guidance, to help perform the task. Ideally, it would also help you learn so you could gradually not need the performance support, and could know different users and help them differently.

More generically, we can think of information that you could make available on paper. Although it’s really just a job aid, it increasingly makes sense to distribute it electronically for a variety of reasons. For one, you can fit a considerable amount of content on a digital device that might occupy much more than a book if printed on paper. For another, it could have some interactivity built in to yield customized recommendations. This latter is closer to the original EPSS implementation.

In one case, we talked to a client with a closet full of PDF product information, trouble-shooting, and repair printouts that their service engineers were supposed to take on a call. Of course, the engineers did no such thing. However, they were moving to XML for the generation of these documents, as well as a content management system, and were wondering whether there was an opportunity to make this information available digitally. They could’ve even just loaded the (converted) PDF files onto a handheld device, but of course they could have done more with XML versions.

One of the early versions of interactive support started with sales tools for pharmaceutical representatives that not only showed demos on a laptop but which the rep could also query for specific details. Custom application development can be costly, but the tools are getting easier and more powerful, and you can even do much with simple Website forms and backend tools.

Workflow learning was a step beyond EPSS, working systemically instead of handcrafting it onto an application. Workflow learning proposed that tools like Business Process Modeling software, which builds the support from a flow diagram of the process, could auto-magically also build support. This uses infor-
mation much as the contextualized support mentioned above does, and could work the same way for mobile delivery.

**Media**

Another common application of mobile learning is in the form of media files. Audio and video files allow perusal when convenient, not just when live. You can capture existing events with audio or couple them with video (e.g. for accompanying slides, talking heads don’t add much value for the extra bandwidth and/or data storage required). You can create new special events as well, such as hosting a Webinar or conducting interviews.

One instance of this approach is how universities are now capturing lectures and making them available as Podcasts. For example, Stanford has its own iTunes university where one can download lectures. These can and should be coupled with downloadable presentations, or having the slides appear on devices with appropriate screens.

Creating such media files is increasingly available automatically. Many Web-presentation tools, if not most or all, already include capture abilities. Similarly, software is increasingly available that will even capture your slides and output from a Webcam to make a presentation.

Another example is a company that depended upon top technical skills. This company found that its engineers weren’t finding time to read their colleague’s white papers, so they arranged to record someone reading the white papers, and the engineers demanded more. Would you like your “customers” demanding more of your services?

**Learning Follow-on**

Another replicable model is the notion of a learning follow-on. In this model you deliver further content after a delivering a learning “event,” whether F2F or Web-mediated. We know reactivation and additional processing works to deepen learning. The notion here is to reactivate those associations in the brain, and ideally apply the knowledge to new and different problems than seen in the learning situation.

So, we could deliver a new example, where someone solves a problem using the relevant content. Ideally, these would be stories collected from inside the organization. Even better, we could send a practice problem. Ideally, the problem would be set in a context not seen in the original learning environment.
Properly staged, it could even be a fun challenge. In either case, you would deliver these several times over a period, and perhaps regularly if the target times of application are far apart.

There are now learning follow-on systems, but there are undoubtedly several ways in which you can do this, for example triggered or scheduled e-mails or SMS could serve to handle this.

**Communication**

The last basic template we’ll cover here is bringing in people at appropriate times. This may not be proactive, in terms of allowing individuals to choose when and who to access (which they already do), but can be facilitated through employee “yellow pages” applications which allow searching for individuals with specific expertise. The yellow page applications arose from the field of knowledge management, but in our broader picture of performance support this new approach is valuable. Of course, just making an employee directory (multiply searchable) available can overcome an individual’s lack of preparation!

More proactive support might be to tie specific mentors to specific individuals for specific learning goals. Then, we might use information about learning follow-on activities, or one’s schedule, to provide access to support reflection upon the completion of these events.

**Out of the box**

Ideally, we need to consider possibilities outside of the box as well. And, by definition, we can’t have any basic templates for these. Instead, what we can have are examples that can spark some new ideas.

One really cool example is an Immersive Learning Simulation (ILS) we proposed to teach sales skills. If you know the movie *The Game*, you know the basic premise: something you engage in starts permeating your life. In this case, a company would hire you to sell IT hardware. You’d get a list of clients to pursue, each with various characteristics. If you chose the “wrong one,” you’d lose out on more lucrative opportunities. If you chose the “right” one and left a message (e-mail, voicemail) you’d then need to provide some information, requiring you to use the Website to look at the products and send the appropriate PDF. E-mailing the correct one would have the individual call back and leave a voicemail that asked you to provide a technical contact to their relevant engi-
neer, and so on. It’s like more familiar ILS, but it spreads out through your tools and your life, not just through a single computer screen.

Under this was an architecture developed by Red7 that could coordinate information across e-mail, voicemail, and other media (fax, SMS text message, etc), and trigger conditional actions across time. Normally, it would spread out over several days, mimicking the actual interplay of contact management. The prototype was only a little more extensive than indicated, but there was no reason it couldn’t scale considerably.

Similar to distributed games like *The Beast* and *I Love Bees* (used to promote the movie *AI* and the computer game *Halo 2*, respectively), the notion is to use multiple media, spread of time, and conditional action to create an engaging experience and a series of meaningful and important decision (the key to both interesting games and effective learning practice – but that’s another topic).

Another out-of-the-box example is a story I heard in a workshop about how a company used a quiz context to promote use of the company portal. They used cell phones to present quiz questions where user could find the answer on the portal. If I recall correctly, they entered anyone putting in the correct answer into a drawing for prizes.

While not inherently mobile, you could use such a scavenger hunt to promote a mobile portal as well. Other ideas include ones that I’ve merely imagined. For example, some organizations are using virtual worlds to provide practice for traveling around locations, such as orienting new hires to a “campus” before actually starting at the location. What could we do like this using mobile devices?

One idea would be to follow the model used by audio tours (I experienced a preliminary version of the one now available on Alcatraz Island), where it gives you information about the place you're at and then directs you to the next. Location-awareness would be the next step, using RFID, for instance, to let you know what’s nearby. Another would be to equip people with location-aware devices once they arrive on campus, and they have to follow hints to figure out where they are, and when they get there, new hints are used.

Another idea is to have information available on equipment located out in the field. Earlier we heard about loading PDFs on a mobile device. How about if that equipment had an RFID chip that contained the information about itself? So if you came near an appropriately equipped piece of equipment, it could tell
you (through the mobile device) about itself, including how to troubleshoot and repair it.
These are just a few ideas that hopefully will expand your potential solutions space.

**Designing the Design Process**

With those concepts and models, we are ready to talk about design. In looking at design models across disciplines (looking to improve my own), I’ve found 5 step models, 4 steps models, and 5 step models (e.g. ADDIE). In many cases my work has been to an audience broader than just instructional designers, and consequently I’ve found that everyone seems to understand a four-step model of Analysis, Specification, Implementation, and Evaluation.

![Iterative Design](image)

I’ve re-conceptualized them as *re-*analysis, *re-*specification, *re-*implementation, and *re-*evaluation to emphasize that when designing for the complexity of humans you need to cycle through to a solution; it’s a design discipline, not an engineering process. So, you’ll need to specify your design goals and iterate towards them rather than expect a single pass through. You’ll need to prototype, test, and refine.

**Analysis**

So what do we do differently in the analysis phase to design a mobile solution? The first thing to do is to seriously analyze whether this is, or is not a “learning” solution. If it requires a full learning solution, mobile is likely going to be only part of the solution, not the full answer (but then we need to make sure we include mobile in the considerations). If it’s performance support, on the
other hand, it could be a completely mobile solution. Another initial thought is to consider whether there’s a mobile augmentation to a non-mobile situation you’re addressing. Can you extend the learning to make it more effective?

One of the traps we fall into in designing learning is to only consider the contexts we’re familiar with. We also need to make sure that our performance analyses include mobile contexts: those people who are performing in the field. Finally, context-wise, we need to ensure we consider convenience of access or interaction. Is this something people might want to access in a time or place not already considered?

When we consider context we also need to consider our learners. What devices are available to them? Is this something we can take advantage of? What information do they already have that they’re not using, for whatever reason? What information don’t they have that they could use? What are the things that are hard to remember and are better off as “lookup?”

Another important question to ascertain at the information-gathering stage is to identify what models you have access to, or can easily build from what is available. Do you have a context model, or are the contexts easy enough to categorize? Do you have a content model, or can you build one? Do you have competency or role categorizations of your workforce to access? And/or do you have a good understanding of the tasks they perform?

One of the important implications from recent design research is the importance of anthropological approaches to understanding the real need. What I mean here is to seriously investigate the actual people in practice, not trust their stories about what they do, let alone what their supervisors or managers tell you they do. You want that information, but you need to triangulate it. It’s a reliable outcome that individuals, particularly experts, don’t actually know what they do and you have to correlate what they say with what you can observe. That requires observation.

That also can mean experimentation, getting in there with prototypes and testing what happens. **Situated design,** from interface design, requires going into the actual context, observing, even role-playing, or doing the job. As our tasks get more complex (and I’ve yet to meet any other than completely idiosyncratic situations where anyone’s life’s getting easier), useful understandings will take more than just inferences and anecdotes.

The lesson here is not to prematurely converge on your options, or accept some theoretical specifications, nor necessarily listen to your user’s wants or

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**Insight: The Palm Pilot Story**

When Jeff Hawkins was designing the original Palm Pilot, he used an inspired design approach. He carried around with him a piece of wood with the form-factor he was interested in (and a stylus), and asked himself the question: “What would I do with this if I could use it to make me more effective?” The result was the basic applications of contacts, memos, ToDos, and calendar.
perceived needs, but to take some time to understand that real situation and figure out what would really be useful.

This isn’t much more than your existing information gathering, it’s just a bit richer and opportunistic, but opens up the design space to consider a wider array of potential solutions.

**Specification**

So, what are we going to design? The frameworks and templates above should provide some useful guidelines. From this point, we need to explore the widest design space possible. As mentioned early on, however, we tend to solve problems the same way we’ve solved previous problems (an artifact of our cognitive architecture). How do we avoid this trap?

First of all, we need to ensure that our focus slowly drills down from the top-level principles. That is, we need to decide what sort of intervention we need, and when and where it’s best to deliver it, and think through what are the ways we can surround the entire issue in a way to deliver a complete solution. As indicated above, one hint is to consider: what would you give to this person in this context?

Good design also cycles between top-down and bottom-up, so also think what, in context, would provide a useful solution. What do the individuals you’re trying to help think they could benefit from?

**Usability**

Mobile devices are limited. This includes the richness of ways to input data to the device, and the quantity of information that devices can provide to you at one time. As a consequence, we need to worry about information design, parsing it down, and information navigation, getting to the bit we want. It’s about information architecture and input/output under more constraints.

Consequently, one hint draws upon the minimalist principle above. When designing for the Web, it’s a reliable problem that people have trouble weaning themselves from habits developed in print, and they don’t pare down text sufficiently, don’t use highlighting, (underlining, bolding, italics, bullets) and don’t use white space efficiently, etc. You can carry this further for mobile:

> **Full sentences not needed – phrases and “telegraphy” are enough!**
This principle is true for good instructional design writing, as it's appropriate for the Web and in ILS design as well, but it's doubly important for mobile learning.

A mobile example brought this home to me (written up in David Metcalf's mLearning book). I had a writer trim down the SME content according to my directions, and then I trimmed it down again to very telegraphic prose (we were working on 7 line x 15 character phone screens, try it!). I can't say we got everything on a screen without scrolling, but we got very close.

Another hint on information design is to use the journalistic standard of having the first paragraph provide an overview of information, and then subsequent paragraphs drill into more depth. This allows users to drill down to the point they need or want, rather than forcing them to peruse all available information.

The latter brings up a second important issue: information architecture. We talked about information design, how to structure information so that it’s both minimal and comprehensible. As indicated above, we also have to worry about information architecture, the way you organize the information so that you can understand how it’s structured and consequently find your way to specific bits. The short solution is to chunk it up small, and to figure out a consistent scheme to provide navigation through the small elements.

For that mobile example above we had to make the content extremely terse, and divide up several different categories of support to make it comprehensible and accessible. We had three major components (one with a sub-component), and each had its own structure. The resulting architecture seems complex, but makes the information navigable.
The point is not to read all the details, but instead to notice the degree to which we had to detail the information architecture for this learning application.

**Mapping Learner to Solution**

We need to make some assumptions about who our learners are. In performance support situations, we may find that some of our learners are relatively novice, and others are expert. Gloria Gery suggested that we should support experts and novices differently.

For instance, novices may need motivation to understand the reason why they are performing the task, and why it's important. Similarly, they may not have a context for the application of the knowledge to problems. Practitioners and experts, on the other hand, will need merely reminders of the steps they need to perform, without a lot of explication of context.

A second consideration is who is the default learner for support? Do you assume novices or experts? If you know who it is you can optimize, but otherwise you'll need a good first case.
**Example:** In one (non-mobile) case, we assumed expert and made more detailed information an extra click away. This made the minimum information quickly available, and novices who wanted more could ask for it. The context here was a situation where someone would come in to the environment but then typically would stay there a long time, so our users were more likely to be expert.

Having the default be expert is also a fair approach in most cases, streamlining the work of the expert, and with little extra overhead for the novice who will likely be slower anyway.

**Content Models, Learning Objects, & Reuse**

Earlier, we mentioned content models from the perspective of customized content, but another reason to think about content models is from the perspective of reuse. The point being that if you have specifically targeted semantics, defining the type of object you have, you can repackage them to meet different learning needs.

![Figure 84 – Learning Object Reuse](image)
So, for instance, if you identify each of the major components from an e-Learning course, separating out different concept presentations, each example, each practice, and any job aids, you might reassemble each of these to meet different learning needs. For reactivating over time, you might send them the concept presentation and a practice. For just in time support, you might provide a concept and an example. My recommendation is to think in advance about all possible applications of the content and design accordingly.

One of the associated issues with the learning object approach (e.g. SCORM, the Shareable Content Object Reference Model) has been granularity: at what level do you divide up your content? One answer is that it isn’t a learning object unless it is a complete learning experience. I differ, though I’m perfectly willing to call it merely an information, content, or knowledge object, not a learning object. My pragmatic definition of the right level of granularity is the smallest chunk you’d give to one learner versus another, within the context of a smart tutor who knows the learners, their goals, and strengths. Practically, it has to be system-comprehensible, so using the different learning roles of the content has been a useful level of granularity.

In the larger picture, thinking of content models across the enterprise is a move that will facilitate mobile and other efficiencies. Looking at content creation across the product/service life-cycle, from the generation of marketing requirements, through development specifications, to separate versions of end-user information: sales training, customer support, help systems, etc, is the core of a strategic step in e-Learning towards greater integration that will reduce development costs and foster opportunities for more flexible delivery.

**Implementation**

With greater integration of content development, much mobile implementation can be systematized and auto-generated, but regardless of whether it’s still custom-crafted or not, implementation is about mapping content to delivery through tools. These tend to break across one major division, whether the content is static (generated dynamically or not) or whether it’s interactive. The decisions currently still depend to some extent on the delivery platform, due to proprietary standards and competition, although that’s changing due to other pressures. Security becomes an issue as well.
Some of the ubiquitous tools have entailments, and other tools have their own tradeoffs. You’ll want to evaluate the options and costs, and make a choice that’s optimal for your situation.

Note: While “Tools for m-Learning” on page 121 covers more specifics about vendors, the following is intended to give you some principled guidance which will help sort out the various information you can get from providers.

**About platforms**

There are a handful of major platforms for delivery, essentially the operating system, or OS, of the device. There are tradeoffs among them that can affect your development solution. The major players are Palm, Windows (Microsoft), Symbian, and RIM. The iPod has its own approach, but that’s likely to move to the version of Apple’s Macintosh OS that’s just been released on the iPhone. (This is an extremely dynamic environment, and much of what’s true here now may have changed by the time you read this!)

**Palm:** The Palm Pilot pretty much launched the mobile learning system, as it was the first system that survived (e.g. Apple’s Newton did not). So PalmOS is a basic software platform, and it’s an open system with a Software Development Kit (SDK) that’s robust and accessible.

Palm devices (the various PIM devices as well as the Treo line of smartphones) consequently have many different formats supported, and can play media as well as display documents. There is also an enormous variety of third party applications available that do almost any obscure thing you might want.

**Windows Mobile:** A major alternative to the Palm OS is Microsoft’s Windows environments for PDAs and phones. Capitalizing on the familiarity with Windows desktop, this environment works well with the desktop, and comes in several versions for different devices: phone, PDA, and combination smartphone.

The benefit here is that it leverages the well-established Windows development tools, and taps into the rich suite of media and information processing suites. The content tools include the Microsoft Office suite such as Word, Excel, and PowerPoint, and also synchronization with Microsoft Outlook and Instant Messaging.

**Symbian:** Symbian is another operating system that has become widely available, particularly for mobile phones. It runs on perhaps a greater variety of phones than any other, including Nokia & Sony/Ericsson. Consequently, Symb-
bian has a suite of applications available, though not as wide as Palm. Symbian’s advantage is its broad installed base of handsets.

RIM: Research In Motion, the company behind the Blackberry line of e-mail-capable phones, has its own proprietary operating system that supports third-party development. The devices are ubiquitous, but there aren’t as many applications available.

Apple: Apple’s iPod was essentially a closed platform, and while you could prepare media (audio and video) for delivery, you couldn’t develop your own applications. The new iPhone, however, supports many browser-based applications. The iPhone runs on an abbreviated version of Mac OS, and it’s plausible that a development path will open up that may not be as fully open as desktop operating systems, but still be more flexible than the iPod. It’s also plausible that new iPods will similarly use this same environment.

Others: Note that new systems arise constantly, with suggestions that Palm will move to a Linux kernel, etc. The point here is not to tell you how to develop on these different platforms, but to make you aware of some of the tradeoffs each platform entails, and the relative lack of standards that complicates the picture. There are certain media formats that a large subset of the platforms typically supports, and then other formats which are less broadly available. Consequently, delivering essentially static content is easy, but interactive applications can be quite a bit harder.

**Content: (relatively) easy**

The reactive step, above, of making sure your content is mobile accessible and mobile deliverable, as well as the proactive step of developing specific content (not interactivities) is relatively easy.

For text, with or without graphics and images, two fairly easy solutions include PDFs and Web pages. Most mobile devices have, or can have, a PDF reader. You may need to download the document and sync it to the device, but you should be able to make documents available and viewable on many devices.

Web delivery will work for most devices that have Web browsers as well, at least for static content. As mobile browsers become more capable, XHTML (XML-based HTML) now largely supersedes the old WML (Wireless Markup Language that they rolled up into the Open Mobile Alliance) as the language of choice, The main criteria is to make sure that pages render appropriately on smaller screens, and restrict use of Flash and JavaScript.
There are an increasing number of audio and video capture tools that make life simple in this regard. The Macintosh comes with built-in tools, and PCs have free or low-cost tools available. Thus, there are many tools to develop “canned” media, prerecorded audio, and video.

**Interactivity: harder**

It’s a more complicated story if you’re interested in creating a solution for interactive capabilities. Web pages are probably the easiest approach, but dynamic uses in Web pages are problematic. The two major approaches are Flash and JavaScript, but neither works reliably across mobile platforms, and it’s often the case that a particular mobile browser will support neither. Note that this is changing, with JavaScript ever more available, and Flash Lite regularly making Flash more accessible.

Once you go beyond Web pages, you’re essentially talking about special applications. The first category is extensions to existing tools that can produce mobile deliverable content, and the second is custom applications.

Increasingly, general tools have mobile content generation capabilities. Tool vendor Trivantis acquired Zirada as a way to provide mobile output, for instance, and Adobe Flash allows you to develop specifically for Flash Lite players, their mobile Flash solution. The real solution here is to see if any of your existing tools have or can accept extensions that allow mobile production before you go searching for a mobile-specific solution. Similarly, JavaScript can make interactive Web pages.

Ideally, the goal would be to standardize across these different platforms. There are a number of specialized mobile content tools, such as Go Test Go, which produces quizzes that you can run on over 90% of mobile phones, and JumpStart Wireless which promises solutions that work across devices to handle what paperwork originally handled. iQuiz creates quizzes for the iPod, but they’re highly limited in feedback. Hot Lava Software has specialized tools to build mobile content as well, a step above custom programming. This is just indicative, not exhaustive.

Beyond using authoring tools, the next step is to actually get custom applications programmed. There are tradeoffs in this approach, one being the extra programming (and any ongoing maintenance issues, the other being creating the most efficient applications. Qualcomm’s Brew is one environment that supports programming and delivering solutions on mobile phones, and a mobile edition, J2ME, supports the Java programming language. Similarly, Win-
dows Mobile also uses a programming environment that’s an offshoot of the traditional Windows programming environment.

Here, look for experience in vendors or employees, and specify your parameters before you contract for the capabilities and features you need.

**Feeling Secure**

As indicated above, security is a major issue for mobile devices. There are solutions, though not necessarily easy ones.

There are a couple of ways in which devices can lose their security. One is when someone else accesses the device. This happens when a device is misplaced or lost; the second is interception of data transmission. The former is more likely; the latter may be more dangerous.

The first solution is only to make information available that you’re willing to have someone see. The second is to require a password to any online accessible section for each time of access. This second option should also require a password any time you turn the device on. This cannot only prevent access, but using it incorrectly can trigger a memory wipe of the device. This is much easier when the organization has provided devices; expecting such behavior on individuals’ own devices may be a bit much. It’s a tradeoff here between convenience and security. Another possible step is to require that all information on a device be encrypted on the device and is only unencrypted when a password is entered. Thus, even if someone copies or accesses the data outside the dedicated application, it’s secure. A final step is that certain devices are capable of “kill pills,” where you can remotely wipe out data on a device when you are not sure where it is.

Note that print information runs the same risk, and anything you might provide in print you can probably provide via mobile access as well.

The second concern has to do with encrypting the transmissions to mobile devices. This is certainly possible as solutions exist, but maybe should be reserved for instances where you absolutely need the data and you must absolutely keep it protected. Otherwise, it’s better to restrict access to such information rather than attempt the necessarily onerous measures about secure transmissions.
Evaluation

If you build it, they may not be able to use it. They may not even be aware of it (but that’s a later topic). However, you’ll have new issues in evaluating the utility of your mobile intervention. So, in addition to the usability (always done before educational evaluation) and efficacy, you need to address the mobile-specific issues.

Most of the issues are performance or usability-related. For instance, you have to ensure they can find the content, and that it’s accessible either from the desktop to synch with the mobile device or wirelessly from the device. Then you have to ensure it’s actually easily downloadable (if that’s the case), and in a reasonable amount of time. If you need to wirelessly access it you also need to determine if it’s wirelessly accessible where it needs to be, not just where it’s convenient to test.

Once accessed, there come the issues of whether what displays is not only navigable but comprehensible in context. For example, if it’s audio, can you use it in a potentially noisy environment? Make ecologically valid tests, and test and test and test again.

Ready, Fire, Aim:

While it certainly is okay to make a mobile experiment, in the longer run you’ll want to include mobile access as part of your strategic support of your organization’s individuals. Already, it’s more likely that someone has a mobile device than that they have Internet access! And you’ll want to follow what people know about organizational change in your implementation, as introducing or supporting a technology is an organizational change.

Mobilize

At the first level, it’s about content. So, the first step is to be proactive about the reactive strategy above: make your content mobile accessible and deliverable. That includes both ensuring there are ways to transform the content to appropriate form-factors, and to make that content available in ways that people can find it. Information architecture plays a role here.

The second step is to start looking for opportunities to develop content specifically to meet mobile opportunities. The final step at the first level is to consider...
what you might do to take advantage of context knowledge that might be available, and think about what real opportunities are possible.

But there’s another level, the strategic level, where an organization starts looking beyond training, and thinking about breaking down silos to increase effectiveness and achieve efficiencies.

At this level, steps include: developing content models, not just content; making sure curricula are mutually aware (e.g. product training is developed in light of the current sales training approach and content); making new Web capabilities available in the infrastructure and leveraging them; and integrating data from different areas to leverage the different models – the knowledge of competencies in the LMS, the expertise in yellow-pages applications, information about tasks from roles, etc.

Then proceed as normal

With this greater strategic focus on information, not just on learning but on performance, the organization has a greater chance to succeed. However, don’t necessarily await the strategic awareness on the part of your organization; you may have to be an agent of change. For one, manage up! Help your organization understand the opportunities that await – and do one more thing...

Keep your eyes open for organizational changes that you can leverage. There are a number of common initiatives that are prime for aligning with mobile, and provide an opportunity for you to add significant value for a marginal additional investment.

Obviously, a ripe opportunity is any initiative providing mobile devices, whether Treos, Blackberries, Windows smartphones, PocketPCs, or iPods. I remember one person concerned that if they provided iPods, they might not be able to expect the learner to use it for company purposes. I suggested that expecting them to use it also for company purposes was reasonable given that the organization was providing the device.

If your organization is beginning to (or already) using a Content Management System, there’s an opportunity to make that content available for mobile devices as well. Along the same lines, efforts to move to more flexible content types are an opportunity. If you hear phrases like XML, DITA (Darwin Integrated Type Architecture) or single-sourcing (writing once to populate many different needs), this is another instance where effort is going into rethinking content, and mobile is suddenly easier and worth considering.
Any knowledge management initiatives also provide opportunities. You can make “yellow pages” of individuals by expertise available for contact for more effective problem-solving, and any content portals created to bring information together could be a mobile opportunity as well.

You’ll want to approach these as an organizational change, as with any e-Learning initiative (c.f. Cross & Dublin’s Implementing eLearning). You’ll need the traditional vision, messaging, early success, aligned incentives, etc. You’ll also need policies and procedures for the different problems that could arrive. It’s not rocket science, but it is important.

**Action!**

The purpose of this screed was to help you think differently about your role and the power of new technologies to empower individuals in an organization (note that the principles apply to higher education, K-12, and other facets of life-long learning as well), and then to provide you with some systematic steps to take in your processes to make these capabilities more of your normal considerations. I certainly hope it’s met that goal, but it’s a very dynamic field and constantly changing, so you’ll have to take some responsibility to get your mind around what’s here, and use that as a basis to move forward.

I hope you feel equipped to think differently on behalf of the individuals you are responsible for. Go forth and mobilize!

**Bibliography**


http://www.quinnovation.com/LearningAtLarge.pdf


**Acknowledgements**

In 2000, Marcia Conner asked me to write an m-Learning article for Learnativity. I hadn’t thought about it, let alone done it, so I wrote a thought piece. It was far from perfect, but as it was one of the first pieces out there it gained me a small amount of notoriety and led to me learning more. Thanks, Marcia!

Along the way, I hooked up with several of the early experts (two of whom are represented in this research group, 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 (also on the team) & Mark Oehlert about mobile learning. Some of what I have presented here I learned from them.
Tools for m-Learning

By Judy Brown

(For information about Judy, please see page 61.)
M-Learning Toolbox

We learned in “Embracing m-Learning” on page 61 about variations for performance support, review or reinforcement, knowledge acquisition, coaching or mentoring, receipt of updates, data collection, audio and/or video instruction, and decision support along with some of the tools used. Here we will look at some of the tools used to create those examples.

In the current mobile learning survey, we did not ask about tools in use as in other surveys. Currently less than 10% of the respondents have implemented m-Learning but two-thirds are either in the process of implementation or planning to do so. Over three-quarters of the respondents agreed that employees are increasingly mobile, thus the availability of development tools is a topic of high interest.

Let’s take a look at some of the options for available tools today.

Note: The eLearning Guild’s Buyer’s Guide contains a list of vendors and their associated tools that you may use to develop and deploy Mobile Learning. You can access the Buyer’s Guide by logging into www.elearningguild.com and clicking My Reports from the menu along the left side of the screen.

E-Learning Tools

You may be surprised to learn that some of your existing development tools and expertise are also tools for mobile development. Many authoring tools have shipped with templates for mobile screens and some of the XML-based systems enable development shops to develop once and deploy on multiple platforms.

Adobe has an extensive site with papers and downloads for the use of their products with mobile devices. Tools you may already be using such as Captivate, Flash, and Dreamweaver also work for mobile development. See the Mobile & Devices Developer Center at http://www.adobe.com/devnet/devices/.

Today Flash or Flash Lite is available on over 500 various mobile devices and growing (with the exception of the new iPhone at this time.) Most e-Learning development shops already have extensive Flash development expertise.

Java is an Open Source programming tool that you can use for many devices.

A Microsoft Windows shop can use SharePoint and .NET technologies for Windows Mobile devices.
It is also entirely possible that your LMS may already support mobile delivery, or have an add-on to do so. It is certainly worth checking. (For information on integrating Mobile Learning with an LMS, see “Case Study: Integrating m-Learning with a Learning Management System” on page 157.)

**Mobile Browsers and UI Experience**

Before planning to redevelop content for your mobile workforce, be sure to check out your existing content on some of the new mobile browsers. **Opera** ([http://www.opera.com/](http://www.opera.com/)), built into many Smartphones and Internet tablets, handles a surprising amount of standard Web content very well. **Thunderhawk** ([http://www.bitstream.com/wireless/](http://www.bitstream.com/wireless/)) is a fast mobile browser available for Java, Symbian, and Windows Mobile devices. Few have any complaints about the Web-browsing capabilities of **Safari** on the new iPhone. **ZenZui** ([http://www.zenzui.com/products.html](http://www.zenzui.com/products.html)) is a new user experience using zooming. Accessing and viewing content on smaller screens is an area that continues to improve.

**RSS**

RSS feeds are a “really simple” way to get started to implement mobile learning updates quickly. There are now at least a dozen Mobile RSS readers. The Ultimate RSS Toolbox at [http://mashable.com/2007/06/11/rss-toolbox/](http://mashable.com/2007/06/11/rss-toolbox/) list several options.

**Mobile Development Tools**

There are several content development tools available today specifically designed for mobile devices. As noted above, your current development tools from Adobe or other vendors may also support mobile learning content. Be certain, though, to check that they support the range of devices you will be supporting.

**Hot Lava Software** ([http://www.hotlavasoftware.com/index.php](http://www.hotlavasoftware.com/index.php)) recently released their new Learning Mobile Author™ (LMA3.2) development and delivery suite and the Hot Lava Mobile Delivery and Tracking System™ (MDTS). The tracking system can integrate with an existing LMS system or you can use it independently. The new LMA authoring software features the following new options: survey page, polling option, radio buttons, question tagging, and cus-
tom directional controls. This toolkit allows rapid creation and deployment of mobile content to multiple devices such as PocketPC, Windows Mobile, BlackBerry, Nokia, PalmOS, mobile phones, Smartphones, and the desktop. You can develop content once and deploy it for the various devices.

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**Note:** Hot Lava Software is also featured in Perago’s case study on integrating Mobile Learning with an LMS. See “Case Study: Integrating m-Learning with a Learning Management System” on page 157 for more information.

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**Kallisto Presenter and Composer** ([http://kallisto.com/](http://kallisto.com/)) has an authoring environment for assembling graphics, text, and audio into animated presentations. Composer can generate presentations for Java MIDP phones and other thin clients. Kallisto is a custom learning development shop which is making their in-house development tools available.

**Zirada Mobile Publisher** ([http://www.gotzapp.com/create](http://www.gotzapp.com/create)) is a mobile development tool initially created by Trivantis (the Lectora folks.) They have now made it available free to target teens to create photo galleries, blogs, and diaries, with music clips and animation accessible on most color screen cell phones. You can also use it to quickly create a prototype for mobile delivery.

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**Systems**

**Giunti Interactive Labs eXact Mobile** ([http://www.giuntilabs.com/info.php?vvu=34](http://www.giuntilabs.com/info.php?vvu=34)) is the first commercial Mobile Learning Content Management Solution. It is a new module of learn eXact, which enables context-aware (or location-based) learning content delivery when the learner needs to access it. Giunti has been active in Europe in the mobile arena and now has opened a U.S. office. Keep your eyes on them, as they now have location-based detection using GPS and Microsoft Virtual Earth, CISCO Wi-Fi positioning, and are heading towards Virtual learning worlds and real-world augmented proximity detection (called Geo learning™ extension) to their mobile solutions.

**Emantras’ MobLS** ([http://www.emantras.com/emanwebfinal/flashui/MobLs.pdf](http://www.emantras.com/emanwebfinal/flashui/MobLs.pdf)) platform is highly scalable with an adaptive platform for content and courses that you can easily deploy and manage. The platform for Windows Mobile devices is built to handle and manage rich-media and SCORM-based data and metrics.
Instancy's (http://www.instancy.com/) revolutionary platform is the first Knowledge On-Demand solution of its kind. With Instancy, you can rapidly create, manage, and deliver knowledge via the Internet and mobile devices, and you can empower individuals and groups with persistently-immediate knowledge solutions. You can create content once and deploy it over the Web, on a mobile device, or even in a paper format.

LiquidTalk (http://www.liquidtalk.com/) is a secure, on-demand application to empower sales, service, and other remote workers to find, organize, create, and distribute proprietary audio and video business content to mobile devices including iPhone, iPod, and BlackBerry. Their services help organizations leverage content, devices, and users to accomplish mobile sales enablement, learning and training, knowledge transfer, corporate, and customer communication.

Meridian Anywhere 3.0 (http://www.meridianksi.com/products/meridian_player.asp) is a desktop application that allows your organization to deliver SCORM-conformant content to anyone, anywhere, without connectivity to your organization’s learning management system. You can use this tool as a mobile LMS application, a remote learning solution, or a multi-user training kiosk.

Mobile Chalk (http://www.chalk.com/Services/MobileContent.asp) provides authoring templates for content creation, push technology to send device-appropriate content directly to your users, and content tracking in a secure environment.

OnPoint mLearning Pro (http://www.onpointdigital.com/new_site/products_mlearning.htm) offers an innovative way to publish, notify, deliver, and track learning content and assessment results for mobile users.

**iPod Tools**


iQuiz Maker (http://www.iquizmaker.com/) is an easy way to create custom quizzes for the iQuiz game for the iPod. iQuiz Maker works seamlessly, so you can write, create, and package your own quizzes.
iWriter (http://www.talkingpanda.com/iwriter/) from the Talking Panda Team provides for creating iPod study tools.

ProfCast (http://profcast.com/public/index.php) from Humble Daisy, Inc. offers a low-cost solution for presentation recording, synchronization of slides with audio, RSS generation, and publishing support.

Techsmith’s Camtasia Studio (http://www.techsmith.com/camtasia.asp) is a popular screen recorder and video editor that makes it easy to create content for audio or video iPods.


Other Tools

Mobipocket Creator (http://www.mobipocket.com/en/DownloadSoft/ProductDetailsCreator.asp) provides a free tool for creation of e-Books and an e-Book reader for your PC, PDA and Smartphone, Palm, Windows mobile, Symbian, Blackberry, or PocketPC.

StudyCell (http://www.cellpup.com/) supplies the tools to create your own mobile flashcards.

Impatica (http://www.impatica.com/imp4bes/imp4bes.html) enables Blackberry users to view entire PowerPoint presentations directly on their handhelds.

See “Embracing m-Learning” (page 61) for several tools that will aid in creating your own mobile sites.

This is only a small portion of the tools available for mobile content creation. The list continues to grow. Visit http://www.mlearnopedia.com for additional options and new additions. If you discover additional tools for mobile learning, please let me know at judy@judybrown.com and we will include them.
The Business-Value Proposition of Mobile Learning

By David Metcalf

(For information about David, please see page 75.)
Overview

In order to really understand how to use mobile learning and the associated technologies most effectively, we must start by looking at an internal investment strategy and business-value propositions. Business-value propositions do not start with cool gadgets, devices, and mobile technology. They start with a fundamental understanding of our audience’s views and business’s views and then link those technologies to those application areas where appropriate.

Some of the best examples of mobile learning that I have seen have not even started out to address a learning need. They started out to address a fundamental business need of an increasingly mobile workforce. Understanding the needs of a mobile sales force, a mobile service force, or executives that are constantly on the go is extremely important and provides relevance to supporting individual performance needs, which more often than not, roll up to organizational level business performance needs.

Why Mobile Learning?

Mobile learning is an outgrowth of one of the signs of our times. We are a much more mobile society now than we ever have been. And that trend doesn’t seem to be decreasing. We are continuing to spend more time in transit, more time in remote locations, and more time doing jobs that require us to be on site, present, or learning in a realistic setting.

The Yankee Group’s 2007 Attitude and Behaviors Survey showed that 43% of the most productive workers are, in fact, mobile; pointing to a strong need and use for mobile technologies to augment personal productivity. Furthermore, the study went on to state that over 20% of the workers in U.S. organizations qualify as mobile workers, and that that number is growing. Another indicator of mobile learning’s attractiveness is the fact that we spend so much time in transit. Research studies by the Texas A&M transportation lab indicate average commute times that equal over 40 minutes a day for the average individual.

Over the years, there have been many strategies for putting this time to good use. Anything from radio news broadcasts, to “books on tape” style content, use of cell phones to conduct business meetings while on the go, and any number of other mobile performance and productivity aids that have elements of learning built in.

Now we have interactivity through our phones available to us, with even more options for delivery of mobile content. Many of the people that I talk to who at
first say, “No, I’ve never used mobile learning,” have not looked at some of the common technologies they use all the time. E-mail on their Blackberries to check a listserv with new information about new products and offerings; current events in their industry; or dialing into a corporate network to access just-in-time information (or better yet, some form of PUSH technology that alerts a mobile employee of information he/she should have.). Here are things that people do every day that fit within our definition of m-Learning and m-Performance:

- Calling to check the status of our flights before we go to the airport.
- Using a GPS system to review our location and find out all sorts of information that’s useful to us right at the point of need – whether that’s local eating establishments, directions to a location, or the ability to tie into information that you need to know about a particular location.
- Receiving e-mail on a Blackberry or cell phone.
- Using an MP3 player to listen to a Podcast on industry trends and technology while waiting in an airport or navigating through expressway traffic.

**Mobile Devices are Ubiquitous**

Another important factor beyond the personal productivity that links to organizational goals and overall productivity improvement is the widespread availability of mobile technology. A recent Merrill Lynch study, published in January, 2007, indicates that there are 2.4 billion cell phones in the world and this number is growing rapidly. Of those, 700 million are camera phones, representing one of several advanced capabilities that many phones have. There are also another half-billion PDA devices, including 100 million Apple iPods, along with many other types, styles, and brands of mobile music and/or video players.

As a delivery platform, these numbers are staggering. This is more than the total number of cars, televisions, and PCs, according to a 2005 report from the Gartner Group. This makes it the largest available global delivery platform for any type of content or information, including learning, performance, and knowledge content.

We need to address a number of issues:

- Understanding the different modalities for delivery to a mobile device
• The different nature and challenges of smaller screens
• Battery life issues as devices become more powerful
• The general nature of mobile devices used for human-to-human communication rather than linking to systems, organizations, or contents
• Areas that lack coverage

Fundamentally, however, having this many devices in this many people’s hands shows the mass-market potential for delivery to audiences while they’re on the go, granting access to technology capable of making them more productive in their daily activities.

M-Learning Supports Best-Practices in Pedagogy

Research from people such as Dr. Will Thalheimer (2004) show the actual increases in learning that can occur based on an optimum time interval. Generally speaking, the optimal interval for mediation and reinforcement around key learning points is 18 hours. Without the use of an intervention that is readily available to the learner no matter what the setting, it’s difficult to produce and replicate this interval at scale. However, after initial learning has occurred, if you can deliver reinforcement over a mobile device using a PUSH model, this interval model becomes more realistic for delivery.

Jupiter (2003) states there are three things that, if people leave home without them, they’re most likely to go back for. They are keys, wallet, and cell phone. This indication of the number of people with these devices, and their relative importance, speaks to their availability for use for learning content and delivery of other materials that improve productivity.

Another consideration in “Why mobile learning?” is the multi-purpose capabilities of many of the newer phones with multimedia and/or smart-phone capability. Being able to adjust to multiple modalities of learning on a single device that is simpler to use than a computer, more readily available, instant-on, and multi-functional holds great promise.

This is not to say that individual use devices with no built-in intelligence, such as an iPod, or other mobile handheld devices with limited interactive function or no wireless connectivity cannot be useful for mobile learning. This only says that the greatest promise in this emerging class of devices lies with those which can perform all of these functions, plus provide interactive two-way
communication, Web-browser access to Web-content while on the go, and production or consumption of multi-sensory content.

**Just-In-Time Information vs. Formal Learning**

One of the main reasons I believe that mobile learning will continue to be an increasingly useful and relevant mode of delivery is that it will continue to look less like traditional learning and more like knowing or performance. Let me explain what I mean. Do I really want to spend time “learning” something if what I really need is to “know” it instantly? Do I really want to memorize an entire map when I only need to know enough to understand how to use a map so that I can know where to go, where I am, and where potentially useful services might be? Do I really need to know everything if I only need a small portion of that information that’s instantly and readily searchable to perform a particular task right here and right now?

The speed and rate of learning will not be able to keep pace with the speed at which we need to know or need to perform. Our ability to easily access information, not only online but out in the real world around us, is another key reason for mobile learning and a great reason why a mobile device can serve as a gateway between the real world (physically around us) and the online or virtual world which holds so much information about our world, about us, and the link between.

Let me give you an example. I recently saw a demonstration that used a camera phone to point and shoot at a woman’s dress in a magazine. As the phone pointed at the dress, it sent information to a server with optical and image recognition software that determined the name, brand, make, and price of the dress, and then sent that information back to the mobile device’s screen (see “Point and Shoot Learning” on page 75 for other examples).

This ability to have easy search capability that can bring any type of content, whether pictures, text, audio, or visual to your mobile device with minimal user interface interaction other than pointing and shooting holds promise to mitigate some of the issues of the small screen and the usability of small devices.
From Mobile Consumer to Mobile Producer

Another trend that speaks to “Why mobile learning?” is the notion that our mobile devices don’t just allow us to connect to people who have expertise, or to have a one-way downloaded consumption of content while on the go, but also to better enable people to be mobile producers. Right now I’m stuck in traffic in my car, keeping my hands on the wheel and my eyes on the road but having some thoughts I wanted to share with you, the audience of readers. And with a press of three buttons, I’ve been able to record and dictate this information for later transcription by my team members, and it greatly increased my productivity and allowed me to become a producer of information. On Bloom’s Taxonomy, I’ve extended beyond simple knowledge transfer or comprehension, and into synthesis. As I synthesize, and use this as a teaching medium, I share knowledge with you that you’ll hopefully benefit from, but I also benefit from using that knowledge, and codifying it in new ways to make it even more relevant to me than it was before when I simply knew it and did not put it to use or practical purpose.

Let me give you a further example. From 2002 to 2005, I had a vision that it’d be great if there was a mobile learning book and a contract to that effect. I knew I didn’t have time to write a book, but I had a contract, and a burning desire and interest to codify my knowledge and synthesize something that would solidify my own learning, if nothing else, and hopefully share some of this with my students, colleagues, and hopefully people in the broader audience. So how did I write a book with no time and a super-busy work schedule? I wrote the first part of the book, representing about 50%, or 80-90 pages, while I was in charge of a London office and had to make frequent transatlantic flights. After two hours, my laptop battery was dead and I had choices of sleeping, watching a movie, reading some materials (which rapidly ran out too, on such long flights), or using my mobile device. (At the time, this was a Palm Pilot that had a battery life of 12 to 16 hours, and a foldout accordion keyboard.) On many occasions, I chose the latter and became a mobile producer, following my outline, thinking about the ideas I had, and simply typing those ideas into a simple text editor. This worked very well, until one day I wrote so much that I actually ran down the battery on the Palm Pilot before I could synchronize it back in my office and lost 10% of the book. Needless to say, I didn’t write for another three months.
However, after bouncing back from this, and starting to write again, I completed about 50% of the book. At the time, my work schedule changed and I started to have a commute to the University of Central Florida’s Institute for Simulation and Training; about 30 to 45 minutes each day. At this point, I had to change my work model. I no longer had long periods of time in seats on public transportation. I had a commute in a typical car, and I had a recorder that had a 40gig hard drive and was easy to turn off and on. This Archos 400 device allowed me to dictate a significant amount of information in a short period of time. Within just a couple of months of using the spare time that I wasn’t on the phone to dictate while in the car, I was able to complete the other half of the book. I didn’t have enough time to put all the pieces together or to change the voice, so I hired an editor to help gather up some of the other factual data, put together the flow, and work with me consistently on what I would say in about three weeks of my own dedicated time required at a computer, editing, working through, and revising certain passages that were too colloquial, too informal, based on the spoken word, or the extreme number of typos from the mobile device. But the end result was, in 2005, I was able to publish a 260+ page book on mobile learning that I never would’ve had time to write, except for using what I tend to call “stolen moments” of learning; in this case, for synthesis.

Now I’m not suggesting the typical student or learner will do this, but I am suggesting it’s possible, and any subject matter expert could, with relative ease, produce not only audio and text on the go, but even produce multimedia content using the camera phone, video features, audio recording, and captured text messages; all while on the go. There are many tools that aggregate all of this type of digital media into one consistent flow, and could even turn it into learning objects that could be used in a variety of settings; from something as simple as showing a work instruction process in action, to delivery of audio content that could be reused as a Podcast, distributed through a voicemail system, or just placed on the Web for future use by teams that aren’t mobile or don’t have access to field-relevant data.
How to Get Started with m-Learning

I’ve encouraged people that ask about how to get started in mobile learning to do the following things:

1. Look at the Balanced Scorecard (BSC) or other strategic documents for the organization and find areas where there might be some mobile element of need for your group.
2. Address that need and see where the technology fits.
3. Decide on a quick win that can be done easily, have a meaningful impact and at low cost, and make that your first target.

Upon analysis, you may also find that your audience is already using m-Learning techniques in an informal way. Linking to this activity and formalizing it can pay business dividends. Additional resources could extend this model from a few select users to your broader audience, and help shape the culture of the organization.

I’ve given you many of the rationales and reasons why mobile learning will continue to catch on and is casting a vision for the future that’s already here and already being used in other disciplines such as marketing – a vision that we in the learning profession can take hold of, make our own, and take even further. This is the excitement and passion that I personally feel about mobile learning and some of the evidence of why mobile learning is so important now and will continue to be important well into the future.
iPhone: Is Your e-Learning ready for m-Learning?

By Brent Schlenker

Brent Schlenker is the Research and Emerging Technologies Evangelist for The eLearning Guild. But he has performed many roles throughout his career in e-Learning. Before completing a Masters degree in Educational Technology, Brent was in broadcast television producing news, commercials, events, and local programming. While perfecting his craft in broadcast media he began to see media and digital technology as a powerful educational tool. After graduate school he spent over 10 years designing, developing, and implementing corporate e-Learning solutions. He spent the majority of those years with Intel Corporation helping many internal organizations make the shift from instructor-led training to e-Learning.

Widely respected as an authority on practical e-Learning technologies, Brent shares his knowledge and insights with industry colleagues through his blog: Corporate eLearning Strategies and Development at elearndev.blogspot.com.

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The Next iPhone

I love my iPhone. I waited five hours in the blistering Arizona heat to get my hands on the future of mobile computing. And after several weeks of experimenting, testing, and playing, I can safely say the future of m-Learning is in the iPhone.

But ... just not in this iPhone.

My iPhone is only a stripped down version of the future. It is a beautiful device that does many things very well. But it’s incomplete. The long list of “that’s so cool” features is short compared to the list of missing features covered in great detail throughout the Internet. No cut/copy/paste, no GPS, no Adobe Flash, no choice of service provider ... and the list goes on. However, the iPhone has the capacity to add much of what it lacks in its next version without impacting the core features that do work so well.

Despite the iPhone’s shortcomings, its greatest achievement is that it even exists at all. Previous mobile devices left me disappointed and frustrated. The dream of a mobile computing platform that worked well did not seem possible. But my iPhone experience gives me hope. The uncertain future of mobile computing, and m-Learning, is now clear. One mobile device can and will handle much of our digital lives with elegance and simplicity. To use a buzzword of our industry the iPhone is one step closer to the ultimate blended learning device.

Successfully combining the functionality of an iPod, the Internet, and a cell phone in one device is only the beginning. How the e-Learning development community responds to the iPhone is the future. What follows are just a few things to consider as we all prepare our learning strategies for the next iPhone.

iPod for Passive Learning

Steve Jobs calls the iPhone the best iPod yet. I think he’s right. The iPhone has a larger screen and improved image, amongst other things. The increased quality elevates the mobile video experience from bearable to enjoyable. This makes m-Learning audio and video a viable option for designers. However, the power of the iPod comes from its desktop counterpart, iTunes.

The iPhone synchronizes with iTunes; a process already familiar to millions of iPod owners. Even before the iPhone, the iPod and iTunes combination was a simple experience, putting digital music into the pockets of many non-
technical users. But how we blend our desktop and mobile activities extends beyond music. There is so much more we want to take with us, and even more things we want to do.

iTunes connects us to a world full of learning content. The iPod lets us take that content on the road. We listen to lectures and watch video clips. I do it now and I love it. The iPod got us to the point of consuming media comfortably away from the home or office.

Does your current learning strategy include passive m-Learning? Are you planning on it? Your learners will soon demand it – if they don’t already.

But the future of m-Learning is not in the consumption of media on a mobile phone. Listening to and viewing Podcasts is a passive experience. The future of m-Learning requires mobile participation. The iPhone takes us into the future of the iPod, but leaves us wanting more.

Internet for Discovery Learning

More of what we need in a mobile device is the ability to do stuff. The iPhone lets me do cool stuff. And a lot of what I want to do is on the Web. The iPhone is connected to the Internet all the time as long as you have cell phone coverage or a nearby Wi-Fi hub. The Web browsing experience is the best I have had on a mobile device. Much of what I do on my desktop browser I have done on my iPhone and it works nicely. The Web actually works on the iPhone.

Imagine listening to a lecture while browsing a related Web site. While the lecture plays in the background you switch from the Web site and tap out some thoughts in the notes application. A click and a tap and you’re back at the Web site learning more. The lecture Podcast ends. You tap back to the notes application and add a final question about something that has you concerned. You tap the e-mail icon and your notes magically appear in the body of an e-mail waiting for an address and subject line. You enter the information and tap send.

In this scenario the user consumed iPod and Web content for a media-rich learning experience. I could imagine myself in that scenario, Googling my way around many different, yet related, sites. This activity may turn up information undiscovered by the professor and my peers, shifting my role from consumer, to collaborator/creator.
Have you designed your learning strategy to leverage these activities for learning?

Wireless connectivity is often an issue, but the infrastructure will improve. This is an issue that all mobile devices will encounter. The iPhone’s Wi-Fi helps much more than I thought it would. The iPhone’s Wi-Fi is simple to use and greatly improves the connected mobile experience. With wireless networks improving, and increasing numbers of Wi-Fi hotspots, the future of wireless connectivity is becoming a reality. And even with today’s troubled wireless infrastructure, the future of the wireless iPhone is bright.

Mobile Internet connectivity that works well significantly improves searching and the consumption of content on the go. This connectivity moves learners from the role of disconnected passive receiver to active seeker and collaborator, and back again on a single device.

Active Learning Smart Phone

I read somewhere that “Smart phones offer desktop functionality in a mobile phone.” My Treo never delivered on that promise for me as it did for many. But it did introduce me to the possibilities of creating and publishing content with a mobile device.

Figure 85 – A slide from my Learning2.0 slide deck before the iPhone.
You can capture and publish every idea and experience for the world to see. This is a powerful way to share, collaborate, and learn in our global economy.

Yes, other smart phones can do this, but they require some tinkering to do so. In my experience it was often not worth the effort. Similar activities on my iPhone are seamless and make me smile. I’m happy to create content and collaborate with colleagues while simultaneously consuming content. Of course, there are many smart phone features that have a place in m-Learning that I haven’t mentioned – I will not mention them here. But yes, using each of them on the iPhone makes me smile. The iPhone is a smart phone that works well, making it a powerful learning tool, for many, today.

Does your learning strategy leverage and support user-generated mobile content and collaboration?

**Final words**

The iPhone is an artifact from the future limited only by the legacy of current e-Learning tools, design, and development methods. It’s incredible to see Moodle working in a mobile Web browser. Communicating with colleagues using the iPhone is a delight. It’s easy to share learning experiences with images and text, and then publish to the Internet. The iPhone is ready for m-Learning but m-Learning is not ready for the iPhone.

Seeing the future of m-Learning in the iPhone is my cue to update my instructional models and methods. Are you ready to rethink your learning strategy?

As we rethink the future of educational content we must realize that mobile devices will soon be the preferred device for our digital media consumption, social connections, and user-generated content creation. My experience with the iPhone has confirmed this for me. You may need to experience it for yourself. We may not be ready for *this* iPhone. But we can be ready for the next one, if we rethink instructional design and development.

The future does not include rich-media trapped inside the empty promise of a course. We must set free the rich media of e-Learning’s past. When learning content becomes loosely joined media elements mixed with user-generated content and shared amongst an interacting network of experts and peers, then you have entered the dynamic world of e-Learning possibilities. And when you can intuitively access that world from a mobile device ... welcome to the future of m-Learning. Are you ready?
The Future of Mobile Learning

By David Metcalf

(For information about David, please see page 75.)
Overview

Based on the rapid pace of innovation in mobile technologies, mobile learning is set for both significant opportunities and challenges in the coming months and years. Mobile learning has the potential to enable certain learning theories and instructional design strategies that have otherwise only been science fiction dreams of the future. The ability to enable self-directed learning, active learning, and situated learning strategies, as well as performance support strategies, holds great promise.

Mobile learning then becomes part of a larger context of blended learning, and gives us one more tool in our instructional toolbox. We anticipate that mobile devices will deliver more and more content, and indeed it was surprising that almost 20% of Guild members use Mobile Learning or Podcasts to deliver content sometimes or often, as shown in Figure 2.

<table>
<thead>
<tr>
<th>Mobile Learning</th>
<th>572</th>
<th>2,409</th>
</tr>
</thead>
<tbody>
<tr>
<td>Podcasts</td>
<td>504</td>
<td>2,486</td>
</tr>
</tbody>
</table>

Figure 86 – Mobile Learning and Podcast use among Guild members as of July, 2007 (all industries and company sizes).

The innovations that I, personally, am most interested in are those that enable learning strategies that were not possible before.

Things You Couldn’t Do Before

Having full data access, including Web browsing, e-mail, and the use of downloadable audio and video, all at low prices, will be a great enabler for specialty devices and multi-purpose devices like smartphones. The ability to use camera phones, special sensors, barcodes, and other technologies that enable us to interact with the real world around us, and provide us with a virtual overlay of important online information is another great enabler for mobile learning. It will lead us to innovations in the mobile search for knowledge management applications, improvements in location-aware learning, and augmented reality strategies that could lead to innovative real-time coaching, performance support, and online mobile games and simulations with hybrid
elements from the real world. This will also enable peer communities and expert location based on profiles and proximity.

Current usage trends indicate that we will have even more examples of innovative uses of text and data feeds, including SMS messaging, e-mail, and multimedia media messaging. These will enable many components of our lives, and also allow for better content developments at the right place and time, based on either our wishes, or our known needs gathered into profiles or our organizational strategies. The greater use of cameras for point-and-shoot learning will further enable access to rich data, with fewer user interface limitations.

Innovations in storage will also allow us to have practical audio/video strategies while on the go, and, where appropriate, lead to conversion of additional data and content types to mobile formats to meet learning objectives. One of the systems that we have developed and proved at Walden University is the use of audio Podcast content over the standard cellular audio connection, making use of sophisticated back-end server systems for call transfers, interactive voice response, automated audio, and SMS delivery based on a scheduling system, and playback of the same audio content over the phone or Web. This gives multiple delivery options for content, including download of MP3 files, or playback in Adobe Flash players.

Mobile storage techniques used for USB and MicroSD strategies can deliver secure mobile content packages on cards no bigger than a thumbnail that can hold 2 gigabytes.
Can the U.S. ever catch up in mobile technology?

To fully understand the context of these trends from a U.S. perspective, it is also important to ask a fundamental question: Why is the U.S. so far behind in mobile technology innovation compared with Scandinavia, Japan, Korea, etc.?

In order to answer this question effectively, we have to look at some of the reasons the U.S. is behind in the first place. I argue that the problems have been three-fold in relationship to network technology, handset technology, and policy from government and regulatory bodies.

It's important to note that the U.S. had an early lead with Motorola technologies used by the military that allowed cellular communications starting as early as the 1940s. Some of this technology was commercialized first in the U.S. in car phones and lunchbox-size portable phones. These mobile phones seemed impractical, but for those that needed access to communications, they were a far step above pay-phones or finding phones to use in remote locations.

Too Many Standards in the U.S. …

The next generation of digital cellular phones held great promise. The U.S. advanced so far, so quickly, that in a free-market economy, several standards emerged. Having multiple standards at the network level presented various problems. AT&T’s network used TDMA (Time Division Multiple Access) technology, while other carriers that were fast emerging, such as Sprint and many others chose the superior CDMA (Code Division Multiple Access) technology. These two baseline standards, along with analog and data standards for paging networks, and data standards for early digital networks and digital pagers like CDPD (Cellular Digital Packetized Data) all made for a mess of standards, each used for a slightly different need with different coverage areas. Different core technologies for signaling were needed including different handset architectures – global mobile standards such as GSM (Global Standards for Mobility), and a whole alphabet of additional high-end 2G, 2.5G, and 3G technologies such as UMTS, EDGE, GPRS, and more recently, HSUPA and HSDPA, for very high speed transmissions.
… One Standard in Europe and Many Other Areas

There are still large tracts of the U.S., particularly in rural and wildlife-preserve areas that have limited to no coverage by any cellular network, other than satellite. The U.S.’s headlong push with most standards has led to most of the difficulties that we’ve seen in our cellular market today. Contrast that with Europe’s early standardization on GSM across multiple countries with interoperability across those countries, which allowed them to, on a small nation by small nation level, build out a consistent infrastructure with the ability to move between those different areas. They also have a smaller, denser area to cover. Europe was also able to standardize on one set of handsets that would accommodate GSM and the 2G and 2.5G data standard such as GPRS, EDGE, and UMTS for a logical step progression to higher speeds of data transmissions. The U.S. has had carriers leapfrogging each other and competing with standards and with different handsets that are exactly the same except for signaling technology. This causes handset manufacturers to spend less time innovating, and more time trying to accommodate multiple standards for the same handset design. This has greatly slowed our industry. It’s also led to confusion for the consumer, who, even though they can transfer their number portably (as they have been able to do since 2005), cannot at this point, transfer the handset between networks easily.

Note: Sprint and Verizon handsets use CDMA while AT&T and T-Mobile handsets use GSM.

Government Legislation

The U.S. had a huge auction for the wireless spectrum for next generation 5G technology. This auction approach, while also used in Europe and smaller countries and markets, was much more complex because of the land mass and the area that needed to be covered. The number of smaller business licenses versus large business licenses that the government tried to put into effect, and the high price tag on the spectrum that the government required in the bidding wars, have added to the cost and complexity. While this raised a significant amount of money, and helped with the federal deficit during the Clinton administration, it slowed down progress, and changed the cellular carriers’ revenue models in order to be able to afford these expensive licenses and pass those costs on to the consumer. This is an overall hindrance to innovation, even if it was a boon to our federal coffers.
While the auctions are widely hailed as a success overall, there's no doubt that they did slow the innovation process and the rollouts of 2.5G and 3G technologies to a wider audience. While many European nations did use auctions for their spectrum, they had fewer types of licenses to auction, and smaller land masses and areas to cover. And in many cases, the nations were within a socialized system still had nationalized telecom carriers. Telecommunications was at one national carrier with only a few challenges, rather than a free-market economy for carriers to compete openly. Some nations also had preset subsidies. All of these factors combine to put Europe in a better stance to roll out technologies more rapidly, have longer test and lead times, and possibly to have subsidies on their roll-outs.

**Pricing Models**

This leads to our third and final point for why the U.S. is behind. Many things in our U.S. pricing model of having one large bucket of minutes that you pay for (to standardize the revenue of the carrier), and paying for every incoming call as well as every outgoing call, are very foreign to most European nations. In Europe you pay per use, and even have prepaid cellular which is easily accessible and uses the same standards to, as they say, top off your cellular phone with prepaid minutes so you know exactly when you’re out and exactly how much you’ve spent. You can also be quite judicious in Europe, which can typically deliver SMS messages cheaper than in the U.S., and you can have someone call you back, in which case you do not pay for incoming calls. It’s quite foreign and disturbing for a European to come to the U.S. and see that you pay on both sides for every call received versus just paying for one side of the equation. These things have slowed consumer progress, and innovation at the consumer level. All these factors combine to put the U.S. at a distinct disadvantage.

So what do we have going in our favor? One of the things I’ve been most impressed with is our ability to catch up and latch on to some of the newest standards, and to have a consistent road map for those standards. And then to combine the offerings from all the major carriers into one consistent set of standards that map to each other over an integration timeline. Our ability to more rapidly latch on to some of the high-end standards and integrate those into some of our high-end handsets also impresses me. For instance, HSDPA is rolling out more rapidly in the U.S. than it is in Europe or even Asia, and this standard is capable of 5.6Mbits per second. So high-speed videos, streaming
data content, and access to the types and speeds of data that you have on your desktop are much more readily available and possible at a much lower price point in the U.S. than they are in Europe. Certainly Europe has to catch up and leapfrog back and forth across these standards, but the UMTS standard is around 1Mbit per second, at this point, until they get to further revisions of Web 2 and Rev 5, which promise higher speeds. This ability to innovate, the ability to make use of broadband speed, and our pricing models which are set for all the data you can use for a set price could push the U.S. into a leadership position. Having access to all the data you can use from a mobile handset, and being able to link your computer to that handset and use that handset as a modem for your computer using Bluetooth and other technologies, has made it so that for $19.95 per month, plus tax, you can get access to unlimited data, all of your e-mail, gigabytes and gigabytes of data including digital video, larger games downloaded to handsets, and access to any data that you want through Google and other sources. That you can do this without any fear of overrunning your bill will lead to more user uptake and more use. It will also allow for another model that the U.S. seems to be at least on par with, if not ahead of the rest of the world, and that is pay-for-application services.

What do I mean by this? For example, if you want to have navigation on your handset, you can do so and pay five dollars extra per month for Telenav, for instance. This navigation service is one of many that give you turn-by-turn directions on your handset as if you have a GPS in your car. This needs no additional equipment fees and has more up-to-date maps due to the fact that they’re streaming down from the cellular device automatically. These devices work surprisingly well, and map to some of the same geographical information systems and GPS databases that are in use by commercial grade systems like TomTom, Garmin, and others. This pay-per-application is an area where the U.S. is going to shine, and it is already showing that. We are able to leverage all of our talented software developers that have been doing things for the Web and for Internet technologies and speedy innovation out of Silicon Valley, out of Boston, out of Austin, and other areas across the U.S. that are able to innovate at the application level. We’re seeing tools for mobile marketing, for mobile learning, for mobile search, proliferating from the U.S. We’re also seeing our trusted community of investors, like our angel networks, our venture capital community, and even our bankers who invest in innovation more heavily than in other parts of the world starting to invest in this emerging technology area. We’re seeing the promise of applications, and the application levels, now
that our network technology infrastructure is somewhat settled and there are only two or three standards to map to.

So even though we’ve been behind, I’m bullish on our future in the U.S., because of innovation, because of the funding applied to innovation, because of the application level of these capabilities which will really drive the next steps of innovation, and the ability to only have to provide a few handsets plus the high-end handsets being rolled out in the U.S. These handsets are feature-rich yet easy to use, and have been quite a hit with our U.S. consumer market, which has the money to afford to buy these mid-range to higher-end-capable phones. The last area that I’m bullish on is the ability of the U.S. to continue to innovate in the ultra-mobile PC market, in handsets, and in the leverage off of our large players in the market, such as IBM, Motorola, Intel, AMD, and the many other innovators on a smaller scale. These companies continue to innovate in hardware and handsets, and in many cases are keeping up with the Scandinavians, the Koreans, and the Japanese, who continue to innovate and force us to be competitive in a global market and economy. So what do you think? Are we behind? Will we catch up? We’d love to hear your thoughts. Feel free to e-mail me at metcalf@digital.net with your thoughts and opinions.
Notes from the field – interviews with practitioners

By Angela van Barneveld

Angela is a Program Manager at a global Business Intelligence and Corporate Performance Management solutions company. Her experience in the learning industry spans academic, public, and private sectors. Clients have included Entrust, Cognos, McGill University, Government of Nunavut, Ontario March of Dimes, and Algonquin College. She was an invited presenter at The eLearning Guild Online Symposium on blended learning; presented at ISPI on learning objects (voted an Encore Presentation); and presented at ELEARN on mobile learning. Angela is pursuing a Ph.D. in Educational Technology at Concordia University in Montreal, and has been a member of The eLearning Guild’s Research Committee for several years.

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Introduction

To develop this section of our report, we interviewed industry practitioners about their implementations of mobile learning. Our interviewees come from a variety of industries, including insurance, retail, software development, consulting, and automotive design/building efficiency. Common among all of them is the intent to optimize the learning time and learning experience of their respective users. Although the domain, audience, drivers (organizational need), tools, and solutions are all quite different for our five (5) interviewees, the challenges that they faced are interestingly similar. There is a measure of consistency in the lessons learned and the words of wisdom that they share with us. Let’s start with the description of the projects (needs and drivers that led to the mobile solution), then move to the design strategies and challenges, and wrap up with the words of wisdom.

Projects

Project 1 had an audience of 5,000 sales agents geographically dispersed across the U.S.A. They were constantly on the move, a mobile workforce, and varied in their technology knowledge and comfort level. The need was to provide self-paced training for product and process knowledge, and to minimize cost-ineffective use of the classroom. The device used was primarily a company-supplied laptop, but some best-practices recordings were created for audio devices (iPod, MP5, etc.)

Project 2 had an audience of seasonal employees who had English as a second language. The business need was to provide job training on safety, compliance, and to support non-English-speaking employees participating in the same class as English speaking employees. The device of choice was an iPod – pre-pilot phase.

Project 3 had an audience of medical staff in Africa. The need was to train staff on the distribution and administration of medications, and to have an efficient data capture strategy related to program efficacy that made use of current tools. The device used was a basic cell phone (in Africa, more ubiquitous than the Internet).

Project 4 had an audience of field technicians, services personnel, and engineering consultants. The need was for product training and information for a mobile workforce. The device used was an HP iPAQ Pocket PC.
Project 5 (experimental phase) had an audience of repair technicians. The need was for immediate mobile access to information on a bigger surface than that available on an iPod. The devices selected for the project were video eye-glasses that project a virtual monitor that looks like a 20” to 24” screen.

Design

Many of our interviewees indicated that their launch strategy focused more on information design rather than interactivity design. One of our interviewees, an independent consultant, stated that, for one of his projects, the customer decided to initially sacrifice some interactivity for mobility.

The design of the content across projects varies and includes small self-contained chunks, “learning nuggets” that are 1 to 2 minutes long, and podcasts that are no more than 5 minutes. On the horizon for experimentation among our interviewees are virtual tours and embedding learning into the application to move training away from the “separate event” space and more into an integrated performance support function.

Some used a strategy of converting their existing PowerPoint slides into PDF format to reduce the size of the content accessed on the mobile device. There were several comments received as part of the Mobile Learning survey where respondents indicated that they were looking for ways to port their e-Learning content onto a mobile device and/or establish a single-sourcing strategy that would allow content to render easily on various devices. This was also the top barrier identified in the survey; with over 85% of all respondents indicating concern that content developed for one medium would not transfer well to another (see Figure 87 on page 154).

With regard to content access strategies, most were using a PULL strategy where the learner is required to go online and retrieve or request (PULL) the content or information from an online location. One project team experimented with a PUSH strategy, whereby they send (PUSH) the content or information to the audience.

When asked about measuring outcomes, all our interviewees indicated that learning assessment was an important part of their implementation, but not all had a strategy in place. One of our interviewees, a learning design consultant in a major retail organization, indicated that she uses skill checks at the end of classroom coursework. Another of our interviewees, a manager of learning technologies in an automotive design organization, said that they needed to

“What everybody already has in their pocket or purse is the cell phone. We’re starting to see that as the logical entry point to get successful programs off the ground.”

~ President, learning and mobile device software development company
define an assessment strategy for their audience. He further stated that follow-up was an important part of that strategy, since comprehension alone is no guarantee that learners can transfer new skills to the job or can perform better on the job. A sales training consultant from a large insurance company stated that the company used an online system for online testing and surveys, where all sales consultants were required to pass the online tests prior to being able to sell any product.

In considering the choice of device, one interviewee indicated that he decided to go with the most ubiquitous device available and used by the audience, and eliminate the need to introduce new technology.

**Challenges**

Several challenges were identified by our interviewees, but three stand out; the screen size of the handheld device, management, and standards.

The limitations of screen size impact use. In some cases, the screen was difficult to read, and in others the screen was too small to show all the content as desired. Moving the e-Learning content onto a mobile device required a rethinking of the design strategy, as there was too much information for the small screen and graphics would lose their context. The manager of learning technologies (automotive design/building efficiency) indicated that the use of a zoom capability as part of their design was a nice feature on some of their e-learning offerings, but using the same capability for technical content (e.g., graphics) on their mobile devices led to a loss of visual perspective.

The most oft-cited challenge encountered by all of our interviewees was the issue of management, in all its varied incarnations. For instance, because none of the implementations linked into a learning management system (LMS), learner management was a definite challenge. Tracking of learners and their progress (including assessment) was a consideration for subsequent implementation phases of the mobile learning projects. (For information on one company’s successful integration of m-Learning with an LMS see “Case Study: Integrating m-Learning with a Learning Management System” on page 157.)

Change management was another challenge. The sales training consultant from a major insurance company stated that sales agents used the information via their mobile devices, but not as much as desired by the project team. He indicated that better marketing was required. Newer sales representatives were making use of the online tools, while the older, more tenured sales rep-
resentatives were not. It was not clear whether this difference was a result of comfort with the technology, or whether the newer representative simply needed more learning and support than the more experienced sales agents.

Device management, which encompasses the cost, capabilities, and security/loss of devices, was a concern. Related to this is digital rights management. The challenges here were plentiful, including how to make outdated content obsolete, and clarifying content ownership and intellectual property once loaded onto the device, especially if the device is not company-supplied.

Finally, our interviewees reported that a lack of standards and a common development platform present a huge challenge. The president of the software development company explained that the larger the company, the more devices in the device population, and the harder it is to figure out how to design for users. Further, although some learners have access to several devices (our survey data shows that about 76% of respondents personally use at least 2 mobile devices), users do not necessarily use the same device for the same purpose. For example, the manager of learning technologies (automotive design/building efficiency) indicated that communication with their technicians is a challenge because, although the iPAQ is becoming the standard tool, not all technicians are using it for e-mail. Some prefer to use their cell phones to receive e-mails. “Getting the word out” becomes a much larger task than the click of a button.

In our survey, we asked respondents what they thought were the organizational barriers to the adoption of mobile learning. Figure 87 shows that the responses were consistent with the challenges that our interviewees mention above.
Lessons Learned and Words of Wisdom

We must acknowledge and appreciate those who tread into the unknown before us and share with us their lessons and suggestions, so that our implementations may benefit from their experience.

There is no order in which these suggestions are listed. However, I do position this first pearl of wisdom as a top contender. Almost all of our interviewees mentioned it. It is a simple and basic consideration, perhaps taken for granted, and is sure to bring your implementation to a grinding halt if overlooked.

- Ensure that learners know how to use the mobile device. This includes functionality, how to get files online, how to download, etc.
- Make access to information easy.

**Figure 87 – Elements which are, or will be, a barrier to your organization adopting mobile learning (survey results as of August 3, 2007).**
• Experiment with devices to see what suits your organizational needs. Do your homework, and be willing to step back. Work out the organizational need and device capabilities early on. The biggest impact on launching an initial mobile learning project is the device selection.

• One hour of mobile learning is too long.

• Ensure alignment with your IT team for technical and system support.

• One size does not fit all. The design of mobile learning needs to be different. You cannot port Web-based e-Learning to a mobile device. The basics of instructional design still apply.

• A logical entry point into mobile learning is to start with what everyone already has (i.e., the device).

• Just because you can, doesn’t mean you should. Learning needs to be effective, user-friendly, and appropriate for the mobile device.

We thank our interviewees for sharing their journey and their words of wisdom.
Case Study: Integrating m-Learning with a Learning Management System

By Tristan Evans with Brent Schlenker

Tristan Evans is the president of Perago Learning Solutions, Inc. a global provider of custom learning content, systems integration, and consulting services. Previously, he served as Senior Manager of Global Learning Services Delivery at GlaxoSmithKline. Tristan has expertise in instructional technology, e-Learning development, and process improvement with a certificate in Instructional Design.

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Overview

As noted in the survey results on page 55, 9% of members have implemented m-Learning and close to 50% plan to do so in the next 12 months. These members cite numerous hurdles to their successful adoption of m-Learning, and one of the hurdles cited often is integrating m-Learning with a learning management system.

A number of members and vendors have ventured into these relatively uncharted waters, and in this section we’ll explore how one vendor, Perago, has addressed its mobile learning needs and fashioned a solution. In this section we will review:

- Perago’s Predicament – what drove their needs to integrate mobile learning with an LMS
- The Learner Experience – what it’s like for a learner that’s using an m-Learning solution that integrates with an LMS
- What’s behind the scenes – how the “Tab A” of m-Learning fits into the “Slot B” of the LMS
- How to apply the type of solution Perago developed to your own needs

Perago’s Predicament

Business partners in Asia, Africa, and the Middle East utilize technology within their sales and support organizations a bit differently than we do here in the United States. U.S. sales teams are equipped with laptops and, in some fortunate cases, access to desktop computers as well. This makes traditional e-Learning, developed with standard authoring tools, a more viable solution. Yet, when Perago engaged with global partners, the situation changed. For their new global partners, conducting daily work activities via Pocket PC devices and mobile phones is the norm. These are the main devices for getting work done, not an extra device for certain mobile working situations. It was immediately apparent that they needed to deliver product training and performance support tools to these workers via their primary electronic device.

In assessing all of their alternatives, a paper-based instructor-led training format would reduce the efficiency of the sales teams and increase the workload of their small training department. Moreover, they would not be able to efficiently track and measure the learning. Hence the need for a smart, cost-
effective solution, targeting the most common mobile devices already in the hands of the learners, that would integrate with their existing LMS.

The Learner’s Experience

Learners begin their mobile learning experience by logging into the Hot Lava system. Figure 88 shows the Login screen.

![Login Screen](image)

*Figure 88 – Users log into the Hot Lava Course delivery system by entering their User name and Password.*

This may look familiar to you. The interactive experience simply shifts from a desktop browser to the browser on a mobile device. Consider the following steps:

1. Enter URL in the mobile device’s browser.
2. Enter username and password
3. Select a course
4. Continue through the course and complete an assessment
5. Review your results
6. Repeat the course, exit, or select another course.
As you can see, the process could describe the learning experience on a desktop or laptop. For this case study, the hardware has changed, but the process for the user remains the same.

And despite the small form factor of mobile devices, users are able to interact with the course content. As seen in Figure 89, testing your mobile learners with multiple-choice questions is still possible. This also means that it’s possible to engage your learners through decision making simulations and other creative instructional-design techniques.

**Figure 89** – Multiple choice questions can test a mobile learner’s knowledge.

**Firedrill Example**

While Perago’s core competency is in software development, it also trains its personnel on fire safety procedures. At first glance, this seems strange for a software solutions company, but it makes sense when you understand the big picture. When Perago engages with a new business partner, in many cases they set up a new hardware and system environment maintained by new Perago personnel on the business partner’s site. Both Perago and the business partner have invested a lot of time and money in these systems, and so, while they do not mandate this training, it is simply a good business decision in protecting their investment.
New employees across the globe need to understand the basic skills required in the event of a fire. This is not training that can be taught once, but must be “top of mind,” according to Tristan Evans of Perago, in the event of a fire emergency. So, several times a year they must push out refresher courses to the employees to help keep them prepared for unforeseeable emergencies. Figure 90 is the course as seen in a mobile device.

Figure 90 – Facilities workers are given small (15 minute) learning refreshers throughout the year on their handheld devices as part of an ongoing workplace safety initiative.
Behind the Scenes

The Big Picture

The Perago three-part solution includes:

1. An LMS,
2. A mobile learning authoring and delivery tool, and
3. Custom middleware to facilitate the integration between 1 and 2.

SumTotal Systems’ Results on Demand (RoD) is the LMS in this solution. Perago selected Hot Lava Software’s Mobile Learning tool to author and deploy mobile learning content to the handheld devices. Both systems contain learning data, and an additional layer of technology was required to facilitate their connection behind the scenes. Perago worked with the SumTotal team to integrate the data from the mobile learning platform into the LMS. The Perago programmers developed middleware that manages the synchronization of data between the LMS and the Mobile Course Delivery System.

Figure 91 – How the components fit together
This, of course, is the 50,000 foot view. There are several ways to make this happen with a manual method being on one end of the spectrum and an automated, fully integrated, middleware application on the other.

But on all points of the spectrum, what you gain is the ability to deploy learning activities all managed in one place and which reach all frontline workers with e-Learning at their convenience on their primary mobile device.

**What’s really happening?**

When users access course content the Hot Lava system tracks their activity. With Perago’s middleware installed, the activity data automatically synchronizes into the LMS. The system administrator can configure the middleware to perform the synchronization at any predetermined interval.

The complete learning experience for the end-user does not change in terms of tracking and course management. Learners access their history and other data, as they have in the past, through the existing LMS functions.

### Training Transcript

**Username:**
bristan.evans@perago.net

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimated Credit Hours</th>
<th>Start Date</th>
<th>Completion Date</th>
<th>Expiration Date</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course: Base 1</td>
<td>4/16/2007</td>
<td>4/29/2007</td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

*Figure 92 – LMS transcript reflects course taken on handheld.*

In summary, the student accesses the content on their mobile device via the mobile delivery system, and the data updates back in the LMS. A note of interest is that the data updates in both systems. While seemingly redundant, it can be a benefit for data validation when implementing such a solution in heavily-regulated industries.
How to Apply the Approach

*On the technical side*

You will need to engage your LMS provider, or programmers who understand Web services, and give them a few months to create a notification handler. You will need to determine the range of learner data you want to import to your LMS, and the frequency of the data updates. You can batch the data daily or in real time.

*On the training side…*

…it’s business as usual. The training staff creates a shell of the learning activity in the LMS and uploads the mobile content to the mobile delivery server. The only change to their process is *where* they upload the learning activity, but that is, again, straightforward as the Hot Lava authoring tool allows you to publish the course directly to the mobile delivery system.

*Figure 93 – Course resides in both systems.*
Project Summary

Name of Project
Integrate m-Learning with an LMS

Description
Perago Learning Solutions, Inc. was able to solve a business need with m-Learning. International business partners were able to receive learning on their handheld devices, and Perago integrated the learning data into the existing LMS to maintain the efficiency of the training staff.

Link
www.hotlavasoftware.com
www.sumtotalsystems.com

Forms of training/learning used
Tutorial, assessment, survey, simulation, and performance support

Number of learners that will use the system
75

Project Cost
Range from $4,000 – $20,000

Implementation Time
Two months

Tools, Products, and Services Used
- SumTotal System’s Results On Demand
- Hot Lava Software’s Mobile Authoring and Delivery System
Case Study: A Look at Mobility within the Walls of Tyco International, Ltd.

By Don McDougal

Don McDougal is Director of Learning Technology at Tyco International, where he recently completed a global Learning Management System rollout, which supports 120,000+ employees worldwide. At Tyco, Don establishes strategy for leveraging learning technology in the business. Don joined Tyco in January 2004 from RWD Technologies where he served as Director of eLearning. At RWD, Don focused on building a strong custom courseware development organization and serviced companies like Vodafone, Cisco, HP, AT&T, 3COM, and Tyco. Prior to this Don worked for Harris Corporation, where he was responsible for developing training, documentation, and support infrastructures for large information systems. Don first became involved with e-Learning in the early 90's when he introduced it as a means of saving the FAA millions of dollars in training costs required to support a new weather information systems. When Don is not working, he enjoys water sports and spending time with his wife and four children. Don holds a B.S. in Logistics, and a M.A. in Computer Resources and Information Management.

You can reach Don at dmcdougal@tycoint.com.
Foreword

By A. J. Ripin, Moving Knowledge

We are in the midst of a cultural explosion within the mobile environment. By the end of 2009, Gartner Group estimates that 1 billion cell phones will sell annually. Apple’s forecast of the sale of the one-millionth iPhone by the end of its first full quarter of sales, reminds us of the reality of Gartner’s projection. The impact of this mobility phenomenon is all around us as our daily experiences quickly become integrated. Now, I can perform mobile banking activities as I wait for a doctor's appointment (Bank of America) or check e-mail while at a traffic light. With all that being said, just how are these concepts of integration transferred best to corporate learning environments? Tyco’s history with Mobile Learning tracks longer than many other organizations. This snapshot into their mobility strategy provides us with a unique opportunity to see how lessons learned from the past are pointing the ways to the present and future.

Introduction

- Tyco International, Ltd., the multi-national group of manufacturing and services – providing companies active in life safety, flow control, and security, has been experimenting with mobility for quite some time.

- Over the next six months, we will be piloting Mobile Learning as a source of electronic performance support with our technicians to validate its effectiveness and to get their input and suggestions.

- We will use mobile devices to manage service orders, do inspections, and generate pricing quotes. Since we’re making the capital expenditure to buy all these devices, we’re now able to deliver learning on them, where in the past it’s been too big an expense to buy all the devices and develop the training.

- As we make this transition to offering more on-demand, on-hand support, I see us focusing on doing less traditional classroom or Web-based training.

- Let’s take a look back at some of our earlier activity to see how we got here.
The Early Years

Collectively, we thought if we could cut minutes, or even seconds of time off a process – and provide our customers with improved quality, and quicker and better service, ultimately, leading to greater customer satisfaction – we’d increase brand awareness, loyalty and equity.

We began looking at mobility as a solution to accomplish these objectives.

One of the earlier experiments we performed was for SimplexGrinnell, a business unit which handles fire detection and alarm, fire sprinklers and extinguishers, fire suppression, integrated security, healthcare communications, sound, intercoms, telephones, and time clocks.

The work environment for the sales and service personnel was complex and fast-paced; as such, it was impractical for this group to invest a great deal of time with the traditional user interface of a mobile device; typing on a mobile keypad or a small Palm OS keyboard wasn’t realistic. Alongside BWD Technologies, we examined what practical mobile applications for this division would be.

This forced us to step outside the box; as such, we looked into one of the newest tools at the time; voice input integration with data:

The key is getting a device to function not as two parallel paths – with data as one channel and audio as the other – but to pull both functions together and operate well. (METCALF, 2005)

Figure 94 – Technicians can view work orders on a handheld as presented above. The focus was to integrate audio and hand-held mobile access to CRM data.
The ability to link these important services and information to fire safety tips; troubleshooting questions and answers through a voicemail recording, using a message retrieval system, and sending important messages for management can all be done through this audio box type of approach. (METCALF, 2005)

One of the best parts is that this may be accomplished by taking advantage of existing voice mail systems; we integrated a voice response system, designed around a voice-based portal, which enabled service personnel to engage in not only learning assets, such as audio book-style content, but Customer Relationship Management (CRM) data.

Using the voice system, they could press “1” for more information on what they’d sold to certain clients; “2” for the fire and safety tip of the day; “3” for the ability to hear some of the common problems clients were experiencing; and “4” to record a problem that they’d seen, which would then flow into a database for the most common problems. Another press of the button could present a message from the company CEO. (METCALF, 2005)

As with any type of mobility project, one critical key to success is identifying and focusing on what competitive advantages are available with the modality that are not possible with others – and capitalizing on those features. Ultimately, with mobile devices, one primary benefit is mobility, the device is always in possession of the service personnel. With that in mind, our performance group focused on the concept of collaboration – enabling the mobile workforce to share important information that an instructional designer wouldn’t even be aware to include in instructor-led, Web-based, or other type of traditional training:

Example

“When you get on site at the ACME Company for any type of work order, you’ll need to go to security and ask for Mr. Smith; he’ll be able to grant you immediate access. Otherwise, you’ll spend about 25 minutes waiting as security goes through their admittance protocol.”

Including Interactive Voice Response (IVR) and easy accessibility to information from a handheld unit, such CRM can be effective in achieving business requirements. Such innovation
can lead to automation of key processes, such as Simplex-Grinnell’s inspections and equipment reviews and follow-up on services and sales needs, identifying for long-term excellent customer support and service. (METCALF 2005)

Figure 95 – As shown above, Technicians can visit a Logs tab to review text notes or voicemails left by other Technicians or record their own messages about the work they performed.

These initial experiments for SimplexGrinnell paved the way for future activity with mobile devices.

No Time like the Present

Since 2001 there has been significant growth within the Mobile Learning space; influences such as cultural adoption and technological innovation each have played their parts. As a result, from a corporate standpoint, we’ve been able to further evaluate mobility as an important piece in the puzzle of enhancing performance.

Similar to many other organizations, our learning structure transformed into a Blended Learning Model – an integration of how our people learn – the combination of many different modalities, such as: classroom instruction, online e-Learning (live and on-demand), self study, and on-the-job training. As we contemplated how mobility best fits into this equation, we focused our attention to
“On-the-job Training.” Learning “On-the-job” is more effective than learning in advance; research has shown that 85% of what workers need to know is learned “On the job,” not in advance of actually performing the activities. As such, mobility as a modality to deliver performance support is our current center of attention.

We’re piloting a program in which Pocket PCs deliver task-specific, mobile e-learning courses, such as a video clip of a wireless communicator to instruct technicians how to evaluate its signal strength and send alarm system information through a GSM/GPRS wireless network.

Since we’re now making the capital expenditure to buy all these devices, we’re now able to deliver learning on them, where in the past it’s been too big an expense to buy all the devices and develop the training.

Again, the key is integrating just-in-time, just-in-place support into the framework of our technician’s work process. Empowering our technicians with the capability to locate the specific type of information they need, when they need it – on demand.

Tyco’s technicians service more than 200 categories of equipment; it’s impossible to expect our technicians to commit this knowledge to memory and to recall it in the moment of need. It’s a good example of the on-the-job training argument above.

The pilot program includes a non-mobile, standard e-Learning module that explains to technicians how their PDA delivers learning and job support in the field. The approximately 30-minute module features practice exercises simulating a mobile device on the e-Learning course.

As such, this pilot focuses on teaching our technicians how to access the critical knowledge they need from the mobile device – when they need it – instead of holding them accountable for memorizing insurmountable volumes of information.

Over the next six months, we will be piloting mobile learning as a source of electronic performance support with our technicians to validate its effectiveness, and to get their input and suggestions.
Program: Introduction to Mobile Learning and Support

Challenge: Technicians cannot possibly learn the details of every product or device they may encounter in the field. Now that mobile devices are in the field, we can put training and support data on these devices.

Goal: Accomplish a task on-the-job using mobile performance support.

Figure 96 – Examples of mobile performance support that a technician may use while completing a task; even accessing content directly from the work order.
Looking Ahead

Building upon our earlier activity with mobility – augmenting the CRM examples previously illustrated – is tying performance support to the work order. By providing “On-the-job” support, designed to supplement the work order process, technicians can instantly gain access to a wealth of knowledge that can effectively improve performance and execution of the work order.

Figure 97 – Through the tab navigation shown in the top image, multimedia files may be included as performance support.

Arranged on a series of tabs for ease of use, technicians can quickly switch between the different resources provided by selecting the appropriate tab. Tabs include Job Aids, Simulations, Schematics, Videos, Logs, and Record a Voice Memo.
Simulations include interactive demonstrations of the work being performed and other helpful examples.

Schematics include any diagrams relevant to the work being performed, such as location and equipment.

Figure 98 – These above examples illustrate how an alarm panel may be programmed, and a floor plan sample.

As we make this transition to offering more on-demand, on-hand support, I see us focusing on doing less traditional classroom or Web-based training.
Project Summary

Name of Project (Case Study)
Introduction to Mobile Learning and Support

Description
Technician engages in an “Introduction to Mobility” e-Learning course. Once successfully completed, the learner will receive a mobile device with a Mobile Performance Support module to perform and complete a task.

Link
http://www.ecircuits.cecs.ucf.edu/tyco

Forms of training/learning used
Web-based course – Introduction to Mobile Devices and how to access and navigate within a Mobile Performance Support module
Flash Animation – remote display screen recording of User Interface with Mobile Device and Mobile Performance Support Module

Number of learners that will use the system
Several thousand learners

Project Cost
Not available

Implementation Time
Six months

Tools, Products, and Services Used
Not available
Resources

By Angela van Barneveld

(For information about Angela, please see page 149.)
Web sites

Aclearn.net – Mobile learning
http://www.aclearn.net/display.cfm?page=958
The Community Learning Resource Website supports the adult and community learning (ACL) sector. It provides information, advice, and guidance to those working in the sector and is designed to complement the rollout of effective e-Learning and related support into ACL.

ADL Community
http://adlcommunity.net/
This community site evolved from the Advanced Distributed Learning (ADL) Initiative to support advanced distributed learning and to gain feedback from implementers. The intention is to bring together both resources (papers, examples, tutorials, etc.) and people with similar interests to establish a vibrant community where all work together to share and improve learning.

Ambient Insight
http://www.ambientinsight.com/
Ambient Insight is an integrity-based R&D firm specializing in performance technology, wireless productivity tools, and mobile learning products and services.

Australian Flexible Learning Network – Mobile learning
http://e-standards.flexiblelearning.net.au/topics/mlearn.htm#top
Contains recommendations for specific m-Learning standards, and other background information about m-Learning, and links to useful resources.

British Educational Communications and Technology Agency (BECTA)
http://www.becta.org.uk/
BECTA leads the national drive to improve learning through technology. We do this by working with industry to ensure we have the right technology for education in place. We also support the education sector to make the best use
of technology so that every learner in the U.K. is able to benefit from its advantages and achieves the best they can.

**Carnival of the Mobilists**  
http://mobili.st/

The Carnival of the Mobilists is a weekly collection of the Web's best blogging on mobile and wireless. Also check out the Blogroll for additional links.

**dotMobi**  
http://pc.dev.mobi/node/201

This is a comprehensive guide to mobile Web development. It layers on the advice from the W5C's [Mobile Web Initiative Mobile Web Best Practices 1.0](http://www.w3.org/TR/mobile-best-practices/) document, but takes it further.

**EDUCAUSE – Mobile Learning**  
http://www.educause.edu/SEARCH/606

Articles, papers, reports, and more on mobile learning.

**e-Learning Center – Mobile and Wireless Learning**  
http://www.e-learningcentre.co.uk/eclipse/Resources/mlearning.htm

This page provides links to resources (including links to projects) on mobile learning (or m-Learning) as well as wireless learning; listed in order of entry with the most recent first.

**e-Learning News (ASTD)**  

Article – *Walk this Way: Healthcare Leads the Way in Mobile Learning*

**Findability**  
http://findability.org/2004/topics/pervasive.php

This site focuses on pervasive technologies, including location-awareness, RFID, wearables, and more.
Further Education Resources for Learning (FERL)
http://ferl.qia.org.uk/display.cfm?resID=8542&page=65&catID=192

FERL is a Web-based information service managed by the Quality Improvement Agency (QIA). We aim to support individuals and organizations within the Post-Compulsory Education sector to make effective use of ICT and e-Learning. This is in accordance with the QIA's charter to encourage innovation and excellence in the learning and skills sector.

Futurelab
http://www.futurelab.org.uk/resources/publications_reports_articles/literature_reviews/Literature_Review203/

Futurelab is passionate about transforming the way people learn. Tapping into the huge potential offered by digital and other technologies, they develop innovative resources and practices that support new approaches to learning for the 21st century.

Handheld Learning
http://www.handheldlearning.co.uk/component/option,com_frontpage/Itemid,1/

Handheld Learning promotes the use of mobile and ubiquitous technologies to enable transformational improvements in teaching and learning. Device agnostic, and a believer in open standards, we host international conferences, meetings, and online knowledge sharing that bring together the world's foremost thought leaders, opinion formers, decision makers, and practitioners. We are located in the UK in both London and Cambridge with a further facility in Madrid.

Home pages for mobile devices
Tools to easily build home pages for mobile devices.

mob5 at http://mob5.com

Winksite at http://www.winksite.com/site/index.cfm

mobiSiteGalore at http://www.mobisitegalore.com/
IEEE Computer Society - Distributed Systems Online
http://dsonline_computer.org/portal/site/dsonline/menuitem.20d6846e1c7ed783f1a516106bbe36ec/index.jsp?pName=dso_level1_home&path=dsonline/archives&file=index.xml&xsl=generic.xsl&

IEEE Distributed Systems Online is a springboard for building a stronger distributed systems community and a forum for sharing ideas and discussing projects. In addition to the expert-authored articles, the site also contains digital library and media-center resources. Using the term “mobile learning” as a search term will retrieve at least 100 hits.

IEEE Pervasive Computing
http://www.computer.org/portal/site/pervasive/

This site is dedicated to catalyzing realization of the vision of pervasive or ubiquitous computing. The essence of this vision is the creation of environments saturated with computing and wireless communication, yet gracefully integrated with human users.

Infoplease
http://www.infoplease.com/ipa/A0873826.html

Provides Internet statistics on a worldwide basis. The cell phone usage by country may be of interest – http://www.infoplease.com/ipa/A0953605.html.

International Review of Research in Open and Distance Learning (IRRODL) – special issue on mobile learning

Special issue on mobile learning – available in HTML, PDF, and MP3 formats.

iPod in Education

A site to help you find out about using iPods and Podcasting in Education.

Kaleidoscope report – Big issues with mobile learning
Edited by Mike Sharples. Kaleidoscope is the European research network shaping the scientific evolution of technology-enhanced learning; helping to build a dynamic knowledge-based economy for Europe, engaging social, economic, and political stakeholders at all levels.

**Mackiev.com**
http://www.mackiev.com/iphone/index.html

Recently announced: the release of This Day in History, an educational iPhone software application; the application is based on a widget by the same name from the company's World Book Multimedia Encyclopedia. It displays a calendar page for each historical event that happened on the same day.

**MIT Media Lab**

The goal of the MIThril project is the development and prototyping of new techniques of human-computer interaction for body-worn applications.

**mlearnopedia**
http://www.mlearnopedia.com/

Contains a wealth of resources related to mobile learning – latest news, activities, development, documents, examples, reports, and more.

**Mobile Browsers**

Check existing content in one or several mobile browsers before redeveloping it.

**Mobile Devices / SMS / IM Social Science Research**
[http://ist-socrates.berkeley.edu/~nalinik/mobile.html](http://ist-socrates.berkeley.edu/~nalinik/mobile.html)
This is a bibliography-in-progress on social science research about mobile devices, mobile phone uses, SMS/texting, and instant messaging; also contains links to books.

**Mobile Learning and Pervasive Computing**  
[http://www3.telus.net/~kdeanna/mlearning/](http://www3.telus.net/~kdeanna/mlearning/)  
This Website provides a portal to the latest information on mobile learning and pervasive computing for trainers and educators at all levels, from elementary education through higher education.

**Mobile Learning for the Learning Citizen**  
This site contains many resources, including two mobile learning projects – m-Learning Project and MOBIlearn ([http://www.mobilearn.org/](http://www.mobilearn.org/)).

**Mobility Site**  
Mobile news, reviews, and views. Check out the Resources section, which also contains tutorials.

**NetworkWorld**  
[http://www.networkworld.com/topics/pdas-r.html?GG_SMB=mobile&qclid=CLfXpPaukl0CFSHQXg0drLKeKkQ](http://www.networkworld.com/topics/pdas-r.html?GG_SMB=mobile&qclid=CLfXpPaukl0CFSHQXg0drLKeKkQ)  
The latest headlines from the mobile industry, technologies, and trends.

**Northern Alberta Institute of Technology (NAIT)**  
[http://www.nait.ca/MobileLearning/defaultST.asp](http://www.nait.ca/MobileLearning/defaultST.asp)  
The Mobile Learning project provides industry-relevant curriculum in a new leading-edge fashion. Students involved in this exciting new initiative will have access to learning materials, fellow learners, and instructors anytime, anywhere. Download the final report from the Mobile Learning Pilot Project, *Harvesting Fragments of Time.*
Podclass.co.uk
http://podclass.co.uk/about.asp?aff_id=0

Converging technologies allow for the development and delivery of training in ways we could not have imagined only a few years ago. Podclass.co.uk seeks to build on new technologies to develop and distribute learning in new and exciting ways.

ProfCast

ProfCast is a versatile, powerful, yet very simple-to-use tool for recording presentations including PowerPoint and/or Keynote slides for creating enhanced Podcasts. It offers a free trial of the full product.

PRWeb – Press Release Newswire

GoLive! Mobile announces a free, mobile version of Wikipedia Encyclopedia in a showcase of "Text-2-WAP" Technology. Free service aims to show the potency of combining text messaging with the mobile Web.

Quinnovation – articles by Clark Quinn


http://www.quinnovation.com/LearningAtLarge.pdf

http://www.quinnovation.com/MLO-WP.pdf

http://www.linezine.com/2.1/features/cqmmwiyp.htm
RSS readers
Littefeeds at http://www.litefeeds.com/
Newstouch at http://www.newstouch.com/

RSS Toolbox (The Ultimate)

Study Cell
http://studycell.com/home.html
Create your own mobile flashcards for your cell phone. Make and share your own downloads.

Tech.co.uk
http://www.tech.co.uk/news
Technology news first. The iPhone can now speak foreign languages and translate phrases thanks to a new talking translator from lastminute.com. See the news article at http://www.tech.co.uk/gadgets/phones/mobile-phones/news/iphone-now-speaks-foreign-languages?articleid=437234859

TecO Ubiquitous Computing
http://www.teco.uni-karlsruhe.de/%7Emichael/mobile/mobile.html
Ubiquitous and Mobile computing is one of two main research fields at TecO. The research focuses on HCI, context awareness, communication, and appliances. Some of the work was developed in cooperation with industrial partners. Research includes the following main topics: (1) Support for ubiquitous computing and handheld devices, (2) Mobile computing, HCI, and communication in ubiquitous computing, and (3) Context awareness, context fusion, and wearables.
**Texterity**


A leading provider of digital publishing solutions, Texterity has launched a Beta version of the first digital magazine interface and portal designed for the Apple iPhone. This is the first time users will see a publisher's complete magazine, as originally published, on the iPhone. Texterity and a select group of publishers will offer free digital editions, designed for the iPhone's Safari browser, of over 20 different magazines for iPhone users to read and enjoy through Texterity's new digital magazine **iPhone portal**.

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**The eLearning Guild's Buyer's Guide**

The eLearning Guild's Buyer's Guide contains a list of vendors and their associated tools that you may use to develop and deploy Mobile Learning. You can access the Buyer's Guide by logging into [www.elearningguild.com](http://www.elearningguild.com) and clicking My Reports from the menu along the left side of the screen.

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**W3C – Mobile Web Best Practices 1.0**

[http://www.w3.org/TR/mobile-bp/](http://www.w3.org/TR/mobile-bp/)

This document specifies Best Practices for delivering Web content to mobile devices. The principal objective is to improve the user experience of the Web when accessed from such devices. The recommendations refer to delivered content and not to the processes by which it is created, nor to the devices or user agents to which it is delivered.

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**Webopedia – Text Messaging Abbreviations**


A guide to understanding online chat and smiley faces.

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**Wikipedia – Mobile Learning**


A description of m-Learning, including history, scope, technologies, challenges, and more.
Wireless World Forum
http://www.w2forum.com/i/Home

Wireless World Forum is a business development and knowledge-share network of 15,429 senior executives in the wireless industry.

Organizations

Canadian Association for Distance Education Research (CIDER) – Mobile learning special interest group
http://cider.athabascau.ca/CIDERSIGs/mobilelearning/

Research into the use of wireless mobile devices to deliver instruction to learners anywhere and anytime.

Mobile Learning Network (MoLeNET)
http://www.molenet.org.uk/

The Mobile Learning Network (MoLeNET) is a unique collaborative approach to encouraging, supporting, expanding, and promoting mobile learning. Collaboration at UK national level involves colleges and the Learning and Skills Council (LSC) sharing the cost of projects introducing or expanding mobile learning and the Learning and Skills Network (LSN) providing a support program.

Books

Educating the Net Generation
Author: Diane G. Oblinger and James L. Oblinger (2005)

Learning Unplugged
Author: Diane M. Gayeski (2002)
mLearning: Mobile Learning and Performance in the Palm of your Hand

Author: David S. Metcalf II (2006)


Mobile Learning: A Handbook for Educators and Trainers

Editors: Agnes Kukulska-Hulme and John Traxler (2005)


Mobile Learning: Essays on Philosophy, Psychology, and Education

Author: Kristoff Nyiri (2003)

http://www.amazon.com/Mobile-Learning-Philosophy-Psychology-Education/dp/3851656032/ref=sr_1_14/105-0671138-1349211?ie=UTF8&s=books&qid=1183155632&sr=8-14

SmartMobs: The Next Social Revolution

Author: Howard Rheingold (2002)


Examples

mlearnopedia

http://emerginged.com/mlearn/index.php?option=com_content&task=category&sectionid=5&id=17&Itemid=63

Examples of mobile learning.

m-Learning.net

http://home.m-learning.net/learn/iframe_page.htm

Examples of PDA-based m-Learning that you can execute on your PC.
PublicHealthGames.com
http://www.publichealthgames.com/games/panflu/

Mobile Panflu Prep is an interactive cell phone application to help prepare the public for a pandemic flu. It is free to download on select cell phones from Cingular, Sprint, and T-Mobile.

Sify eLearning
http://www.sifyelearning.com/cisco_intro/qlm-pda-video.html

Example of PDA-based quick learning module for network configuration and performance support.

SonoSite Training and Education
http://sonositelearning.com/

SonoSite offers video refresher modules for clinical applications of ultrasound delivered on a video iPod. SonoSite made the initial videos free for downloading, but has moved to a charge model. Examples of their instructional videos can be viewed.

Conferences

Handheld Learning 2007
Conference theme: Learning while mobile

Handheld Learning 2006
Conference theme: Education on the move
Access conference presentations from this site.
http://www.handheldlearning.co.uk/hl2006/
IADIS International Conference Mobile Learning 2007
http://www.mlearning-conf.org/

IEEE International Conference (7th) on Advanced Learning Technologies (ICALT 2007)
Conference theme: Distributed social and personal computing for learning and instruction
http://www.ask4research.info/icalt/2007/

International Conference (3rd) on Mobile and Computer Aided Learning (IMCL)
Amman, Jordan. April 16 - 18, 2008
http://209.61.205.141/default.htm

International Workshop on Mobile and Ubiquitous Technologies for Learning (MUTL) 2007
Papeete, French Polynesia (Tahiti). November 4 - 9, 2007
http://www.iaria.org/conferences2007/MUTL.html

mLearn 2007 – 6th World Conference on Mobile Learning
Conference theme: Making the connections
Melbourne, Australia. October 16 - 19, 2007
http://www.mlearn2007.org/

mLearn 2006 – 5th World Conference on Mobile Learning
Conference theme: Across generations and cultures
Link to some abstracts and presentations - http://www.mlearn2006.org/program/

mLearn 2005 – 4th World Conference on Mobile Learning
Conference theme: Mobile technology: The future of learning in your hands
Free access to full papers at http://www.mlearn.org.za/papers-full.html
mLearn 2004 – 3rd World Conference on Mobile Learning

Conference theme: Learning anytime everywhere

Free access to full papers at

mLearn 2003 – 2nd World Conference on Mobile Learning

Conference theme: Learning with mobile devices

Free access to full papers at
https://www.lsneducation.org.uk/user/order.aspx?code=041440&src=xoweb&cookie_test=true


http://www.iaria.org/conferences2008/CFPUBLICOMM08.html
Glossary of Terms

2G
Second-generation (2G) mobile telephone technology. 2G cannot normally transfer data, such as e-mail or software, other than the digital voice call itself and other basic data such as time and date, although SMS messaging is available for data transmission for some standards. 2G services are frequently referred as Personal Communications Service (PCS) in the United States. 2G technologies are either TDMA-based or CDMA-based standards, depending on the type of multiplexing used for signal exchange. Most 2G protocols offer data, fax, and Short Message Service (SMS), as well as different levels of encryption.

2.5G
See General Packet Radio Service (GPRS).

3G
Third-generation (3G) mobile telephone technology. The services associated with 3G provide the ability to transfer both voice data (such as making a telephone call) and non-voice data (such as downloading information, exchanging e-mail, and instant messaging).

4G
Fourth-generation (4G) mobile telephone technology. When implemented, 4G will be the successor to 5G. It will feature high-speed mobile wireless access with a very high data transmission speed, of the same order of magnitude as a local area network connection (10 Mbits/s and up). It also addresses the notion of pervasive networks, an entirely hypothetical concept in which the user can simultaneously connect to several wireless access technologies, and can move seamlessly between them.
802.11
The official designation for the wireless protocol known as Wi-Fi. Short for “wireless fidelity,” Wi-Fi denotes a set of wireless LAN standards developed by working group 11 of the IEEE LAN/MAN Standards Committee (IEEE 802). The term is also used to refer to the original 802.11, which is now sometimes called “802.11 legacy.” The 802.11 family currently includes six over-the-air standards that all use the same wireless internet protocol. 802.11b was the first widely accepted wireless networking standard, followed by 802.11a and 802.11g.

Bluetooth
An industrial specification for wireless personal area networks (see PAN) using radio frequencies to link enabled devices. A generic name used by computing and handset manufacturers for developing ad hoc local area network (LAN) interfaces used to deliver phone, e-mail, and Internet information to a cellular phone device. This short range radio technology expands wireless connectivity to personal and business mobile devices and enables users to interconnect mobile phones, computers, printers, digital cameras, and other electronic devices, without cables.

Code Division Multiple Access (CDMA)
A rival to the TDMA standard in the Americas, this standard was developed by Qualcomm, from which providers must license its use. CDMA carriers in the United States include Sprint PCS (which started as a GSM carrier), Alltel, and Verizon.

Context-aware computing
Refers to a general class of mobile systems that can sense their physical environment, i.e., their context of use, and adapt their behavior accordingly. Such systems are a component of a ubiquitous computing or pervasive computing environment. Three important aspects of context are: (1) where you are; (2) who you are with; and (3) what resources are nearby. Although location is a primary capability, location-aware does not necessarily capture things of interest that are mobile or changing. In contrast, context-aware more generally includes nearby people, devices, lighting, noise level, network availability, and
even the social situation; e.g., whether you are with your family or a friend from school

**Enhanced Data rates for Global Evolution (EDGE)**

A digital mobile phone technology that acts as a bolt-on enhancement to 2G and GPRS networks. This technology operates in both TDMA and GSM networks; allows Global System for Mobile Communications (GSM) operators to use existing GSM radio bands to offer wireless multimedia IP-based services and applications. EDGE is a superset to GPRS and can function on any network with GPRS deployed on it (provided the carrier implements the necessary upgrades).

**General Packet Radio Services (GPRS)**

A mobile data service available to users of GSM mobile phones. It is often described as “2.5G” – that is, it is a technology between the second generation (2G) and third generation (3G) of mobile telephony. It provides moderate-speed data transfer that is much faster than the traditional 9600 bps, by using unused TDMA channels in the GSM network.

**Global Positioning System (GPS)**

A satellite navigation system used for determining one’s precise location on the earth, which also provides a highly accurate time reference almost anywhere on earth. The U.S. Department of Defense controls GPS, and it can be used by anyone, free of charge.

**Global System for Mobile-telephones (GSM)**

Most commonly used cell phone standard in the world. GSM systems are used in nearly two hundred countries, with six hundred million subscribers worldwide. It originated in Europe and can now be found in Africa, Asia, Australia, and North America. Originally utilizing the 900 Mhz spectrum, GSM providers in parts of Europe, Africa, and Asia later added additional capacity at 1800 Mhz. In North America, GSM service is currently available only at 1900 Mhz. Most cell phone manufacturers offer dual-band (900 and 1900 Mhz) or tri-band (900, 1800, and 1900 Mhz) phones that will work in most places GSM systems are found.
Instant Messaging (IM)
A client that hooks up a user to an instant messaging service. Instant messaging differs from e-mail in that conversations happen in real time. Most services offer a “presence awareness” feature, indicating whether people on one’s list of contacts are currently online and available to chat. Generally, both parties in the conversation see each line of text right after they type it (line by line), thus making it more like a telephone conversation than exchanging letters.

Integrated Dispatch Enhanced Network (iDEN)
A hybrid of TDMA digital cell phone and two-way radio. Providers are limited (e.g., NEXTEL in the United States). Motorola is the exclusive producer of phone equipment, as it is the company that created the standard by blending its historic experience with handheld radios with its expertise in cellular technology.

Multimedia Messaging Service (MMS)
The evolution of Short Message Service (SMS, which is a text-only messaging technology for mobile networks). It allows the sending and receiving of multimedia messages such as graphics, video, and audio clips.

MP3
An audio compression format capable of a great reduction in the amount of data required to reproduce audio while sounding like a faithful reproduction of the original uncompressed audio to most listeners.

Personal Area Network (PAN)
A network for communication among computer devices (including telephones and personal digital assistants) close to one person, where the devices may or may not belong to the person in question. The reach of a PAN is typically a few meters. You can use PANs for communication among the personal devices themselves (intrapersonal communication) or for connecting to a higher-level network and the Internet.
Personal Digital Assistant (PDA)
An electronic device which can include some of the functionality of a computer, a cell phone, a music player, and a camera.

Personal Digital Cellular (PDC)
Behind GSM and D-AMPS, the world’s mostly widely used digital system. Its use is limited to Japan.

Personal Handyphone System (PHS)
A newer Japanese standard especially designed for high-speed data transmission up to 32 Kbps. Some installations may also be found in parts of China, Thailand, and Taiwan.

Podcast
A Podcast is a digital media file, or a series of such files, that is distributed over the Internet using syndication feeds for playback on portable media players and personal computers.

Radio Frequency Identification (RFID)
A method of remotely storing and retrieving data. An RFID tag is a small object, such as an adhesive sticker that can be attached to or incorporated into a product. RFID tags contain antennas to enable them to receive and respond to radio-frequency queries from an RFID transceiver.

Really Simple Syndication (RSS)
A family of Web feed formats used to publish frequently updated content such as blog entries, news headlines, or Podcasts.

Short Message Service (SMS)
Available on most digital mobile phones, a service that permits the sending of short messages (also known as SMSs, text messages, messages, or simply texts or even txts) between mobile phones and other handheld devices. Originally designed as part of the GSM digital mobile phone standard, SMS is now available on a wide range of networks, including 5G networks.
Smart Phone

Any handheld device that integrates personal information management and mobile phone capabilities in the same device. Often, this includes adding phone functions to already capable PDAs or putting “smart” capabilities, such as PDA functions, into a mobile phone. The key feature of a smart phone is that one can install additional applications to the device. Features tend to include Internet access, e-mail access, scheduling software, built-in camera, contact management, and occasionally the ability to read files in a variety of formats including Macromedia Flash and Microsoft Office applications.

Time Division Multiple Access (TDMA)

The first digital network widely used in the Americas, this system is the core of major U.S. wireless networks. The increasing growth of GSM and CDMA in the Americas is predicted to bring an end to TDMA.

Ubiquitous

Being present everywhere at once.

Universal Mobile Telecommunications System (UMTS)

One of the third-generation (3G) mobile phone technologies. It uses W-CDMA as the underlying standard. UMTS is sometimes marketed as 3GSM, emphasizing the combination of the 3G nature of the technology and the GSM standard, which it was designed to succeed.

Wideband Code Division Multiple Access (w-CDMA)

A wideband spread-spectrum 3G mobile telecommunications air interface allied with the GSM standard. W-CDMA is the technology behind UMTS. Networks using W-CDMA are a form of cellular network.

Wi-Fi

Short for wireless fidelity, and is meant to be used generically when referring of any type of 802.11 network. See 802.11.
**Worldwide Interoperability for Microwave Access (WiMAX)**

The domain of working group Number 16 of the IEEE 802 (IEEE 802.16) that specializes in point-to-multipoint broadband wireless access. Predictions suggest that WiMAX will take over the 5G networks and become the 4G wireless technology.
Appendix – Working with Direct Data Access

What You Will Need to Get Started

Before you can use the Guild Direct Data Access portfolios, you’ll need to have three things in place.

1. You must be a member of The eLearning Guild (you can join as a free associate).
2. You must log in to the Guild Website.
3. You must prepare your computer system by installing a Citrix plug-in or thin-client viewer that will enable you to interact with the data.

Note: Instructions for installing the plug-in and thin-client are available from the main Guild Research page.

Everything Starts with “My Reports”

You access any and all reports to which you are entitled by clicking “My Reports” from the menu along the left side of The eLearning Guild Web site. Remember, you must log in to access the reports.

For this next series of examples we’ll explore three different Direct Data Access portfolios to illustrate how to use the system.
E-Learning Salary and Compensation Report

Note: This report is available to all members. See http://www.elearningguild.com/pbuild/linkbuilder.cfm?selection=fol.28 for more information.

To access this report, do the following.

1. Go to www.elearningguild.com and log in.
2. Click My Reports from the menu along the left side of the screen.
3. Scroll down until you find the report you want to access, as shown below.

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**Guild Interactive Research Reports**

<table>
<thead>
<tr>
<th>Report Title</th>
<th>Interactive Report Descriptions</th>
<th>Thin-client</th>
<th>Plug-in</th>
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</thead>
<tbody>
<tr>
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<td>Review salary and total compensation based on job level, industry, region, education, experience, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e-Learning Projects Database</td>
<td>Review projects that fellow guild members have created, the tools and training modalities they used, how much the project cost, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Modalities</td>
<td>See which training modalities are being used often, broken down by multiple dimensions.</td>
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<tr>
<td>Training Modality Trends</td>
<td>See adoption and rejection of training modalities over time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools &amp; Products</td>
<td>Explore comprehensive market share analysis for e-Learning tools and products, broken down by various categories including industry, company size, etc., based on total number of different members.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools &amp; Products Satisfaction</td>
<td>Investigate comprehensive satisfaction ratings for e-Learning tools and products, broken down by various categories including industry, company size, etc., based on total number of different members.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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4. Click the Go button below either Thin-client or Plug-in for the e-Learning Salary and Compensation Report.

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The Thin-client requires that you download a small program and install it ahead of time (You will find a link on the Guild research page). The plug-in (which only works with Internet Explorer) will automatically prompt you for permission to install.
The Direct Data Access portfolio for this report will load, as shown below.

Figure 100 – Demographics showing breakdown by State, Department, and Job Level. Notice the status bar at the very bottom of the screen indicating that there are 3,831 records (responses).
Accessing Different Views

Each report contains many different views. You access different views by clicking the tabs along the bottom of the report.

Figure 101 – Access different views by clicking the tabs along the bottom.

Figure 102 – Portfolio showing Average Salary, Average Total Compensation, and Average Work Weeks Hours for virtually every industry and job level.

Viewing Details and Copying Images

If you hover the cursor over a bar you’ll see details about the underlying information, as shown below.

Figure 103 – Hovering the cursor over a bar displays details.
You can also copy an image by right-clicking and choosing Copy Image from the pop-up menu.

![Average Total Compensation](image)

**Figure 104 – Copy images for inclusion in reports by right-clicking a graph and selecting Copy Image from the pop-up menu.**

**Applying Filters**

While the information contained in Figure 102 is interesting, it's not particularly useful as it combines every type of e-Learning professional into one big vat, showing that the average salary for a male e-Learning professional is $82,707 a year and the average salary for a female is $72,121. But this “giant vat” view averages people who have been in e-Learning for 25 years with those that have been in for 25 days, as well as senior executives and just-starting interns. To get a better idea of salaries, work week hours, and so forth you need to apply filters.

**Check Box Filters**

For example, if we exclude Owner/Principle/Executives under Job level, and those with a Doctorate under education, the average salaries decrease to $76,400 and $68,800, respectively.

![Check Box Filters](image)

**Figure 105 – Applying check box filters.**
Radio Button Filters

We can filter the results further using the “Single” button. For example, suppose we just want to see the average salary for Practitioners, we can do this easily by doing the following.

1. Click the Single button on the Job Level filter.

2. Click the Practitioner radio button.

Using the Exclude Values Filter

Now, suppose you want to see the average salaries for all job levels except Practitioner. While you could click the Multiple button and apply multiple check boxes, you can also use the Exclude Values feature, as shown below.

- Click the small down arrow in the upper right corner of the Job Level filter box and select Exclude Values from the pop-up menu.
The filter box display changes, as shown below.

**Median Salary and Median Age**

One of the more interesting views is a scatter plot diagram showing all salaries plotted against all ages. We can see this view by clicking the All Salaries/Age tab at the bottom.

Figure 106 – Scatter plot diagram showing all salaries and all ages for all job levels except practitioner and all education levels except doctorate. You can hover over individual values or click items (such as the Median and 95th Percentile lines) to get more detailed information.
Age and Years in e-Learning Filters (Slider Filters)

The other type of filter that appears in many of the Direct Data Access reports is a slider filter.

While slider filters do indeed allow you to move a slider to change settings, it is often easier to type values directly into the filter. For example, right now the Age filter is set to show results for all members between the ages of 20 and 90.

Let's suppose we want to see results for people between the ages of 30 and 60. You can change the lower limit by clicking the number (20) and typing in a new value, as shown below.

You change the upper limit in the same way.
Using Map Filters

In addition to education, experience, job level, purchasing authority, industry, company size, and so on, there’s one more factor that may determine salary: location.

You can use the map tab to filter results by state, as shown below.

1. Click the Filters and Map tab.
2. Draw a box around the area you want to include in your query. You can select discontinuous regions by holding down the Control key.
3. Right-click one of the selected areas, as shown below.
4. Select the view you want to examine from the pop-up menu.

The newly displayed view will reflect all the filters you have applied, including the state filters.
Tools & Products Satisfaction

Note: This report is available to paying members (Members, Members Plus, and Premium Members). See http://www.elearningguild.com/pbuild/linkbuilder.cfm?selection=fol.28 for more information.

To access this report, do the following.

1. Go to www.elearningguild.com and log in.
2. Click My Reports from the menu along the left side of the screen.
3. Scroll down until you find the report you want to access (Tools & Products Satisfaction).
4. Click the Go button below either Thin-client or Plug-in for the Tools and Products Satisfaction portfolio.

The Direct Data Access portfolio for this report will load, as shown below.

Figure 107 – Satisfaction ratings for Courseware authoring tools.
Important Note: Figure 107 shows Courseware authoring satisfaction ratings for members of “all sizes and shapes” who work in all industries and all company sizes. We strongly encourage you to apply filters that are applicable to you and your organization, because products that may work well in large corporations may not work well in small educational institutions, and vice versa.

How Guild Members Rate Products and Services

The Guild requires all members to provide us with certain personal and organization information. We also ask (but do not require) that members tell us which products and services they use, and to rate these products and services.

We compute the overall rating for a product or service by using the following formula:

Would you use this vendor again: 50%
Vendor responsiveness (includes technical support): 15%
Learning / Implementation curve: 15%
Cost benefit: 20%

Figure 108 – How eLearning Guild members rate the products and services they use.

As of this writing, thousands of members have shared this information with us. In addition, every 90 days we remind members to update their profile and survey information. If a member goes a year without updating information, we filter that information out of our live reports.
Finding more information about a product

If you want to know more about a particular product, you can right-click the rating bar for the product and choose View Product Information from the popup menu, as shown below.

A new browser window with product information appears.
LMS Side-by-Side Comparisons

Note: This report is part of the Guild’s 360° Report on Learning Management Systems and you must purchase it separately.

To access this report, do the following.

1. Go to www.elearningguild.com and log in.
2. Click My Reports from the menu along the left side of the screen.
3. Scroll down until you find the report you want to access (LMS Side-by-Side Comparisons). Note that if you have not purchased the Guild’s 360° Report on Learning Management Systems you will not see a link to this report.
4. Click the Go button below either Thin-client or Plug-in for the LMS Side-by-Side Comparisons portfolio.

The Direct Data Access portfolio for this report will load, as shown below.

Figure 111 – The LMS Side-by-Side Comparison Portfolio.
For this example we will examine several popular Learning Management Systems and see how they compare among corporations with more than 1,000 learners impacted.

First, we’ll select the LMS’s we want to compare.

Next, we’ll de-select the industries we don’t want to include, as shown here.
And lastly we’ll indicate that we don’t want to include corporations with fewer than 1,000 learners, as shown here.

![Image of learners impacted criteria]

We can now explore different views of the data by clicking the tabs along the bottom of the screen.

![Image of chart showing number of responses for selected systems]

Figure 112 – Number of responses for the systems we selected, based on the criteria we set.
Figure 113 – Satisfaction for specific product features.

Figure 114 – Cost per learner, based on costs to acquire and configure the system.
Figure 115 – Reported return on investment.
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