A New, Adaptive Model to Improve Learning via Mobile Devices

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Abstract—In this paper we present results from an Italian high-school project looking at the adaptation of eLearning to meet different contexts in different knowledge tools. In our accelerating world, even education has become mobile-oriented. Learners have to acquire greater and greater amount of knowledge while the number of contact lessons, especially in higher education, become less and less. That is why giving particular information belonging to a certain topic should be raised— one method for this would be visualisation. This means that lectures would be structured in a way that the usual verbal lessons are supplemented by diversified and spectacular visual information. Educators are required to apply new teaching devices. If the informations were displayed by mobile and shown in an interactive way the efficacy of teaching would get intensified. The fact that education supporting new means and circumstances of learning, calls for changes in the methodology of teaching and learning. Besides, we also intend to introduce a new framework which plays an important role in forwarding learning material to students. These are then tested by means of focus group discussions. Finally, recommendations are presented for training providers of e-learning for SMEs as well as areas for further research.

Index Terms—learn-by-doing simulation, e-learning design, Interactive Mobile Solutions, virtual teamwork, learning pedagogies in classroom.

I. THE APPEARANCE AND THE MEANINGS OF THE NEW TOOLS

Traditional education, in which the teacher presents the material in front of a group of learners and the single help and test are provided using an adaptive mobile eLearning in different spaces.

As the potential for technology to enhance learning grows, we often see the phrase mobile learning bandied about. Clearly, the term appears vague as the concept emerges, yet it does call to mind a simple question: How does mobile learning differ from online or distance learning options?

II. THE MPNE PROJECT

E-Learning is a subset of Distance Learning - Mobile Learning is a Subset of E-Learning.

One of the most unique characteristics of mobile learning is that it should be delivered in short 'nuggets' rather than large units of information. Successful mobile applications are goal directed, and are not effective if they expect too much reading from a small screen. Therefore, content format has to be chosen with care from options including audio and video transmission, freestyle drawing, simulation tools, and interactive scenarios.

Mobile learning is sometimes considered merely an extension of eLearning, but quality mLearning can only be delivered with an awareness of the special limitations and benefits of mobile devices. Mobile learning has the benefits of mobility and its supporting platform. Learning content can be accessed from any location and is personalized for the individual learner. Personalization is a key component of mLearning since the difficulty of navigation and small screen size of mobile devices makes it critical to target learning material as much as possible.

Mobile learning needs to differ from eLearning in the following ways: More personal, More fun, More interactive, Networked, Spontaneous, Shorter duration, More connected, Directly to the point, Just-on-time learning. Engaging users to contribute and share, From reader to producer of content [1].

III. MOBILE CHALLENGES

Every new computing paradigm has challenges and the new mobile revolution is no different. However unlike some people who think that things like price tag of a mobile device or its battery are holding mobile learning back from full adoption, I’m convinced technology has little to do with what’s holding us back from crossing the chasm.

You see, time will take care of technology. Processors in mobile devices will get faster, connections will become more ubiquitous, in fact, it’s likely most cities will have the right infrastructure to provide us with WiFi-everywhere in the near future. As for the batteries in our smartphones, they will last longer or better yet, will be replaced all together by solar power technology.

So if technology isn’t the real challenge for us in transitioning from eLearning to mLearning, then what are the real challenges?
Here are 5 things I think are more difficult to overcome than technology, on our way to the promise mLearning land:

A. Having the right Mindset

Again, it’s not about Technology, time will take care of advancing technology forward, it always has and always will, but even if innovation in mobile suddenly halted today (not likely), we would still have a lot to work with in mLearning (i.e. with all the sensor superpowers) in order to create amazing learning experiences on mobile.

The reality is that we don’t like change and mobile is a new way of thinking.

But we need to embrace change in order to make the most of this new opportunity mobile presents to us, and reinvent our Learning Industry in the process. What we need in eLearning is not an evolution, it’s a revolution and mLearning is just the kind of paradigm shift we need to make this happen.

B. Embracing simplicity

this is a big challenge for Instructional Designers everywhere. As a school, we have been conditioned to think that the more animations we have in our courses, the more engaging they are for the learner. Tools students focus their entire knowledge strategies (I know I was one of them) on studying “more interactive” features. Every new version comes with more interactions, more widgets, more timelines, more triggers, more ways of animating text, and more support for all those animations in PowerPoint. As users of these tools, we feel that unless we use all of these cool features in a Project (or in a single slide), we are likely behind the trend, and so we end up burying the real course objectives in a sea of animations.

However the mobile experience is about simplicity, it’s about sharing one big idea per screen and nothing more, it’s about looking at what’s really important and then getting rid of everything else, the fluff. Again, mobile learning is about thinking different, almost unlearning everything we know and starting over and reimagnining the entire learning experience.

C. Lack of mLearning Tools

The existing eLearning tools will evolve into great tools for true mLearning design.

Don’t get me wrong, I do think that existing eLearning tools do exactly what they were designed to do, namely help us rapidly develop eLearning courses for the desktop.

The problem I see, is that for a little while now, we have entered a “post-eLearning” era and new tools are needed to help us meet today’s connected and mobile learners’ expectations. I strongly believe we need new tools that are built from the ground up and that embody everything that is great about mobile, including a new mindset, new templates, simple, yet powerful and beautiful experiences and most of all, tools that can display these learning experiences in a personalized way and on every screen.

D. Thinking Desktop First and Mobile Second

Most people today think desktop-first and mobile-second, if at all, and that’s a big problem. One of the quickest ways to immediately improve our desktop eLearning is to start thinking mobile-first and then go back to our desktops and apply the simplicity that is derived from embracing mobile constraints that come with smaller screens [2].

E. The Temptation to simply convert desktop elearning to HTML5

And last but not least is the temptation to hit the new HTML5 publish button in the latest versions of some tools, that allows us to take our existing desktop courses exactly as they are and make them available in HTML5 with the promise that this will check off the mLearning box. Not so fast however.

One of the biggest technical differences between eLearning and mLearning is that eLearning was created for that very tiny mouse pointer, while mLearning requires a much bigger touch target for our fingers. This minor, seemingly insignificant difference changes everything in terms of design, and it’s yet another reason why “one size does NOT fit all” in eLearning and mLearning. Take Microsoft’s design guidelines for their Windows Phone 7 platforms for example, which recommends that each touch target be at least 9mm in size and that there be at least a 2mm space between actions.

IV. DEVELOPMENT APPROACHES FOR MPNE

TEACHERS AND STUDENTS

mPNE for eLearning provides a complete solution for rapid training and mobile learning, enabling rapid deployment of training accessible from anywhere, anytime, on virtually any device.

A. Deploy training faster

Create and deploy content within days versus weeks, and instantly publish to the cloud for widespread access. Repeat sessions without preparation using persistent virtual classrooms.

B. Reduce the cost of cross-device content creation

Leverage education-leading tools to create content once and publish for access across virtually any device.

C. Reduce the cost of cross-device content creation

Maximize training registration and attendance.

D. Enable mobile learning on virtually any device

Conduct training or participate in virtual classes across devices including iOS, Android, and BlackBerry PlayBook, as well as the desktop with no client downloads for learners.

E. Deliver immersive experiences in live and on-demand classes

Track learner engagement in real time to maximize participation. Coordinate with multiple trainers behind the scenes for seamless execution.

F. Efficiently manage and track training

Manage training with features of a Learning Management System (LMS) at a fraction of the cost, or integrate with an existing LMS to leverage your infrastructure.
V. THINK MULTISCREEN WHEN DEVELOPING AN mLEARNING STRATEGY

One thing I stress in this project is the fact that having an iPad-only strategy for Learning is not a thorough mLearning Strategy.

Granted, the iPad accounts for 91% of all tablet web traffic and that statistic alone is compelling enough to make you want to focus your entire learning development efforts on just this tablet, however as you think about your own mLearning strategy, I strongly encourage students to think instead about the multiscreen world we live in and develop for it.

Right now, we have the traditional desktop PCs and Laptops, Tablets and Smartphones, but it’s not too early to start thinking also about smart TVs, game consoles and dashboards in cars, and why not the foldable screens of the future. As content developers, our mission is to make sure our stuff will be accessible by our audiences from any of these screens and in ways that provide a great experience on each one of these many screens.

A. Interacting in an ecosystem of screen

For one thing, today’s connected Learners interact in an ecosystem of screens. So for us in the Learning Education, it should not be just about designing great isolated learning experiences that may only be consumed on desktops and iPads, it’s also about developing a multiscreen strategy that will make our content accessible anywhere, especially as Learners acquire more devices and begin expecting that their ‘learning’ follows them as they shift between devices.

B. Three patterns of an Ecosystem of screen for mLearning

The model we propose after test discovered six patterns of the ecosystem of screens, however I think provide a great blueprint for how we should approach our learning design.

VI. DESIGN CONSIDERATION

Working for all those devices was interesting and challenging. Not just because of the diverse screen sizes and input methods, but because we learned in our user research how different the contexts are in which these gadgets are used.

Even more interesting, however, is the question how those devices relate to each other. What does it mean for the digital products and services we are designing, when PCs, smartphones, TVs and other electronic devices are connected? What implications does it have on the interfaces, if people are interacting in an ecosystem of screens?

A. Coherence in Multiscreen Learning Design

This could just be the most important patterns for us, because we need to make sure our learning experiences are not just accessible through PCs, Laptops, and multiple devices, but that we optimize our content to take advantage of each screen’s capabilities and the context in which our learners use each device [3].

This is where I believe Responsive Web Design will play a big role moving forward.

B. Synchronization in Multiscreen Learning Design

This is another pattern to keep in mind when designing for a multiscreen world. All of us mobile users expect the products and services we use to not only follow us from device to device but to remember where we left off on one device and continue from there on the next device.

C. Device Shifting in Multiscreen Learning Design

This is another important trend for us to keep in mind as we design the next generation of learning experiences. Most of us already own one of more desktop PCs, perhaps a Laptop, at least one tablet, one smartphone if not more, and throughout the day, chances are we reach for the device that is closest to us. So let’s design with this device-shifting in mind.

VII. TECHNICAL QUALITY ASPECTS

There are a number of aspects of mLearning quality that can be assessed from a technical perspective. For
example, a significant aspect of mobility is quality of service in terms of the reliability and speed of wireless connections. Although some learning content can be downloaded to a mobile device and used locally, the limitations on storage mean that network connectivity is an essential component of most mobile learning environments. The reliability and speed of such connections can influence which media types can be used in an mLearning system, for example video streaming is only feasible over a high speed connection. Another technical aspect of mLearning quality is the limitation of screen size and resolution on many mobile devices, with certain mobile device operating systems and software platforms supporting different types of display. The system software also dictates what media types can be managed, for example not all devices are able to download mobile Java applications (MIDlets) and even those that can will vary in their capabilities in terms of which version of the Java 2 Micro Edition (J2ME) platform they will support. Similarly Microsoft Windows based devices have access to services that are not available on other operating systems.

This is even more of an issue in mLearning because mobile devices are more varied in performance and capability than machines on the desktop. The Extensible Markup Language (XML) can assist in providing the same content across different platforms by encapsulating generic content that can be dynamically transformed for different client devices [4]. A further role of XML is to support the development of standard tools and metadata to manage and describe content. This encourages reusability and integration of learning content from multiple sources.

VIII. BEYOND TECHNICAL QUALITY

The purely technical aspects of quality in mLearning are important, but are coupled with equally important aspects of quality that are content related. mLearning technologies that are easily customisable, technically flexible and contain relevant content are those that are most likely to be successful. Thus we see that a quality assessment for mLearning must encompass both technical and non technical aspects.

There are some positive indications that mLearning is able to deliver quality even in limited technical environments.

This study indicated that mLearning applications can have depth and complexity, and encourage wider scale participation, even where it might be expected that technical limitations would discourage the learner.

It seems therefore that technological sophistication is not necessarily a measure of usefulness, since even simple technologies like classroom response systems have proved effective, engendering rich social practice around basic systems.

IX. THE mLEARNING CONTEXT

The mobile learning context is not the same as that of more traditional E-learning. mLearning is often highly dynamic, targeted to the user’s current context and learning needs. The terms just in time learning or fast learning have been used to refer to content provided for the user’s current context.

Alternatively, mLearning can be regarded as a ‘down time’ activity. In either case one of the commonly stated characteristics of mLearning content is that it should be delivered in short ‘nuggets’ rather than large units of information.

Therefore content format has to be chosen with care, from options including audio transmission, freestyle drawing tools, video streaming, simulation tools among others [5].

It should have clearly explicit pedagogical design principles appropriate to learner type, needs and context, to be up to date in terms of content and be highly interactive, enabling mutual feedback between education providers and learners and assisting in the identification of knowledge gaps.

X. mLearning Design Framework

Based on the quality themes of mLearning research outlined in the previous section, we have developed a conceptual design framework for mLearning based on a combination of design issues, dimensions of learning context, structural factors and their instantiation, and objectives.

Our framework also integrates Wang’s [6] six dimensions of learning context: identity, spatio-temporal, facility (device, including adaptivity), activity, learner and community. We identify five design issues that are critical in mLearning: user roles and profiles, learning on the move, different media types, interface design and collaboration support. We map these to Wang’s six contexts and then to Prensky’s [7] structural elements. From these we address the learning objectives of the system: improved skills, new knowledge, social skills and team building.

![](image)

Figure 4 A new Conceptual mLearning Design Framework

Key features of the framework are that it identifies the importance of the user’s roles and the learning community in meeting learning objectives. We also identify those issues, dimensions and factors that have a user focus, contrasted with those that have a platform focus.
XI. SUMMARY AND CONSIDERATION

While traditional, campus-based colleges continue to see flat enrollments, online universities are seeing steady up-ticks in student numbers. The primary reason for that growth is due to the flexibility online programs offer.

Clearly, the very opportunities provided by mobile learning create complexities and additional challenges for educators who are used to the traditional notion of instructing students. First and foremost appears to be a transition from a reading and writing approach to learning to one that is almost entirely activity-based.

Mobile learning demands an ability to find information rather than either possessing or knowing it. And as technology further emerges, knowing where to find a specific piece of information is no longer as obvious as it once was.

Figure 5 These patterns should help understand and define strategies for the multiscreen world

In the fullest sense, we find that mobile devices create new forms of knowledge as well new ways of accessing that knowledge. Think of a song that is available for an iPod, then the quest for the user to acquire the song, download it onto their iPod, then retrieve it when the person has the desire to listen to it. Many adults would not be able to navigate their way through this process given their lack of knowledge regarding accessing music as well as how to operate the various controls of the iPod itself.

New phrases such as technology enhanced learning or technology supported learning are simply inaccurate here. Such phrases conjure up the idea that technology does something to learning. But it is learning itself that is truly being transformed.

With advanced technologies, one major shift will be to examine how knowledge is organized and interrelated. Do we continue to offer a traditional breakout that organizes learning by subjects like math, science and social studies? And does education continue to see reading and writing as the core that all other learning revolves around?

Or does mobile technology demand that technology be in that fundamental mix, a member of the core subjects? Could we even venture to say technology must be put above all other areas of learning as a new core for the future?

ACKNOWLEDGMENT

Thank you for all teachers and students for recording the material of the lectures, and for the enthusiastic use of PNE - Professional Network e-Learning.

REFERENCES


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Manuscript submitted for review via email attachment on May, 22, 2014. We would like to thank ITST “JF Kennedy”, Pordenone, Italy.

Published as submitted by the author: Massimo Minighin