# m-Learning Manager

# Difference to the e-Learning Manager Skill Set

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## Content



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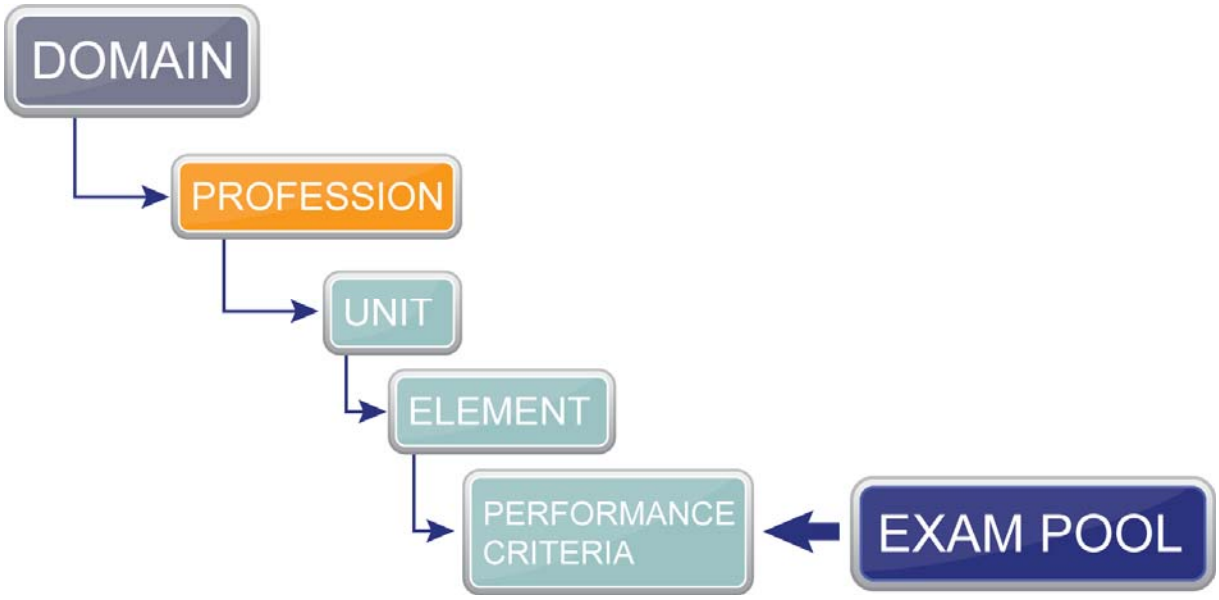
# 1 Introduction

## 1.1 Skill Card Structure

A skill set is a group of specific learning elements that a person should be able to apply within a certain job role. A standard group of skill sets within Europe is necessary due to the free mobility of workers. European countries such as the UK, The Netherlands, and France already have well-established open learning courses which support APL (Accreditation of Prior Learning). In APL the skills of students are assessed, existing skills are recognized, and a learning plan is developed to cover any skill gaps. The skill assessment is based on defined skill units and a skill profile which shows how much of the skill units have been covered.

## 1.2 Definitions




The skill sets are based on the skills definition proposed by the DTI (Department of Trade and Industry) in the UK for NVQ (National Vocational Qualification) standards [2] and revised skill cards from other countries. It contains the following items:

- **Domain:** An occupational category. E.g. Domain = Process Improvement.
- **Job Role:** A certain profession that covers part of the domain knowledge. E.g. Job role = Yellow Belt, Orange Belt, Green Belt or Black Belt.
- **Unit:** A list of certain activities that have to be carried out in the workplace. It is the top-level skill in the qualification standard hierarchy. Each unit consists of a number of elements.

- **Learning Element:** Description of one distinct aspect of the work performed by a worker, either a specific task that the worker has to do or a specific way of working. Each element consists of a number of performance criteria.
- **Performance criteria:** Description of the minimum level of performance a participant must demonstrate in order to be assessed as competent.
- **Level of cognition:** For each performance criteria there is an intended level of cognition. At the same time this describes the complexity level of the test questions for each performance criteria, according Bloom's Taxonomy – Rev. 2001.

# 2 Skill Set Comparison

## 2.1 Mobile Learning Manager Skill Set Structure

***mLeMan.U1 Pedagogical Aspects of mLearning***

- mLeMan.U1.E1 Mobile learning characteristics and design principles
- mLeMan.U1.E2 Devices and content
- mLeMan.U1.E3 Learning theories & approaches in mLearning

***mLeMan.U2 Mobile Learning Tools and Technologies***

- mLeMan.U2.E1 mLearning Content Development – main concepts
- mLeMan.U2.E2 Technological Layers in mLearning

***mLeMan.U3 mLearning Management***

- mLeMan.U3.E1 Needs analysis
- mLeMan.U3.E2 Innovation and Business Management

## 2.2 E-Learning Manager Skill Set Structure

***ELM.U1 Pedagogy***

- ELM.U1.E1 Instructional Design
- ELM.U1.E2 Evaluation
- ELM.U1.E3 Blended learning
- ELM.U1.E4 Assessment
- ELM.U1.E5 Pedagogical theory

***ELM.U2 Technology***

- ELM.U2.E1 E-learning Technological Basics
- ELM.U2.E2 E-learning Tools
- ELM.U2.E3 E-learning Content

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- ELM.U2.E4 E-learning Platforms
- ELM.U2.E5 Providing e-learning
- ELM.U2.E6 Emerging e-learning trends

***ELM.U3 Management***

- ELM.U3.E1 Supplier/ Services
- ELM.U3.E2 Measurement of e-learning benefits
- ELM.U3.E3 Knowledge Management
- ELM.U3.E4 Management of e-learning projects
- ELM.U3.E5 Organizational Analysis

## 2.3 Comparison of the Skill Set Structure

### 2.3.1 Different Structure

Already at the highest level of the skill set structure it is evident that both skill sets are very different. There is not one learning element which is the same in both skill sets.

### 2.3.2 Different Content

If reviewers find a similarity then this only refers to the standard skills set definitions structure applied by ECQA (European Certification and Qualification Association, www.ecqa.org) on about 30 European accredited professions so far. This can be explained by the following analogy:

Lets take the ERP (Enterprise Resource Planning) system of Continental Automotive and of the Bank Austria. Both might apply Oracle as a system but both implement totally different business flow models based on Oracle. Oracle is a tool box, nothing more, the content differs totally.

This is the same here, where the ECQA skills set definitions structure, the structure to perform tests is the same, but the content differs.

This is always the case if a system became a de-facto standard and all content developments start basing on same basic structure.

### 2.3.3 Different Developer Characteristics

Also the development work place differs. While e-learning developers use web applications running on standard web servers and browsers, the mobile development requires using specific application interfaces to existing mobile operating systems.

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Seeing a similarity here would mean that someone would say that a Java Servlet using Tomcat server is the same as an Apache web server with HP programming. It is true that in both cases the user has a web site, but the way it is implemented in the programming language is different.

This can also be explained by the following analogy for non-software developers: You see two cars in front of you, one has a BMW motor inside, and the other car has a Fiat motor inside. Because the driver gets the same functionality to switch gears and drive you conclude that both motors must be same.

# 3 Skill Unit: Pedagogical Aspects

## 3.1 E-Learning Manager

E-learning may in many ways be taken as a merging of technology and pedagogy, a particular use of: The “right” technology based on the right “pedagogy”.

Often, pedagogy is overlooked in favor of a technological answer to a pedagogical question. Pedagogy forms a key part of the knowledge and skills a good e-learning manager should possess in order to, for example:

1. Knowledgeably discuss learner needs with clients

2. Diagnose from a pedagogical perspective why certain e-learning implementations may or may not “work”

3. Implement valid and reliant assessment processes

4. Evaluate programmes based on a range of key pedagogical criteria

5. Make pedagogically-informed choices and decisions regarding the design and development of a range of e-learning solutions

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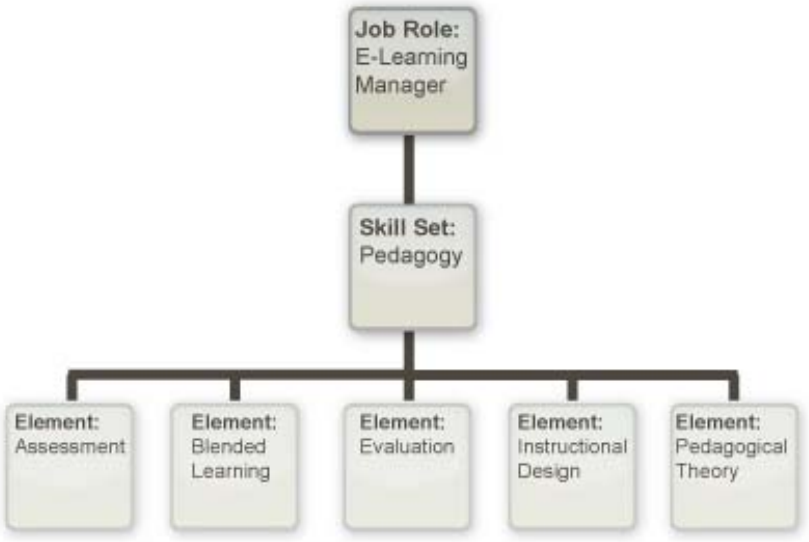


## 3.2 Mobile Learning Manager

### U1. Pedagogical Aspects of mLearning

The pedagogy of mobile learning straddles two quite different pedagogical systems: the pedagogy of traditional face-to-face education and the pedagogy of distance education. The aim of this unit is to recognise the role of mobile learning in conventional, face-to-face education and in distance education. The objectives: Develop skills in the didactical structuring of mobile learning materials; Develop skills in the pedagogy of the use of media in mobile education systems; Develop skills in the pedagogy of the development of student support services for students studying by mobile learning. Decide which elements of the achievements of the Open University can be of value for the mobile learning programme of your institution. Decide which elements of the pedagogy of e-learning can be of value for the mobile learning programme of your institution. Develop skills in the management of the course development process for mobile learning in Textual materials, audio, video and TV materials, location and context sensitive course materials and augmented reality so that the qualified mLeMan manager can manage the production of mobile learning materials in his or her institution.

### U1.E1 Mobile learning characteristics and design principles

Mobile devices can be used to provide a wide range of different types of short, support forms of learning intervention. This Unit presents:

- the mobile learning characteristics (ubiquitous, bite sized, on demand, just-in-time access to resources, blended, collaborative)

| |
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| - the design approaches largely adopted in mLearning: performance support through instant information, assessments/ quizzes/ skills checks, collaborative learning, audio learning, video learning |

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| U1.E1.PC1 | Knowing the meaning of ubiquitous, bite sized, on demand, just-in-time access to resources, bleended learning and collaborative learning |
| U1.E1.PC2 | Knowing the principles to be kept in mind while designing mobile learning solutions |
| U1.E1.PC3 | Knowing the design principles for creating quizzes that can be downloaded onto mobile phones |

### U1.E2 Devices and Content

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| The Unit explains which devices should be considered for mobile learning and describes the key characteristics of each category.<br><br>The Unit also analyzes which types of content are best suited to mobile learning. |

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| U1.E2.PC1 | Knowing which devices should be considered for mobile learning (PDAs/smart phones, digital phones and non-telephony devices including MP3 players, tablets) and their main specifications |
| U1.E2.PC2 | Knowing the type of media elements (text, audio, video, etc. ) used in mLearning content according to the characteristics of the mobile devices |

### U1.E3 Learning theories & approaches in mLearning

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| The Unit focuses on the most common e-learning theories and pedagogical strategies that could support mLearning |

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| U1.E3.PC1 | Knowing when, according to a specific context, within a particular social and physical environment, the "situated learning" applies to mLearning |
| U1.E3.PC2 | Awaring that Mobile devices can support Collaborative Learning by providing another means of coordination among users |
| U1.E3.PC3 | Awaring that the mobile devices can support the individuals to acquire attitudes, values, skills and knowledge from daily activities and the educational influences and resources in his or her environment (informal and non-formal learning) |
| U1.E3.PC4 | Knowing the basics of augmented learning (localization, adaption and personalization of the mobile contents) |

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## 3.3 Comparison

The field of distance education introduced learning at a distance from the teacher and learning usually as an individual, the field of e-learning introduced learning from screens, the field of mobile learning introduced learning from small screens. e-learning is short for electronic learning, that is learning on the Internet and on the World Wide Web. The pedagogy of e-learning is the pedagogy of learning from screens. It therefore has clear implications for the pedagogy of m-learning.

Although the multi-media learning materials of distance education transferred fairly readily to the screens of e-learning, this was not the case with the development of learning materials for the small screens of mobile learning.

*Textual materials*

The A4 textual materials transferred readily to the computer screens of e-learning. In mobile learning, however, the number of horizontal and vertical pixels of the small screens of mobile devices had to be carefully calculated and the text adapted to the space available. The use of bold and italic had to be carefully reconsidered and headings adapted to the displays of mobile devices. E-learning had few problems with illustrations, graphics, designs, graphs and photographs. Mobile learning had serious problems with all of these. In telecommunications courses, for instance, an illustration can cover a whole A4 page with interlocking boxes and interconnected links. For mobile learning these illustrations have to be simplified (whereby they lose their didactic significance) or split over two or three screens.

*Audio and video materials*

One of the weaknesses of both distance education and e-learning is the lack of audio, the medium that has carried education for thousands of years. As mobile devices are an audio medium it should have been possible for audio to have been restored in mobile learning. To date this advantage has not been realized due to file sizes and memory problems. In e-learning the use of video materials and TV recordings has become commonplace. In mobile learning the use of this medium has been seriously retarded due to the memory availability and downloading difficulties of students' phones..

*Location and context sensitive course materials*

Using Open Source software MediaScape, which overlays digital sight, sounds and interactions onto the physical world to create immersive and interactive experiences and QR Codes, it is possible to produce location and context sensitive course materials for mobile devices. This is important because it highlights an area of educational provision which the

other sectors of educational provision, face-to-face education, distance education and e-learning, cannot do, or cannot do as well as mobile learning.

*Augmented Reality*

Augmented Reality is a term for a live direct or indirect view of a physical real-world environment whose elements are merged with (or augmented by) virtual computer-generated imagery – creating a mixed reality. The augmentation is conventionally in real-time and in semantic context with environmental elements. With the help of advanced augmented reality technology (adding computer vision and object recognition) the information about the surrounding real world becomes interactive and digitally usable.

Artificial information about the environment and the objects in it can be stored and retrieved as an information layer on top of the real world view. This is important because it highlights an area of educational provision which the other sectors of educational provision, face-to-face education, distance education and e-learning, cannot do, or cannot do as well as mobile learning.

According to the theory: A first step in postulating a theory of mobile learning is to distinguish what is special about mobile learning compared to e-learning. The obvious, yet essential, difference is that it starts from the assumption that learners are continually on the move.

Second, a theory of mobile learning must therefore embrace the considerable learning that occurs outside offices, classrooms and lecture halls.

Third, to be of value, a theory of learning must be based on contemporary accounts of practices that enable successful learning:

- learner centred: it builds on the skills and knowledge of students, enabling them to reason from their own experience.
- knowledge centred: the curriculum is built from sound foundation of validated knowledge, taught efficiently and with inventive use of concepts and methods.
- assessment centred: assessment is matched to the ability of the learners, offering diagnosis and formative guidance that builds on success.
- community centred: successful learners form a mutually promotive community, sharing knowledge and supporting less able students.

These findings broadly match a social-constructivist approach, which views learning as an active process of building knowledge and skills through practice within a supportive group or community.

# 4 Skill Unit: Technology

## 4.1 E-Learning Manager

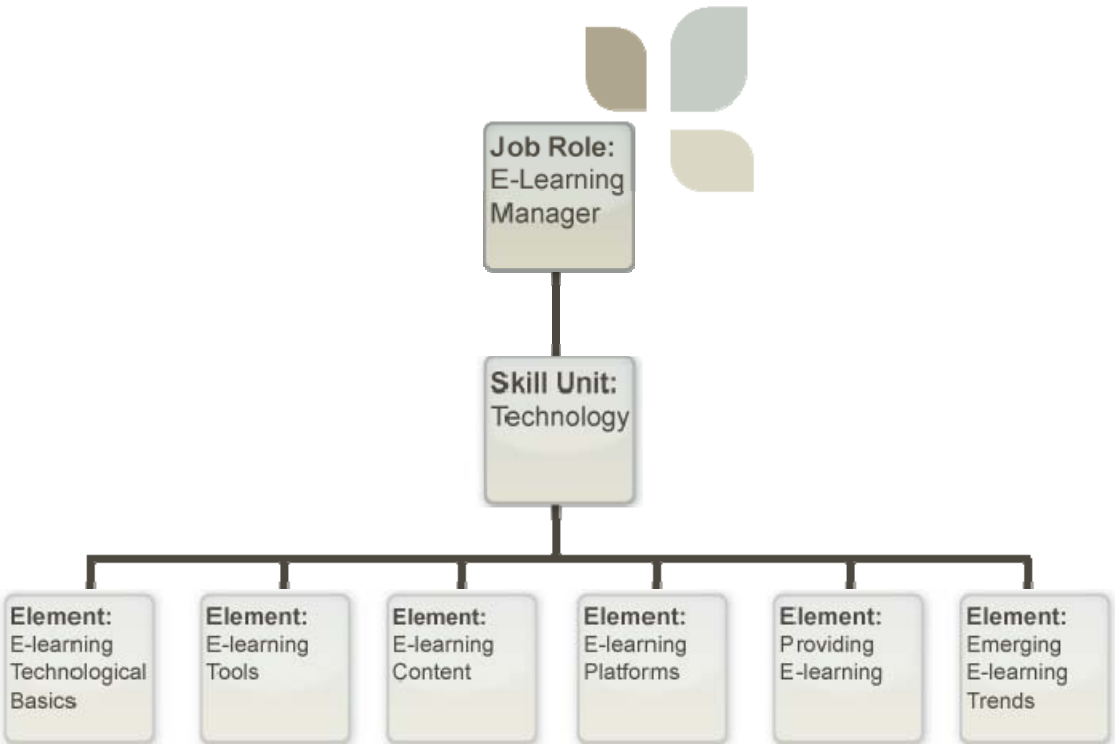
E-learning technology has become more and more a branch of technology in its own right.

In competent e-learning, technology is a enabler, providing the development, delivery and assessment of e-learning content. With an appropriate technological skill set, an e-learning manager should be able not just to develop e-learning content, but should be able to:

1. Prescribe appropriate delivery methods based on the organisation

2. Ensure communication with and monitoring of students is a regular occurrence

3. Be able to make use of new and innovative trends and technologies, such as those offered by the “web 2.0” movement, to induce students to engage in communication and activities

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## 4.2 Mobile Learning Manager

### U2. Mobile Learning Tools and Technologies

Once a mobile learning course should be developed and deployed, content developers often have the problem of not knowing their target groups. These target groups do not use computers anymore, where high-level of interactivity and content display can be used, but prefer working on mobile devices. These lack a lot of the normal computer features (from hardware and software point of view) and contents developed for computers do not suit them anymore. Therefore mLearning Managers must know the basics of mobile technologies, how they limit them and how they can turn these limits in opportunities and powerful learning tools. The large variety of devices allows these tools to be then deployed in large scale of working/learning scenarios and thus allow for better acceptance and usage of the learning content.

#### U2.E1 mLearning Content Development – main concepts

Nowadays, there are many different mobile platforms. Each of them has its different standards and methodologies for content display. Often additional tools are needed for the development of educational content. Due to the smaller screen sizes, different way for working and lack of “typical” for computers features, using standard ways for content delivery is not suitable. Therefore new architectures and systems for content development, which are mobile-ready, must be used. In cases, where standard methods like web and/or file downloading cannot be used (like when sensors like camera/gyroscope/GPS must be used), native application development must be done.

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|---|---|
| U2.E1.PC1 | Knowing the the different mobile operating systems (Symbian, Windows Mobile, Web OS, Google Android, Apple iOS) and their characteristics. |
| U2.E1.PC2 | Knowing the advantages of mLearning applications (use of a camera to read barcodes or for augmented reality, GPS for location based information ...) |
| U2.E1.PC3 | Knowing the different frameworks for developing mobile applications (Java, Objective-C, Java ME, BREW, Flash Lite, Windows Mobile, Mobile Web etc.) |
| U2.E1.PC4 | Knowing how to prepare materials for mLearning. (Tools for converting and formatting file formats, Media-Convert Tools for creating resources (Diagrams, Images, Audiovisual, Audio, Documents, Interactions)) |
| U2.E1.PC5 | Awaring of mobile learning and LAMS – Learning Activity Management System (Collaborative learning system for empowering synchronous and asynchronous learning) |
| U2.E1.PC5 | Knowing the concept of Web 2.0 and how to integrate/use it for mLearning |
| U2.E1.PC6 | Awaring of different browser implementations and APIs in mobile devices (Android, Firefox mobile, IE Mobile, Opera Mobile, Safari, Bl.Berry etc.) |

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### U2.E2 Technological Layers in MLearning

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| Mobile devices are so popular device, exactly because of their mobility and possibility to have connection anywhere with anyone. This is established via mobile networks of different kinds, which have their positive sides, but also their drawbacks. The rich variety of form-factors in mobile devices, gives the opportunity to buy the one, which suits the needs of the user the most. Every mobile device has some kind of interfaces between real and virtual world, called "sensors". These sensors help to enrich the raw online learning materials with real-life experience. Content can be delivered to the user via many different methods. Choosing the fastest one, doesn't always guarantee best results. A compromise must be taken between speed and price. |

| | |
|---|---|
| U2.E2.PC1 | Knowing the basics of mobile networks (GSM, UMTS, CDMA) and how these can influence the learning |
| U2.E2.PC2 | Knowing the typical characteristics (display size, weight, touch/non-touch, etc.) of mobile devices of different kinds/types – e.g. mobile phones, tablets, PDAs, etc.) |
| U2.E2.PC3 | Knowing typical sensors in modern mobile devices (GPS, A-GPS, Camera,...) and how to use them in mobile learning |
| U2.E2.PC4 | Knowing the hardware mobile standards for content delivery (Bluetooth, Wi-Fi/WLAN, GPRS/EDGE, 3G and 4G, WiMAX and HDSPA etc.) |
| U2.E2.PC5 | Knowing the software mobile standards for content delivery (W3C Mobile Web Default Delivery, Mobile Web, E-Mail, SMS-ing, In-Application downloading) |

## 4.3 Comparison

The first difference is the **target devices – computers versus mobile devices**. Nowadays many different types of mobile devices exist and the lack of standards for their production and development causes problems for m-learning developments. Mobile devices come in many different form factors:

Simple mobile phones – can be sliders, candybar'-formed, rotating or other form-factor models. They are defined by their smaller body size, smaller screen size and they almost always possess a twelve-key keyboard.

Smartphones – in this category fall many of the modern mobile devices. They have screens bigger than 3", usually with touch capabilities, and almost always no hardware keyboard at all. Some of them may contain a hardware keyboard underneath the screen, revealed by sliding the top part. Typical examples of this group are the Apple iPhone© and Android© devices.

Mobile Internet Devices – this is a new group of devices, which emerged in late 2008. These are devices with no phone capabilities, but are able to connect to the internet via external networks – wireless LAN, bluetooth connections or even cabled LAN. They have no

defined limits in size, but typically possess screens bigger than 5“. In this group we can also place netbook computers, because of their networking capabilities and their small size, but they are smaller than PCs screens and laptops screens. Devices of this group are the Apple iPad©, other tablets such as WeTab©, Archos 5 IT©, Samsung Galaxy Tab©, etc.

The form-factor, although important for the user, is not significant for the software on the device. It is critical how data is processed and displayed to the user. This is dependent in most cases on the operating system running on the device. Because of the lack of standards in the mobile branche and of the separation between software and hardware manufacturers, each company usually uses its own OS solution (Fling, 2009):

Mobile devices with no operating system – these are the most widely used devices nowadays. These mobile phones have a real-time platform, which serves as the medium between user and device. It is capable of doing simple tasks like receiving a call, sending an SMS or setting an alarm clock. More advanced devices from this group possess simple file systems allowing the installation of packages developed especially for them. These software packages have to be developed in proprietary development environments in different languages – some are using Java ME, like the old Siemens and some of the new SonyEricsson and Nokia phones, others use C++, like Nokia devices. This means, that to cover a wider range of devices for the educational system, developers must plan, develop and support many different applications. This results in higher maintenance and staff costs than in e-learning.

Mobile devices with fully-featured operating systems – although at the time of writing this group is smaller it is fast gaining numbers and soon will reach the usage of the previous group. These devices work in a similar way to a normal computer. They have package management systems, which allow installation and de-installation of software. Special algorithms for memory management are implemented in their operating systems, which allow more effective usage of resources. The vast majority of these devices use Java as the development platform – Android© devices are not the only example (Hashimi et al, 2010). RIM’s Blackberry© devices are also based on this language (Rizk, 2009). But there are also other platforms – Apple’s iOS© (previously iPhone OS©) for example is a proprietary operating system developed in the Objective-C language (Mark et al, 2009) which has a very uncommon syntax and structure different from the other languages. Palm’s new webOS© uses web languages like JavaScript, HTML, AJAX, thus the name „webOS“ (Allen, 2009).

As already stated a big drawback of the web system is, that there is no way to check what file formats for video, sound and images the devices use. This is at one side dependent on the system and on the other side limited by the browser software used. Some of the browsers on mobile devices – like Nokia’s default browser and the third-party Opera Mini browser, report to the web server what kind of device it is being used on (Firtman, 2010) but relying on this information will be a mistake. Many of the mobile phones do not give out this information and it can also be wrong. Therefore to solve this problem, we have to search for

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web standards on mobile devices. The following image displays a comparison between mobile and desktop web:

*Table 1: Differences between desktop and mobile web (Frederick et al, 2009a)*

| | Mobile Web | Desktop Web |
|---|---|---|
| **Average Session Length** | 2 – 3 minutes | 10 – 15 minutes |
| **Minimum Screen Size** | 90 × 60 | 800 × 600 |
| **Maximum Screen Size** | 240 × 400 for popular devices | Unlimited |
| **Browser Vendors** | 12+ and growing | Two with market share over 5% |
| **Browser Bugs** | Frequent.<br>Permanent, except for smartphones with updatable OSes. | Rare and patchable |
| **W3C[1] Standards** | Spotty.<br>Sometimes ignored or challenged by mobile industry. | Mature and accepted |
| **Markup Languages** | WML<br>CHTML<br>XHTML Basic<br>XHTML-MP<br>XHTML<br>HTML | XHTML, HTML |
| **JavaScript and AJAX** | Not on 90% of mobile devices.<br>Available as ECMAScript-MP and JavaScript.<br>Document Object Model (DOM) and supported events vary. Proprietary APIs are common. | Usually available |
| **Addressable Clients** | 3 billion mobile subscribers worldwide | 1 billion total notebooks, desktops and servers |

As can be seen, there are a lot of differences in both platforms. The parameter session length is not so important to us. It sets how long the login of a user in a system is valid. This could be easily overwritten. The screen size is critical to presenting data to the user. Because of the much smaller screen size (more than ten times is possible) data which originates from an e-learning platform cannot be directly presented to the user. Bigger images will force the user to do a lot of scrolling. Reading longer texts on a smaller screen makes the user uncomfortable and can cause serious eye problems. Another way of showing the same content to the user must be found. A solution to these problems are sound and video files. Long texts can be narrated. This way the learner doesn't have to watch the screen and could sit relaxed and concetrate on the materials. Video files are an even better approach. Through such rich media the system gets more interactive: interesting animations like, for example, physical laws can be animated and therefore interactively explained. Such features make the mobile web experience close to the user-desktop computer interaction and the learner feels more comfortable and secure in the mobile environment.

One last obstacle to challenge in the planning phase was the user interface. This is probably the most important part from learner's point of view. Desktop computers have already existed since the 1980s, e-learning environments have been used for the last fifteen years. The user nowadays has built an image of how such a system should look, what

functionalities it should provide and how it helps the learner to study. Moreover the mobile devices themselves have a typical user interface, which looks like a small desktop computer – clock, icons, menu to start from. It is very difficult to tackle this myth and offer the user a new approach to learning. A system, which should be easy to use, must not concentrate only on the materials, which are to be presented, but also on the appeal. An interesting and colourful environment attracts users more than black text on a white background. With the advance of touch-enabled mobile phones, it is important to dump old-styled mobile web pages and consider a new model. Instead of the traditional form: high column of text, through which the user has to scroll to read the text, and menu links placed at the bottom of the page. The new approach is: big, easy to tap objects as menu and horizontal shifting of pages, done with finger touches. Such look and feel is easy to use. By tapping on the chosen task the user is presented with interactive multimedia contents, through which he can scroll horizontally, or access via a horizontal menu.

When we talk about learning systems, the educational content and how it is presented to the user is of great importance. We already discussed some of the limitations of the smaller screen. For the learner it is very hard to read long texts. Textual content should be used for short pieces of information, tips and pathways through the system. Graphical content 'can say 1000 words', as we know. The whole system contains graphical information by itself. The menus are built by images, which are self-explanatory and provide enough information for the action behind. The same method can be used for the educational materials – diagrams, charts, photos.

The only actual limitation of the system is the size of the graphical content. First there is the mobile device's display. The usual mobile device, which a student uses, has a small display with a screen resolution at average 120x160 pixels. Some of the users have better mobile devices with resolution at about 240x320 pixels or even better (when we think of the iPhone© and Android© devices), but the majority still prefer smaller displays due to the smaller price. Then a functional program quite often may not use the full display size. There are buttons at the bottom or at the top, then a title for the program and/or other device-related information. So this situation makes it even harder to show pictures or movie content on the average mobile device. But still when an image is uploaded to the mobile device it needs to be viewable and understandable by the student. So we have set the limit for the pictures to: 240 pixel maximum width and 320 pixels maximum height. If less is possible, then it will be better to be smaller. The educational content creator should use larger images only if he is sure about the devices of the target group.

Nowadays every mobile device manufacturer supports its own standards and although there are attempts to settle on some international ones, we still face the problem with the image file format. As we know our computers support a vast number of image formats – JPEG, GIF, BMP, TIFF, PNG, etc. But the mobile devices, due to their smaller operational memory and slower transfer rates, must use a very good compressed, almost noiseless format. This

format should also be supported by most mobile device manufacturers. That is why we chose to use the PNG format. Tests showed us, that this format is supported on the devices of the most famous companies – Nokia (tested with N82, E90, N73) ©, SonyEricsson (tested with k750i and P1i) ©, Motorola (Razr©), HTC (TyTN and TyTN II) ©. This should secure us wide coverage of mobile devices. Of course, if a format is supported or not, depends only on the system packages installed on the phone. The PNG format is the standard picture format on many mobile devices, so we hope that we can get maximum coverage.

The next feature for comparison is audio playback. Again, if an audio format is supported or not, depends on the manufacturer, but still all devices nowadays use the standard, well-known from MS Windows, format WAV (Hamer, 2007). There comes another big problem – a minute of WAV sound with acceptable good quality is about 10MB, which will take a lot of time to download and process and also lot of money. Course material as sound could also be a lot longer – 5 to 10 minutes or even more. That is why we offer some ‚tips' to minimize file size:

Students don't need perfect quality, unless the course is about music. Normally the human voice uses a frequency from 8000Hz to 16000Hz. So there won't be considerable change of quality if a WAV file is converted from a 44kHz sample to around 8kHz bandwidth;

Record the audio in mono format. Very few devices nowadays offer true stereo sound from their loudspeakers and stereo sound is almost not needed for speech;

The last charactersitic of a sound file is its bit rate. For high-quality sounds this is higher than 20kb/sec. For speech 7kb/sec would do perfectly well without loss of quality.

The last and maybe most interesting and interactive feature for comparison between e-learning and m-learning from technical point of view is the video playback. The 3rd Generation Project has developed a standard for video files on mobile devices – 3GP (file format is *.3gp). Every modern device should and must support this format. Resolution of a video should again not be bigger than the user's screen, so we again considered the limit of 240x320 pixels. 3gp is a container for video information. The video format underneath can follow two standards. The first one is the so called H.263, which is the default 3gp standard. It is characterized by less compression, poor quality, but easier to implement. Therefore it is supported even by older mobile devices. Sound contained in the file should be the standard AMR or AAC (Kumar, 2008).

A more modern format can be integrated in a 3gp file. This is a format developed in cooperation with Apple, which later equipped their devices with a custom implementation of it. This format is the H.264. It allows better compression without losing much of the quality. The drawback of this method is that the implementation of the parsing algorithm is heavy and cannot be implemented on every device. The H.264 format is also an extension to

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the MPEG-4 called 'Part 10' by the standardisation authorities. It is interesting to note, that this format is used also on other platforms like YouTube, Blu-Ray discs, Adobe Flash Video, etc.(Richardson, 2003). Note, that users may want to view such content on the go, where there is no free wireless network, so they have to use a 3G connection. Downloading larger files could cost more at some places, according to the data plan of the user. Therefore it is best to use lower bit rates for audio and video, and make the video screen smaller. Also consider using lower frequency for the audio track if it contains only speech.

We summarize the main points of difference:

- the observations on the user interface of the system. Users react scared at first. They really fear what it means to work with and learn from mobile devices. This is a new field in electronic learning and users, who haven't used such an approach, tend to be cautious. The first surprise comes from the small screen. Users are used to work on big, desktop computer or laptop screens, which provide enough area for displaying a lot of important information – task description, task-specific training, even references and further instructions.

- on the mobile screen however, there is only place to display ten lines of text. Learners must get used to multi-page rendering of information. On normal desktop computers, we are used to see the application menu at the top of the screen. This is not the case on mobile devices. Because the place to display important data is much smaller, this information must come first on the page. Therefore menus are placed on the bottom of the page.

- learners receive all their educational materials in traditional learning and e-learning in the form of text documents – books, leaflets, presentations, pdf documents. Coming to a new platform – the mobile, they have to change the way they accept and interpret data. As already stated it is hard to read text on small screens and other material types must be used to display data. Although we are surrounded with rich multimedia content – on TVs, in music stores, online multimedia stores, etc., we are not used to see it as an educational medium. It is hard to accept, that an audio file can contain something other than music, or a video file shows mechanics lessons instead of the latest movie from the cinema.

# 5 Skill Unit: Management

## 5.1 E-Learning Manager

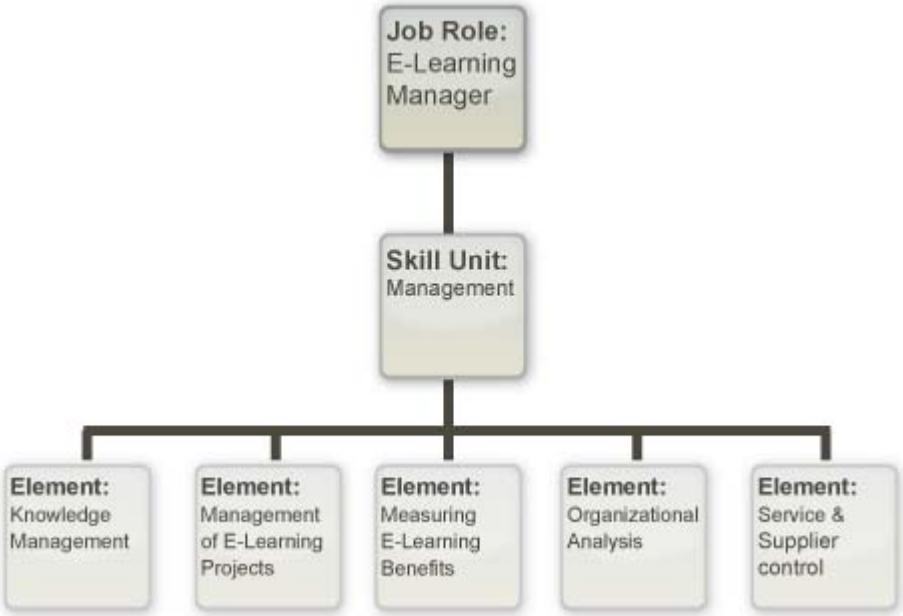
In the last ten years the technology driven focus moved towards a knowledge driven approach for innovation and improvement and since 2003 the innovation and improvement schemes moved towards assessment and measurement driven approaches, where specific

learning and improvement efforts are targeted in those areas where improvement will bring most benefits for the industry.

From the viewpoint of e-learning management, a strong emphasis should be placed on:

1. Supporting the strategic development of learning organisations, and core knowledge which multiplies benefits across the firm

2. Focusing on the proper selection and acquisition of e-learning supporting platforms.



## 5.2 Mobile Learning Manager

The aim of the unit is to give a clear vision about the methods of mLearning target group identification, analysis of their needs and constraints such as the operational environment. and to raise the awareness of new mobile technologies and its rapidly envolving market when preparing/deploying an m-learning initiative.

### U3.E1 Needs analysis

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|---|
| Before preparing a m-learning course or a m-learning application the target group and constraints such as the operational environment (mobile operating system, web browser implementation, …), interfaces to other systems, technical capacities of the devices (screen size, camera, GPS…) must be in detail analysed.<br><br>Especially in m-learning where mobile devices can be used by children or senior citizen, a regular communication and exchange with the target group must be ensured |

| | |
|---|---|
| U3.E1.PC1 | Student knows the importance of identifing the target group (stakeholders, customers) |
| U3.E1.PC2 | Student knows how to elicit needs and expectations from the target group. |
| U3.E1.PC3 | Student can analyze the needs and expectations (operation environment, constraints, interfaces) where m-earning will be used |
| U3.E1.PC4 | Student understands the needs for an effective and regular communication (feedback) with the customers/target group |

### U3.E2 Innovation and Business Management

| |
|---|
| The goal of this element is student to be aware of the innovation aspects of m-Learning management and the role of m-Learning for improving business - critical factors and benefits. |

| | |
|---|---|
| U2.E2.PC1 | Student maintains awareness of new mobile technologies, platforms and concepts |
| | Student understand the business approaches and goals of different application stores and providers |
| U2.E2.PC3 | Student understands the differences to e-learning |
| U2.E2.PC4 | Student knows how to incorporate knowledge management in m-learning |
| U2.E3.PC5 | Student manages the innovation of mobile learning services and products to improve either business or [..] goals |
| U2.E3.PC6 | Student is aware of the critical success factors in m-learning |

## 5.3 Comparison

Both Units, in the e-learning and m-learning manager deal with management issues. The major differences are:

- **Element U3.E1:** There is no element in the e-learning skill set dealing with the needs analysis and identification of the target group. In the m-learning skill set where mobile devices can be used by children or senior citizen, a regular communication and exchange with the target group should be ensured.

- **U2.E2.PC1:** When starting an m-learning initiative (as a learning course or based on an application), the m-learning manager will face a rapidly growing and fast changing mobile market. It is crucial that he/she maintains a certain awareness of new mobile devices (e.g. media tablets) and new operating systems (e.g. Windows Phone 7.5) coming to the market, new network technologies (e.g. 4G networks ) being planed and the constant changes and uncertainties in the mobile market (e.g. partnership between Microsoft and Nokia). All this factors can influence your m-learning initiative, either supporting it (e.g. higher bandwidth in 4G networks required for augmented reality) or hinder your initiative (e.g. your m-learning application was developed for a platform which wont be supported anymore in the future).
    - As an m-learning manager you should evaluate the following questions before starting or planning your m-learning initiative:
    - What is the next generation of mobile devices, what key characteristics and which form factors will gain the greatest acceptance
    - How and which operating system and network/connectivity technologies will influence the mobile market in the future?
    - Which model will be the most successful for delivering and offering m-learning to mobile devices?
    - Which technologies will support/influence m-learning?

  **U2.E2.PC1 is introduced only in the m-learning manager skill set and training materials**

- **U2.E2.PC2:** The application store introduced a new business model for developers to offer/sell their applications. The developers have a new distribution channel to create and sell applications at lower price than it was traditionally possible. The two biggest application stores (Apples Iphone Store and Androids market) are compared in the training materials.

  **In the e-learning world there are no application stores and therefore U2.E2.PC2 is not covered in the e-learning manager skill set and training materials**

- **U2.E2.PC3**: Argue your m-Learning initiative by trying to support the learning process where traditional or e-learning is not possible.
  **The e-learning manager is not dealing with mobile learning**

- **U2.E2.PC4:** If you have a knowledge management process in your company, link it with your m-learning initiative to support the knowledge transport and share the knowledge company wide.
  **In the m-learning skill set and training materials knowledge management is mentioned and shortly described where the e-learning manager has a separate element dedicated to knowledge management.**

- **U2.E3.PC5:** To start a m-Learning initiative in a company make sure that it support the existing business and innovation strategy and it is aligned with the business goals of the company. Only this way you will be able to convince the (top) management to support your m-Learning initiative. As an m-Learning Manager you will need to provide answers to typical management questions like:

  - *What existing problems will m-Learning solve?*
  - *Why do we need m-leaning, isn't e-learning enough?*
  - *What is the benefit for our company?*
  - *When do we have a return of investment?*
  - *How does the solution fit into the business and innovation strategy of the company?*

  However, benefits can't be always quantified in Euro (ROI - Return of invest scenario) they can increase also the knowledge and skills of your employees, motivate them, challenge etc.

  If your core business is not in offering trainings (training center, VET institution etc.) or mobile learning applications, argue your m-Learning initiative by trying to support the learning process where traditional or e-learning is not possible.
  For example: The use of mobile learning in the production and manufacturing plants. The workers there have usually no space for a PC or notebook but require often information available only over the computer. By using a mobile device they could easily access a knowledge database with known problems and solutions for particular tools and machines. The built-in camera could be used to scan the barcode and this way receive particular information for the current configuration of a machine or guidance and help how to access parts of the machine or robot. Newcomers and

apprentices could also get easily interactive help and guidance how to use the tools, machine or program the robot.

**Both e-learning and m-learning must show/return some benefit if used in the company. The main difference is in the business model when using native apps instead of web learning solutions. Also in the e-learning manager this topics is covered in three different learning elements.**

- **U2.E3.PC6:** Often m-Learning is considered as e-learning on your smartphone, content which was prepared for e-learning is accessed over the smartphone and presented as m-Learning. Learning over mobile devices has a wide range of new learning opportunities and possibilities. m-Learning content can be offered as
  - Native application which is specifically designed to run on a device's operating system (and hardware). The drawback of this approach is that only a specific OS can be targeted.
  - As a web application, accessed through the mobile Web Browser. HTML5 is currently the standard that works reliable across mobile devices (Apple iOS, Google Android, …). The drawback of this approach is that phones specific functions like GPS, camera etc. can't be accessed or controlled.

**Both e-learning and m-learning have success factors but they differ as mobile learning is much more dependent on the hardware, operating system and applications.**

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