

Mobivet 2.0

VET Teachers Manual

Mobile Web 2.0 Tools and applications
in online training and tutoring

Final v.1.7



Centrul de Training European in collaboration with
Infoart, e-Training Solutions, AcrossLimits, Slovak University of
Agriculture in Nitra, University of Patras, Grupo Echevarría &
Tecnomedia



MobIVET2.0



MOBIVET2.0 Project
Mobile Web 2.0 e-Training
for Vocational Education Trainers
(LLP/LDV/MT/TOI/02/2012)

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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1. Introduction

This mobile course, available on the Mobile Learning Platform, is based on the study materials and the report produced in WP2 of the MOBIVET project. Our aim is to fill the online gap between the self-guided learners and VET trainers. As the project progresses, we will have further outcomes that both teachers and students can make full use of.

The content of this material represents a training resource that will focus on e-Learning, m-Learning, Web2.0 technologies and creating online courses. e-Learning Technologies use interactive multimedia (the simultaneous transmission via computer screens of text, graphics, computer software, animation, video, voice-over and music in stereo sound, as well as virtual reality worlds). The use of e-Learning Technologies allows user- interaction with controlling computer software programs and may be used effectively in education and training. Sophisticated computer hardware and software are available for the production of high quality flexible training materials at low cost.

Interactive teaching materials enhance the learning process; are enjoyable; and, using wireless networks, may be used anywhere, at any time and by anyone. An individual has the freedom to learn at one's own pace, to select the appropriate level and to pick the times for study, so as to be able to study combine it with working traveling or whilst at home work or at home or in travel. The use of this dissemination medium, if prepared carefully and comprehensively can eliminate the need for face-to-face workshops, seminars, conferences, site visits and attendance at technical fairs, saving time, travel, and extra costs whilst also reducing the release of polluting emissions in air.

This resource will broaden the e-skills and competencies of European VET practitioners (teachers, trainers and tutors) and help develop adequate online training practices for effective distant tutoring of lifelong self-learning activities.

2. e-Learning

2.1. e-Learning technologies

E-Learning is a rather new phenomenon, however it is rapidly and dynamically evolving. The power and flexibility of technologies and tools available has extended the possibility of taking e-Learning to greater heights. Nowadays, e-Learning is used in schools, universities, businesses and also for personal development. One can openly say that e-Learning is now being used to practically teach anything, from languages to even other social and cultural skills. Trends in e-Learning New emerging e-Learning technologies are re-shaping how teaching and learning is achieved. Undoubtedly, technology can help us make learning more engaging and effective, however this can also be a disruptor if not wisely implemented. The top technologies that are currently trending in the world of e-Learning include: Big Data, API's, TIN CAN API, HTML5, Responsive e-Learning Design, Wearable Technology, Videos, Digital Textbooks, 3D Printing, Mobile Learning and cloud computing. Some of the above are already being used by teachers nowadays in schools and by training educators in large organisations, even though they might not have any knowledge in e-Learning. In this section, we will be discussing the most important trends in further depth.

The options available to the instructors and trainers have changed substantially in the last 15-20 years. On the formal learning side, traditional classroom training has transitioned to online e-learning and further into mobile delivery modes. Technology has moved from overhead projectors to PowerPoint displays and onward to Web-based, multiplayer simulations and trusted knowledge domains. More importantly, the informal learning universe has expanded substantially. Web 2.0 has enabled self-directed and social learning to be readily available at the learners' convenience, with mobile devices.

The new Learning 2.0 combines both formal and informal learning. In their book, "The Career Architect Development Planner", Michael M. Lombardo and Robert W. Eichinger describe the 70:20:10 approach to learning (http://en.wikipedia.org/wiki/70/20/10_Model). The 70:20:10 model emphasizes that formal learning is only a small portion (10 percent) of the learning that makes an organization effective. On the other hand, informal learning consists of two parts: 70 percent on-the-job experiences, tasks and problem solving, and 20 percent coaching feedback and examples.

Self-directed learning abandons the traditional "push" environment where learning is doled out by the organization according to a set curriculum at a pre-specified moment in time. Instead, learners embrace a "pull" environment, which is facilitated by technologies like on-demand e-Learning, Web portals and mobile devices; and they pull what they need when they need it. The on-demand availability of knowledge entirely transforms the capabilities and competitiveness of an organization, because employees solve their own problems, and those of their clients, efficiently.

The new e-Learning environment blurs the lines between work and learning. The new approach integrates learning into work using a variety of tools and processes such as job aids, coaching, social learning, knowledge portals, stretch assignments and performance-support systems. As learning modalities change, so do learning measurement techniques.

Dr. Donald Kirkpatrick and Dr. Jack Phillips (http://en.wikipedia.org/wiki/Donald_Kirkpatrick) offered viable methods for assessing the impact of formal training interventions on learning, application and individual performance. In the traditional evaluation model, measurement revolves around the individual and the learning intervention. The learner provides feedback about the course, and then indicates whether training will have an impact on performance or not. A follow-up evaluation can confirm the training's impact on performance.

Knowledge Advisors (<http://knowledgeadvisors.com>) offers a scalable evaluation system called "Metrics That Matter," which is capable of measuring both formal and informal learning. Knowledge and skill acquisition are no longer limited to formal learning events. The universe of learning now has limitless possibilities. In an informal learning environment, learning happens opportunistically at any moment and in a variety of ways.

The performance management approach focuses on measuring performance at a macro-level — at the level where data shows up in scorecards and dashboards - as opposed to the micro-level of post-course assessments. It does not matter whether an individual, team or group gained knowledge and skills from corporate training, on-the-job experience, coaching, team participation or university education. The performance management approach simply focuses on whether individuals have access to the resources they need to perform the task at the optimum level. From whence they pull the knowledge and skills is irrelevant; the only point that is relevant is whether their source can be improved in any way.

The two critical measurable aspects of performance are:

- 1) Capability — the readiness of an individual or group to perform the work;
- 2) Capacity — the availability of individuals or groups within the organization to accomplish the work.

In the performance management approach, if an individual or group is capable, but not available, the organization does not have the capacity to perform the work. An organization is ready to achieve its business goals when it has sufficient and capable human resources that are available to do the work. In this way, the performance management approach combines competitiveness with workforce planning. Toward that end, organizational systems are required to measure, monitor and manage the resources.

As learning and development (L&D) managers use more multichannel deployment approaches, measurement methods will also need to be adapted. The migration toward Learning 2.0 means that formal "push" learning will be less prevalent, resulting in a rise of informal "pull" learning. Measurement practices must adapt to these changes.

In the long run, performance is the key. L&D will benefit if it can use either or both approaches to show how L&D supports individual performance, aligns with business goals and improves organizational performance. In this way, L&D becomes an agent of change as opposed to a business cost center.

2.2. Trends in e-Learning

The new e-Learning environment blurs the lines between work and learning. The new approach integrates learning into work using a variety of tools and processes such as job aids, coaching, social learning, knowledge portals, stretch assignments and performance-support systems. As learning modalities change, so do learning measurement techniques. Dr. Donald Kirkpatrick and Dr. Jack Phillips (http://en.wikipedia.org/wiki/Donald_Kirkpatrick) offered viable methods for assessing the impact of formal training interventions on learning, application and individual performance. In the traditional evaluation model, measurement revolves around the individual and the learning intervention. The learner provides feedback about the course, and then indicates whether training will have an impact on performance or not. A follow-up evaluation can confirm the training's impact on performance. Knowledge Advisors (<http://knowledgeadvisors.com>) offers a scalable evaluation system called "Metrics That Matter," which is capable of measuring both formal and informal learning. Knowledge and skill acquisition are no longer limited to formal learning events. The universe of learning now has limitless possibilities. In an informal learning environment, learning happens opportunistically at any moment and in a variety of ways. The performance management approach focuses on measuring performance at a macro-level — at the level where data shows up in scorecards and dashboards — as opposed to the micro- level of post-course assessments.

When an organization has capable people resources that are available to do the work, it is ready to achieve its business goals. In this way, the performance management approach combines readiness and workforce planning. Toward that end, organizational systems are required to measure, monitor and manage resources. As learning and development (L&D) managers use more multichannel deployment approaches, measurement methods will also need to adapt.

Learning Management Systems (LMSs) Vocational education and training in the secondary vocational schools aims to develop knowledge, skills, jobs' habits and other competences of students acquired during the lower secondary education. The final effect of a graduation is the qualification, which enables them to engage in the working process as a skilled workforce or continue their studies. It is important to ensure that the workforce is developing the necessary skills, with a particular emphasis on the development of small and medium enterprises and on the critical investments that are essential for the economic development. For the successful entry of graduates into the labour market, the adequate education and training must be achieved in an orderly fashion and the active participation of employers is required to address the scope of its objectives, content and structure.

This trend must be adapted to the level and scope of the educational activities and be fully customized to the system of vocational education and training. In the current situation there is a loss of interest in education and training amongst young people, indicated by the schools as well as employers. The actual demographic progress of the population has made the situation worse-off. One way of increasing the interest of young people in vocational education and training is by making the education process more attractive. The traditional book/textbook paradigm of learning should be replaced by a modern Web 2.0 way of

learning, where the learning activities are substituted by social activities. In this new multi-device Learning world that we live in, learners spend most of their time in front of multiple screens – a computer, laptop, smart phone, tablet, etc. to learn or to perform other learning-related tasks/activities.

They move between these different types of devices in sequence (called ‘Sequential Screening’) or use them simultaneously (called ‘Simultaneous Screening’). It is interesting to note that, as per Google’s Report ‘The New Multi-screen World’, 90% of our media interactions are screen based. This scenario makes it very challenging for learning designers to ensure that the learning solutions they design work on all these devices with different screen sizes, shapes, resolutions, or Operating Systems. Responsive e-Learning Design (RED) is the solution to address this challenge. It is the technology that helps us design and deliver learning solutions that work across a broad range of devices smoothly. It follows and adapts the standards laid out by Responsive Web Design (RWD).

Mobile learning exploits both handheld computers (laptops, notebooks, etc.) and other mobile devices such as smart phones and tablets that draw on the same set of functionalities. Mobile learning using handheld computers and mobiles devices is relatively immature in terms of both its technologies and its pedagogies, but is developing rapidly. It draws on the theory and practice of pedagogies used in blended learning involving technology enhanced learning (TEL) and instructor-led-training (ILT) used in the classroom.

Universal Instructional Design Principles for e- and Mobile Learning

In [1] the author presents 8 Universal Instructional Design (UID) principles particularly useful in online learning and education:

1. equitable use
2. flexible use
3. simple and intuitive
4. perceptible information
5. tolerance for error
6. low physical and technical effort
7. community of learners and support
8. instructional climate.

Although not specifically developed for m-Learning environments, these are equally relevant to them. The relevance of almost all of these principles for designing inclusive online learning is further increased when designing inclusive m-Learning.

In [3] the author defines 6 more design principles particularly relevant to mobile learning:

- the multimedia principle

- the modality principle
- the contiguity principle
- the redundancy principle
- the coherence principle, and
- the personalization principle.

“Responsive” Mobile Learning

We are living in a multi-device digital communication world. The growth of the Internet has enabled the development of devices such as smartphones, tablets and laptops and consequently, the educators have to deliver learning solutions that work on all devices. This is not as simple as a desktop solution or a mobile solution, but what is required is a multi-device solution.

Responsive m-Learning is based on the standards and approach behind responsive web design (RWD). RWD was first used by Ethan Marcotte in his article in "A List Apart" in 2011.

In essence RWD means a web page designed to work on multiple devices by using fluid proportion based grids. This means according to Wikipedia that “users across a broad range of devices and browsers will have access to a single source of content” (http://en.wikipedia.org/wiki/Responsive_web_design).

Responsive websites and pages dynamically adjust themselves according to the device on which they are being viewed. Today, many good examples which provide optimal online experience on any device can be seen on the Internet. Desktops get a full-blown interface with videos, large images, and animations. Smartphones get a simplified website that runs fast without the bells and whistles. Tablets and netbooks get something in between.

Responsive web design enables web designers to “embrace the flexibility inherent to the Web, without surrendering the control we require as designers” [Ethan Marcotte in his book “Responsive Web Design”].

Luckily the current developments in HTML5 – the web-based content design language - (<http://www.w3.org/TR/html5/>) mean the instructional design teams can now develop a single mobile learning module which will work on all devices - desktop and mobile (Figure1).



Responsive Web Design for Mobile Learning

The learning professionals can leverage the flexibility inherent in the responsive design of the content, imagery and interactivity to drive learning and performance improvements. This can be done with a change in the instructional design philosophy toward online content and interactive design.

Instead of designing a fixed layout mobile version and a desktop version of a piece of learning content, the instructional designers need to design a version intended to work on a range of devices. The presentation of the content in a browser on a specific device will respond to the exact size of the device screen. Therefore, when a new device is launched which is slightly larger or smaller than needed, the content will respond without having to be rebuilt or customized.

The strategic question that training professionals need to ask is not whether to apply responsive design to learning solutions. Mobile learning is here to stay. They need to ask to what degree their learning solutions will reflect responsive design. Whilst it's easy to manipulate text across devices, elements such as forms or complex multimedia interactions may be more device-dependent. One of the fundamental elements of responsive design is creating designs contextually relevant to the devices on which they run. If VET trainers leverage responsive design for training solutions, they also need to create designs relevant to the intended use of the learning or support program.

Responsive design is an emerging practice, and best practices are still being developed. Applying responsive design to training might require more of a hybrid approach. Some solutions will be more appropriate for a fully responsive design than others. These strategies, good practices and the next developments will help learning professionals craft a sustainable approach to providing their learners with the information, instruction and support they need, where they need it, on all their devices.

2.3. Measuring e-Learning

A vital piece of any training should be evaluating the effectiveness of the instruction. Knowing whether or not the students understood the material presented is valuable information, and is relatively easy to gather. Donald Kirkpatrick, (past president of the American Society for

Training & Development (ASTD - <http://www.astd.org>), suggests four levels of evaluation that should take place as part of each training:

- Reaction
- Learning
- Behaviour
- Results

Reaction – How Did the Students Feel?

Reaction measures how the students felt about the training on an “environment” level.

- Was the Virtual Learning Environment (or LMS software) comfortable?
- Was the training content and (online) presenter interesting?
- Is the material applicable?

The most common type of question used at the reaction level is rating scales. The feedback the trainer receives will enable him/her to understand how the training was delivered to the online audience and how to better plan for future training sessions. If a training session was not well received, there are usually simple ways to fix it. For example, if the audience didn't like the learning environment or presentation style, such can be tweaked by the trainer for next time.

Learning – Did the Trainer Meet His/Her Educational Objectives?

The second level goes a bit deeper to assess whether or not the learning objectives were met. Each trainer wants to make sure the audience understood and benefited from the information presented.

It is helpful for each trainer to design these questions when he/she is planning the content of the training and to determine the desired objectives. The trainers should be creative in the ways they assess their learning objectives, for instance by asking the participants to answer a question before every break. They might want students to summarise the information each day before going home or incorporate questions into a (learning) game. Evaluating learning objectives as the training progresses allows the presenter to immediately gauge the level of understanding and adjust accordingly.

Behaviour - Has the Training Impacted How the Students Act?

The behaviour level of assessment goes deeper and measures how the audience applies the information they have received over time. This can be assessed through follow up interviews, observation or performance reviews. The trainer should keep in mind that in order for behaviour to change, conditions must be favourable within the organization in order to support such change. If a manager or boss is not supportive of or receptive to change, then an employee (learner) may not feel comfortable or may not be allowed to apply what they have learned.

Results – Did Anything Change?

Finally, a trainer has to measure results. This is usually the most challenging level of assessment and the most far reaching. Examples of outcomes at this level might include increased productivity, sales, higher employee retention, or reduced waste that resulted from employees participating in a specific training. Measuring results is a long term commitment that can be beneficial but is not always practical for every type of training.

Assessment is Critical, Don't Overlook It!

Kirkpatrick's four-part model (<https://www.google.bg/search?q=donald+kirkpatrick+model&biw=1920&bih=961&tbm=isch&tbo=u&source=univ&sa=X&ei=-f7kUomPEqGGywoZkICYBQ&ved=0CEYQsAQ>) may not work perfectly for each subject, but at the very minimum, reaction and learning should be assessed at every training phase. After all, if a learning organization (e.g. company) spends time and money the management team wants to ensure that it was effective. When a trainer is intentional in evaluating the training, he/she will be able to see areas of improvement and incorporate them into the training program.

Course Evaluations, Powered by Learning Management System

Each trainer should know that the learning management has an evaluation component. No learning/training management system (LMS) would be complete without it. In just one click a trainer can generate an evaluation form (customised to his/her specifications) for every course he/she delivers. They can easily convert to PDF and distribute these evaluations, then record the feedback within LMS for future reference and actionable information. Both trainers and students can track how well they were performing against each course they deliver/attend.

e-Learning is dynamically evolving, thanks to the incredible achievements in highly powerful and intelligent tools and technologies that are rapidly emerging. These developments have expanded the possibilities of taking e-Learning to great heights more than ever. These advancements that have the potential to not just play a pivotal role, but drastically transform the learning domain are termed 'disruptive' due to the following reasons:

- They fundamentally change the conventional landscape;
- They produce something new and more efficient.

"Information society" is an expression defining evolutionary period of mankind which can be reached through the usage of new information and communication technologies. In this context, e – Learning or online Learning are terms used for the field of education.

The following are technology tools used for distance and e-Learning in various school and colleges:

- Course Management Systems
- Online Writing Tutorial Service
- Streaming Audio and Video
- Testing and Quizzing Tools
- Presentation Tools
- Discussion Tools

Classical forms of training (Figure 2) are carried out in time determined in advance. It requires physical participation of students in lecture halls, classrooms or laboratories. This causes a whole scale of problems – insufficient spatial possibilities of the university, high workloads of teachers, outdated study materials as well as time and financial difficulty for their innovation. A significant decrease of quality of provided education is a result of such study organisation.



Figure 2. Traditional form of education

(<http://cevachandigarh.blogspot.sk/2012/12/normal-0-false-false-false-en-us-x-none.html>)

There was an intention of using information and communication technologies in a teaching process since their origin in the middle of the last century. However, their wider implementation started in the eighties of the last century after the launch of PCs when the first didactic programs, allowing the self-study, were created.

The development of the internet in the nineties and its ability to bring new components of management and mutual communication meant a significant turn in "distance learning". Therefore, the e-Learning is called online learning, as it represents studying in the internet virtual environment.

The Virtual classroom exists anywhere and anytime, an internet connection is the only requirement for its existence. Most self-study materials are distributed through the internet and discussion groups where students can consult their study problems with colleagues,

tutors or other experts (Figure 2) through electronic communication (e – mail, chat or virtual learning environment – VLE) are part of virtual classrooms. The transfer of information in any form (sound, sight, text, data), collection, processing, classification, saving and presentation of information are advantages of information and communication technologies.

Unambiguous advantages of online learning are:

- Memorising all the available information is, due to its enormous number, not the main objective of training process; it is substituted by the ability to search information and the will to participate in the lifelong learning.
- Making the subject matter available through the ICT technologies (mainly multimedia courses) and interactive studying improves the quality and attractiveness of learning and allows students to change the passive form of receiving information into an active one.
- Online learning improves the mobility of students and thus supports the ECVET and ECTS systems.

Online learning is ensured by web technologies and it is provided in the complex virtual environment which allows:

- studying through interactive study materials
- electronic communication with classmates and teachers
- monitoring of work and evaluation of students
- management and administration of teaching process

There are further forms of training within the online learning:

- Web Based Training (WBT) represents studying through computer networks such as the Internet or Intranet. It is based on information and database systems and training courses connecting forms of lecturing through texts, animations, sound records, video and electronic communication. Information systems allow for the simulation and modelling of various situations while the database systems coordinate and evaluate the teaching progress. Support of tutors or managed discussion groups might be also involved.
- Computer Based Training (CBT) is a form of training involving study programs – multimedia training courses. It is especially fit for the blended learning where students partially have to rely on the self-study. There can be a simple CBT application in a form of text, graphics or audio integrated into reference manuals or a complex CBT application in a form of complex e-Learning course. Feedback of the application is provided through the program and it allows for an evaluation of answers and decisions on further training activities to be achieved. The CBT can be divided into several fields:
 - CAI – Computer Aided Instruction
 - CAT – Computer Aided Testing

- CAL – Computer Aided Learning
- Internet Based Training (IBT) is often considered to be the WBT, however, it may not necessarily use the web, http and html technologies. Training is carried out mainly through the TCP/IP transfer protocols (e – mail, news group, etc.).
- Distance learning is a specific form of training usable for most of the training programmes from short courses up to accredited university learning. Besides traditional training materials, a great emphasis is put on materials available through the internet. To a large degree, distance learning uses CBT methods and ICT devices and methods creating virtual classrooms.

Implementation of online learning methods within the traditional training process seems to be very useful because it uses a combination of various resources, video recordings, computer simulations, internet studying, multimedia games, group discussions through internet and many other similar learning methods that make the learning process attractive, respecting individual possibilities and characters of students. However, this open and creative learning also requires a creative approach from teachers, as in addition to their personality, the student is motivated by the learning environment, the learning management and the learning organisation, too. Online learning is not only an effective method for gaining knowledge; it also provides students with the possibility to learn how to adapt in the world of information, and teaches them about the selection of information and its' sorting, processing and evaluation.

2.4. Learning management systems

Online learning – Frequently Asked Questions

What is the difference between e-Learning and traditional forms of learning? Comparison of both forms is in Table 1.

Traditional forms	Online learning
Teacher is a key person	Student is a key person
Passive form of learning	Active form of learning
Teacher “gives” knowledge	Teacher “accompanies” student gaining knowledge
Technologies can be used in educational process; however, they play no key role.	Training is based on technologies helping the student to develop knowledge and to search for own solutions.
Various electronic recording media can be used, however, the emphasis is put on the verbal transfer of knowledge with the support of written notices.	Technologies allow teachers to use various information and communication technologies intended for the transfer and processing of information.

Table 1. Comparison of traditional learning and online learning

When is the online learning appropriate?

Training institution and the student have the necessary hardware and software (multimedia PCs and relevant software) and an internet connection.

- The student has sufficient motivation to study.
- The student has no time (option, will...) to participate in the traditional training process.
- Traditional form of training (verbal transfer of knowledge) is not suitable for the student.

What technologies are used in the online learning?

e-Learning can benefit from a wide range of technologies that can be divided into two groups - transmission electronic media and interactive tools (Table 2), the use of which can be combined with each other, respectively it is possible to use only some of them.

Transmission media	Interactive tools
Printed materials (traditional textbooks and schoolbooks)	Asynchronous (e-mail, list servers, web discussion forums and groups)
Audio (audio stream, audio cassettes)	Synchronous (chat, shared screens and whiteboards, videoconferences)
Video (video stream, video tapes, DVD, TV transmission)	
Data (www, LMS, CMS, online tests, doc., .pdf., .ppt. files...)	

Table 2. Technologies used in e-Learning

What are the methods of training materials distribution?

Electronic training materials can be distributed either online or offline. The online form is based on the distribution of individual courses and training materials through the internet while the offline form is based on the distribution through CD – ROMs, respectively other storage media. Some training forms (such as distance learning) use traditional “paper” training media, too. Online learning tools are:

- Printed media (traditional textbooks and schoolbooks),
- electronic data (various files, LMS a CMS systems),
- audio and video recordings (audio a video streams, satellite broadcast),
- electronic testing and feedback (auto tests, LMS systems),
- synchronous communication (chat, videoconference, teleconference),
- asynchronous communication (e-mail, discussion forums, web-blog).

How can the quality of training be improved through using technologies?

Online learning focuses on the student and his/her training. Training quality improvement can be reached through the:

- better quality of developed courses
- simple updating of courses
- students’ independent search for knowledge (the teacher does not “serve” all the necessary information)
- continuously updating the multimedia materials in the courses by including references to external materials, as the Internet significantly improved the availability of information sources (with attention to respecting the copyright rights and verifying the

- scientific correctness)
- practice of mutual communication and cooperation through asynchronous and synchronous communication by the students

The abilities of the ICT and online learning tools are well known and there are no limits in the field of their technical implementation. Their effective implementation in a training process, current educational system and its methods, a lack of knowledge of teachers in the field of its implementation, insufficient information and communication infrastructure and initial financial costs seem to be the limiting factors. It is impossible to strictly keep the current way of training. If the implementation of online learning methods has to bring some positive changes, it is necessary to carry out some essential changes:

- Change in the way of teaching. The traditional training model is based on the reproduction of the teacher's knowledge to students. The student gains a huge amount of encyclopedia knowledge but he is not able to use it in practice effectively. The current pace of knowledge base development causes that the knowledge gained this way does not reflect the real situation. Teaching students how to get the necessary information when they really need it should be the role of training.
- Change in the way of knowledge presentation. Existing ICT tools enable the creation of multimedia textbooks and electronic courses which allow students to better absorb the subject matter. At the same time they allow teachers to easily update the information they present. Multimedia textbooks and electronic courses might be available through the internet. This will allow students to gain the updated training contents from several sources from any place and at any time. Such access to training materials will further promote lifelong learning without interrupting people's work duties. This kind of training is necessary in radically changing labour conditions. At the same time, the number of students using developed courses and thus enhancing their sphere of activities will increase, together with training effectiveness improvement.
- Availability of electronic training materials and multimedia courses. Today, the Internet connection is a necessary standard in training institutions. It allows access of students to electronic courses and help them gain the necessary information from various sources at any time and from any place. Online learning significantly influences the structure of the learning population by increasing the rate of studying employees.
- The implementation of e-Learning into the teaching process transforms the position of the teacher. Till recent time, the teacher used to create the information content of the course (subject, lecture...), lecture and create didactic aids. However, the creation of multimedia courses for new training forms requires a tight cooperation of several experts – a teacher, a graphic designer, a programmer, an analyst, etc.
- Last but not least, the responsibility for acquiring knowledge is shifted from the teacher to the students themselves. In traditional forms, a teacher is the first person holding the responsibility for students' knowledge. On the other hand, a student is the only person responsible for his online learning.

A constructive teaching method is appropriate for this kind of approach. It starts from the latest knowledge on functions of the human brain and it also respects future requests on training process. Its main principles are:

- development of own motivation
- specific individual work, projects
- involving associates into cooperation
- searching associations between various knowledge and subjects
- learning from one's own mistakes
- change of teacher's role within the teaching process from interpreter to advisor.

3. m-Learning

3.1. Technologies & Tools for m-Learning

Mobile 2.0 is considered to be the combination of the Web 2.0 philosophy with the mobile devices. Firstly, Mobile 2.0 is bringing the Web 2.0 to the user's mobile device. However, Mobile 2.0 goes further in the adaptation of web content to the user's mobile device and also the personalization of the content to the user's characteristics. Thus, a key point to Mobile 2.0 is leveraging Web 2.0 to take advantage of the strengths of our mobile devices. For example, instead of just giving users applications such as Facebook and Last.FM on their mobile device, Mobile 2.0 should give users applications (e.g. Facebook, etc.) that recognizes the location of the users at that moment, whether they have access to a camera and whether they can be reached immediately with a text or multimedia message. Mobile WEB2.0 applications that are delivered to mobile devices need to be adapted to the characteristics of the mobile devices. Also, the user needs to have installed a web browser on his mobile device that is capable of handling AJAX, Flash, and the various technologies used to bring Web 2.0 content. When an application or a service is delivered to a mobile device, several aspects should be taken into account. The basic aspects are presented below.

Smaller screen and different input. Mobile devices have much smaller screens and users have a different way of interacting with them. Instead of a full-sized keyboard and mouse, mobile devices have keypads, mini-keyboards and touch screens. The strengths of mobile devices are that they are always with us, and always switched on.

Images and Video and GPS. Today, almost all mobile devices are equipped with camera and are capable of capturing images and creating video files. Moreover, many also come with GPS technology, which should lead to localized content based on where users are located. Mobile 2.0 should recognize and utilize these capabilities for the best advantage of the users.

So, what is Mobile 2.0? A good definition of Mobile 2.0 describes it as a combination of Web 2.0 with the mobile device. Moreover, Mobile 2.0 is about leveraging social media with the advantages that come with the special capabilities of our devices like camera and GPS and thus Mobile 2.0 is about being smart by recognizing where users are and showing relevant information catered to the user. In this direction, Mobile 2.0 necessitates the utilization of special capabilities of mobile devices such as cameras and GPS.

There are many definitions used to describe learning delivered on mobile devices. TrainingIndustry.com (<http://www.trainingindustry.com>) defines it as "A type of learning that occurs when the learner is not at a fixed or pre-determined location. It is also considered a type of learning that occurs on a mobile device. The objective of Mobile learning is to provide access to knowledge based content anywhere, at any time". Mobile learning allows learners to learn at their own convenience and pace.

Today, people use mobile devices more than their desktop or laptop computers, and the use of mobile devices continues to increase in the workplace. New findings from leading hi-tech analysts Juniper Research (<http://www.juniperresearch.com>) has revealed that the retail revenue from smart wearable devices, including smart watches and glasses, will reach 19 billion US dollars by 2018 compared with 1.4 billion USD in 2013. Revenues will be driven by high price points for these devices allied to their anticipated strong market demand. This increased usage will require learning organizations to provide content for mobile devices. Therefore, in the near future, it will no longer be enough to have “mobile-friendly” content. The new standard will focus on having content that has been purpose-built for mobile platforms.

Mobile device manufacturers are steadily improving on the size, weight, and capabilities of devices. In doing so, there are a tremendous number of opportunities for business intelligence (BI) and process interactions using these devices. Instead of users interacting with static (and in many cases old) content, they are able to work with real-time content. While the addition and optimization of onboard sensors and increasingly higher quality displays on mobile devices have greatly benefitted the individual users, they can benefit the enterprise as well. As users are working and collaborating through their daily interactions, mobile devices are transparently collecting and leaving data traces. It is possible to analyze this information, and in doing so, meaningful process optimization and risk reduction methodologies can be implemented and more closely monitored.

In order to achieve the goal of having content available for more devices in the “Anywhere, Anytime Learning”, organizations will have to shift from a “PC strategy” to a “Mobile First strategy,” meaning that any content, website, or application presented to the end user has to be purpose-built for mobile devices. This includes not only tailoring the content for the mobile device, but also leveraging the unique features of the devices in order to create more engaging, compelling, and useful interactions with viewers/learners.

Mobile Learning Principles and Implications

Several years ago the big question was “Should we do mobile learning (m-Learning)?” Today the question is “How should we do mobile learning?” The good news is that many of the skills and tools necessary for creating excellent e-Learning have also proven valuable for creating excellent m-Learning, but there are new principles and skills the mobile learning educators and designers need to adopt and master, too.

TeachThought.com defines 12 principles of mobile learning (<http://www.teachthought.com/technology/12-principles-of-mobile-learning>):

1. Access (any time, any place)
2. Learning metrics
3. Cloud (content and learning delivery via cloud)
4. Transparent

5. Play (incl. serious games and gamification)
6. Asynchronous learning mode
7. Self-Actuated (personalized: just in time, just enough, just for me)
8. Diverse e-pedagogies
9. Curation/learning management
10. Blending different learning modes
11. Always-On
12. Authentic

According to Futurelab (<http://www2.futurelab.org.uk>) implications of mobile learning for learners, teachers and curriculum developers are as follow:

- Context - gathering and utilizing contextual information may clash with the learner's wish for anonymity and privacy
- Mobility - the ability to link to activities in the outside world also provides students with the capability to 'escape' the classroom and engage in activities that do not correspond with either the teacher's agenda or the curriculum
- Learning over time - effective tools are needed for the recording, organization and retrieval of mobile learning experiences
- Informality - students may abandon their use of certain technologies if they perceive their social networks to be under attack
- Ownership - students want to own and control their personal technology, but this presents a challenge when they bring it in to the classroom (Bring Your Own Device - BYOD).

The challenge for educators and designers, however, is to understand and explore how best they might use these new approaches and principles to support learning. Mobile Learning offers the flexibility to learn across contexts using a wide range of digital devices. As per most of the market research reports, mobile learning is poised to grow at an incredible rate due to the following factors:

- Higher sales (growth) rates of smart phones and tablets the world over
- Higher adoption rates of smart phones and tablets for business related activities in the work place

Smart Phones and tablets are poised to take a greater role in the following types of learning in organizations:

- Smart Phones: Just-in time learning / performance support
- Tablets: Extended learning

In short, this is another disruptive technology that is all set to re-shape the learning and education landscape. Over the past ten years mobile learning has grown from a minor research interest to a set of significant projects in schools, workplaces, museums, cities and rural areas around the world. The m-Learning community is still fragmented, with different national perspectives, differences between academia and industry, and between the school, higher education and lifelong learning sectors.

Current areas of growth include:

- Testing, surveys, job aids and just-in-time (J.I.T.) learning
- Location-based and contextual learning
- Social-networked mobile learning
- Mobile educational gaming
- Delivering m-Learning to cellular phones using two way SMS messaging and voice-based CellCasting (podcasting to phones with interactive assessments)
- Cloud computer file storage

According to a report by Ambient Insight in 2008, "the US market for Mobile Learning products and services is growing at a five-year compound annual growth rate (CAGR) of 21.7% and revenues reached \$538 million in 2007. The data indicates that the demand is relatively immune from the recession." The findings of the report indicate that the largest demand throughout the forecast period is for custom development services, content conversion, and media services and that the healthcare sector accounts for 20% of the total US market for mobile learning.

While many think of mobile learning as delivering e-Learning on small form factor devices, or often referred to as e-Learning "lite", it has the potential to do much more than deliver courses, or parts of courses. It includes the use of mobile/handheld devices to perform any of the following:

- Deliver education materials and promote learning
- Faster communications and collaboration
- Conduct assessments and evaluations
- Provide access to performance support and knowledge
- Capture evidence of learning activity

Today, any number of portable devices can quickly and easily deliver and support these functions. Cell phones or smartphones, multi-game devices, personal media players (PMPs), personal digital assistants (PDAs), and wireless single-purpose devices can help deliver coaching and mentoring, conduct assessments and evaluations (e.g., quizzes; tests; surveys and polls; and certifications), provide on-the-job support and access to information, education and references, and deliver podcasts, update alerts, forms and checklists. In these ways, mobile learning can enhance and support more traditional learning modes, making it more

portable and accessible. Mobile devices can also serve as powerful data collection tools and facilitate the capture of user created content.

New mobile technology, such as hand-held cellular based devices, is playing a large role in redefining how we receive information. The recent advances in mobile technology are changing the primary purpose of mobile devices from making or receiving calls to retrieving the latest information on any subject. "Numerous agencies including the Department of Defense (DoD), Department of Homeland Security (DHS), Intelligence community, and law enforcement are utilizing mobile technology are utilizing mobile technology for information management.

3.2. Web 2.0 Technologies for m-Learning

Mobile platforms

A Mobile platform, also referred to as mobile operating system (OS), is the Operating System that operates smartphones, tablets, PDAs and other mobile devices. Modern mobile operating systems combine the features of a personal computer operating system with other features, including a touchscreen, cellular, Bluetooth, WiFi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, Near field communication and Infrared Blaster. Below, popular mobile platforms are presented.

Android

Android OS is a free and open source operating system widely used in mobile phone and tablet devices. It is currently owned by Google and is based on the Linux kernel. The user interface is based on direct manipulation, using touch inputs that correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects. Additional hardware such as accelerometers, gyroscopes and proximity sensors are utilized by some applications to respond to additional user input such as adjusting the screen from portrait to landscape depending on how the device is oriented. Android also allows users to add shortcuts and widgets to their home screens, to customize them. Widgets can display live content, like emails or weather information. Applications can create notifications to inform users of relevant information.



Users can download and install applications using Google Play, a digital distribution platform for apps on Android and an online electronics and digital media store developed and maintained by Google. For most online Web2.0 tools (Twitter, Facebook, LinkedIn, Pinterest, Blogger etc), there are available free applications that offer a specialized and easy to use interface that is more appropriate for mobile devices.

Windows Phone

Windows Phone is a commercial operating system from Microsoft. It is the successor of the Windows Mobile operating system and is integrated with many third-party and Microsoft services. The home screen, called the "Start screen", is made up of "Live Tiles". Tiles are links to applications, features, functions and individual items. Users can organize these tiles by adding, removing and rearranging them. Several features of Windows Phone are organized into "hubs" that combine local and online content by integrating popular social networks such as Facebook, Windows Live, and Twitter. Using the Hub, users can directly retrieve and interact with content from these social media tools.



BlackBerry

BlackBerry is an operating system developed by BlackBerry Corporation. The BlackBerry 10 version was the next generation platform for BlackBerry smartphones and tablets. The BlackBerry Software development (SDK) can help the users to build applications using the C/C++ programming language. It allows users to do a wide variety of things that are not possible in simple scripting or higher-level languages, such as writing code that directly improves performance and using a number of graphics and game engines to create interactive applications.



iOS

iOS is an operating system from Apple. It supports Apple devices such as the iPod Touch iPad, iPad Mini and second-generation Apple TV. Interaction with the iOS includes gestures such as swipe, tap, pinch, and reverse pinch, all of which have specific definitions within the context of the iOS operating system and its multi-touch interface. Mobile SDK for iOS toolkit can help users to develop native iOS applications for their mobile device.



Mobile Technologies

A fundamental driver of Web 2.0 development is the emergence of a new generation of Web-related technologies and standards. This has been underpinned by the innovative idea of the Web as platform (Figure 3). Technology has moved on to a new stage in its development with the introduction of what are known as Rich Internet Applications (RIA). A popular technology for developing RIAs is Ajax. Ajax is considered to be a group of technologies used on the client-side to create asynchronous web applications. Also there are some AJAX alternatives which are mainly based on the Flash technology. Flash is a multimedia and software platform used for authoring animation, games and rich Internet applications in general. The dynamism of web is constantly being improved through individual techniques such as JavaScript, hidden frames, Dynamic HTML (DHTML), CSS and Microsoft's XMLHttpRequest ActiveX tool. Below, popular WEB2.0 technologies are presented.



Figure 3. Web as a Platform Idea

Web2.0 Mobile Services and Applications

Web 2.0 technologies aims to provide end users with more engagement, personalized and interactive applications. These are not really technologies as such, but services which are built using new WEB 2.0 technologies and standards. Over the last years there is a bloom in developing and delivering of Web-based services and applications that demonstrate the foundations of the Web 2.0 concept, and they are already being used to many domains and mainly in education. Web 2.0 technologies have become deeply associated with the terms: blogs, wikis, podcasts, streaming services, RSS feeds etc., which facilitate a more socially connected Web where everyone is able to add to and edit the information space.

Most of the devices that are found in the market are equipped with the facility of a number of online tools which may aid in making the device more accessible according to the individuals' needs and wants. These are the applications that are mainly found on the google app store, apple app store and windows phone store. These applications are usually either free of charge or against a very small fee. On the other hand each device comes with a number of features aimed at making the users experience a pleasant one. These features include voice recognition, adjustable font sizes, voice control, fingerprint recognition or gesture recognition. One relatively new upgrade made by phones was the introduction of the hands free/ on speaker phone calls. Finally people could talk to their loved ones without having to hold their device to their ear but by holding in front of them whilst speaking. A few years later this was surpassed by the applications and inbuilt features that made it possible for people to hold conference calls from their device. At first this was only possible with the use of a WI-FI connection but in time this was made possible even between two devices using a 3G connection.

In 2012 Siri was introduced in all apple devices. Siri inc. had said that it will also be available on BlackBerry and Android devices but the agreement fell through when Siri was bought by Apple. Therefore developers had the opportunity to create something for Android phones and that is how Iris and Vlingo came into being. These tools work heavily both on voice recognition and pronunciation and can facilitate a number of tasks such as send messages, start a phone call whilst the person is for example driving with the sole use of his/her voice, it can also serve as a google search tool since it can answer all general knowledge questions, as well as find a restaurant/ place on the map anywhere in the world provided that the place is online. The facility of making the gathering of knowledge so easily and effortlessly made these voice recognition applications so popular and dispersed amongst users.

Other tools have been developed with a more specific target audience in mind, people who have a certain impairment or disability hence need different tools to make their experience of using a technological device more pleasant. Such tools include:

- Screen readers: these are usually downloaded or installed by people who have severe vision impairment and the sole use of larger font is not enough to make life easier when using a device. The screen reader reads everything that is written or is being typed in the device to help the user know what is on the screen and interact as much as anyone else would.
- Talking Camera: this does the same work as the screen reader however it can be used for different other media not solely to read from a screen but also any other written text.
- PDF Readers: Make using a PDF file easier and more user friendly.
- Gesture Search: Helps the user make a very quick search in his/ her phone by drawing a letter or a number on the screen of his/ her device.
- Talking Dialer: this application makes dialing numbers on an Android phone easier and faster.

There is also an endless list of applications for people who are experiencing some difficulty due to impairment. For each of the below listed impairment, one can find a number of applications and tools that can enhance the experience of the user, both on laptop or on a mobile device. Such impairments may include the following:

- e-Learning for people with physical difficulties

- blind
- partially sighted
- deaf
- partially deaf
- People with amputations, paralysis, loss of tactile feeling.

- e-Learning for cognitive disabilities

- autistic people,
- dyslexic people,
- people with ADHD,
- Slow learners,
- Fast learners,
- Downs Syndrome,
- People with cerebral palsy,
- People with acquired brain injuries- stroke, infection or substance abuse,
- People with a low IQ (under 70),
- People with developmental coordination disorder,
- People with disorder of psychological development.

- e-Learning for the elderly

- Neurodegenerative diseases e.g.
 - Dementia,
 - Alzheimers disease,
 - Parkinson's disease,
 - Huntington's Disease,
- Stroke
- Depression
- Lack of knowledge e.g. language barrier, technology usage
- Old age.

4. How to design m-Learning using Web2.0 technologies

4.1. Creating interactive online learning materials using open source

Most VLEs (Virtual Learning Environment) offer a HTML editing tool which allows you to create online content without learning HTML codes. However, the web pages created using the tool have limitations: e.g. lack of interactions and sophisticated navigation. Here are three free open source e-Learning applications that can help you to create interactive online learning materials. The materials produced can be used on any web sites including your institutional VLE.

eXe - the e-Learning XHTML editor, which can be downloaded to your local computer. It assists academics in the design, development and publishing of web-based interactive learning and teaching materials and activities.

Xerte – a customisable suite of tools for e-Learning developers and content authors producing sophisticated interactive learning materials.

GLO Maker – design and develop learning objects (called 'GLOs'), incorporating images, audio clips, video clips and quizzes. It focuses on good learning design and provides powerful features in an easy-to-use interface.

4.2. Designing mobile learning

Adopting a mobile-friendly content strategy enables many benefits that go far beyond delivering the right learning content to the right device at the right time - including collaboration via social networking platforms, multimedia (audio and video) enhancements, interactivity (quizzes, simulations and exercises to test mastery of concepts), annotations to content, and much more.

But what is the most efficient way to produce and deliver learning content optimized for the unique dimensions and firmware of every mobile device? How do the mobile learning designers enable the interactive features that make the content more than just a “page turning application”? These are just some of the questions that a mobile content strategy need to addresses.

The instructional design is a systematic process for creating effective instructional solutions. This requires designers to analyze the desired outcomes and content and apply the appropriate design model to achieve the learning outcomes. There are quite a few generic design models that are customizable and highly effective in creating instructional solutions that meet different objectives in online learning. However, quite often, these instructional design models are not suited for designing mobile learning.

The instructional design of m-Learning solutions must first recognize the learner is not in a traditional classroom setting with a motivational and/or supervisory instructor facilitating the learning process. Learner motivations, attention to learning content, understanding of the relevance of the subject matter and ability to have social interaction with peers are not as easy to facilitate. The mobile learners/users can acquire learning content from the centralized shared resources and engage in anytime-anywhere context-aware learning via portable devices in wireless communication environment.

Kineo (<http://www.kineo.com>) suggests 10 practical tips for designing mobile learning right:

1. Always ask "Why make this mobile?"
2. Use those off the shelf information and communication applications
3. Bring the informal into the blend
4. Make sure it's more than e-Learning on a tablet
5. Make it tactile
6. You're in their personal space; you'd better make it worth their while
7. Make the limited space count
8. Consider developing templates for efficient design
9. Extend the impact of your media assets
10. Find the right place to use mobile learning in your new-look blends

e-Learning design can only be generically applied to m-Learning. Many of the current elements of m-Learning are built upon a solid foundation of learner needs, learning outcomes, cognitive processes, and instructional strategies. Each of these foundational

elements is critical to the creation of effective m-Learning and involves a strong collaboration between instructional designers, educational technologists, graphic designers, web/software developers, educators and students/users. However, m-Learning instructional design as an emerging subject requires a more dynamic approach than traditional instructional design. Therefore, the need for more dynamics in instruction combined with the high demand for more m-Learning solutions requires an evolution in m-Learning design and a higher level of productivity. More use of current user centered and evolutionary design methodologies like that of Agile design, rapid prototyping, and successive approximation instead of the antiquated and less iterative methodologies such as ADDIE will allow m-Learning designers to create more robust m-Learning solutions rather than the typical uni-dimensional solutions currently being developed. In addition, in order to meet the need for increased productivity in m-Learning, it is clear that there should more use of rapid development applications. The reality is that creating m-Learning solutions is more time consuming than traditional learning solutions; therefore, using software applications that do not keep up with the high demand for productivity does not allow the actual design to make it into production on regular basis.

At present, it can be concluded that m-Learning will continue to use some of the same software applications and more iterative instructional design methodologies in order to keep up with increased demand in the coming years.

4.3. Creating online courses

When creating courses for teaching there are a number of clear instructions that one needs to follow to make sure that the course is accepted more readily by the interested students. First and foremost one needs to look at the content to determine what the aims and objectives of the course are, and what one envisages to students to achieve once the course is finished. These aims and objectives should give the content provider a clear understanding of what to include or exclude in the course, as well as an indication of the most appropriate delivery mechanism of each of the objectives.

Once this is established one needs to decide how to create appealing and interactive ways of delivering the content. A recent phenomenon is through the use of interactive applications and websites that are usually used online such as interactive whiteboards which have facilitated and promoted the process further. On the other hand, one can see a number of e-Learning tools today that are used individually on one's own pc, mobile phone or tablet which facilitates individual learning. Whatever the medium used, the course designer should make sure that the content appeals to the target audience, and that the graphics and interactive tools used are neither too difficult nor too easy. There needs to be a balance between a challenge and extreme difficulty that may motivate or alienate the student.

One should remember that a picture or a video speak a million words, so when possible one should provide the student with a graphic or picture, rather than a lot of text. However when using text, it is important to use appropriate, easy to read fonts and sizes as well as colors. Some fonts may be appealing to the eye but are hard to read. For instance, small fonts are usually used when a lot of text is concentrated in one page, deviating attention. Making it difficult to read colors or small fonts will put off anyone reading the text.

When speaking about interactivity and graphics one needs to keep in mind one very important factor. It is important to see whether the application/ website can be accessed offline when the person doesn't have internet facility. Another consideration that one needs to make is to see that the application/ website looks and works well across all operating systems and on all devices. Finally, it is of utmost importance that the course content and tool in which this is embedded works smoothly and fast when accessed since otherwise it would only frustrate the user and demotivate him/ her.

As explained earlier the first priority on the list when designing a course should be identifying the target audience. Anything proposed should be done so with that in mind. It should be easy to use, it should capture the attention of the user and it should be motivating and intriguing. Whilst different people have different concentration spans, others might have special needs to consider, such as cognitive conditions or physical difficulties. These specifications should be taken into consideration by the content provider who should make sure that all the kinds of people who are within the target audience bracket are able to access and use the course equally. These difficulties can be overcome by introducing blended learning, where the student may be able to focus on one method of learning which is more suitable to him/ her. On the other hand, community e-Learning, where groups can

learn together online, is a form of peer teaching that can aid people with special needs to learn from different sources and with people who are similar to them. ICT tools can also be made in a way that can be adjusted according to who is using them e.g. with a lot of graphics for the hearing impaired or have a screen reader for the visually impaired and so on.

Finally, in these cases where one is using ICT to teach, it is important that when there is an actual teacher who is physically facilitating the learning, the teacher is very fluent and competent in both the content and the media used to ensure that the students do not lose interest feeling that if the teacher can't do it, how can they? On the other hand, these tools can always fail, hence a good 24/7 help desk should always be available for those users with difficulties and questions.

Elements of Online Courses

When creating an online course, a number of criteria must be met to ensure that students receive the benefits they signed up for. Below is a list of important ones:

Consistent instructor presence: the value of feedback

The role of the instructor is very important in the e-Learning process because it's in their hands to encourage, inspire and ensure students do not feel as though they have embarked on this learning trip alone, and also because it will ensure that students will be tracked and given proper feedback which is very important throughout the learning process. To facilitate such a relationship, Learning Management Systems offer options like instant messaging between peers, email and other tools that ensure that the learner and professor are only a click away from each other.

A streamlined and well-designed LMS

When talking about the success of a LMS, we primarily mean that we want an e-Learning site that will be easy to navigate, is well-organized and contains high quality material. Everyday tasks include the distribution of new material and sending, receiving and grading assignments. A well designed LMS will ensure that those tasks are hassle-free and that its users can easily tap into the myriad of features that are an important part of the e-Learning process.

Content that is up to par

Aside from the ease and design of your LMS, the next most important thing to keep a student satisfied is the material. The role of the curriculum is to set the tone for an organization to design a successful course and offer both teachers and learners a set of guidelines. So while a system must be well designed and efficient, the quality of the content must be on par with the impression you want the LMS to make in its entirety.

Tested delivery methods

Let's start with an example: you are running a course on astrophysics and you have found a very interesting video that you feel enhances the points made within the already existing content. Is adding said video to the material the right move?

As with any other website, application or product, compatibility is always a delicate matter. We need to always be sure that the material we post for learners to use is compatible with all the possible web browsers or platforms being used. To avoid discouraging learners, keeping it simple is preferable to overextending ourselves and possibly hitting an incompatibility roadblock.

All of these key elements have the ability to foster a supportive, effective e-Learning environment. When all of these essential components are in place, online learning establishments have the ability to not only provide students with the skill sets and knowledge base that they are looking for, but a virtual education platform that helps to contribute to the future success of (and serves as a model of excellence for) the e-Learning industry.

Online tests and quizzes

Despite the fact that e-Learning lacks the element of physical presence, tests and quizzes are still essential parts of the educational process. Through online tests and quizzes an instructor is able to track the progress of students and assess the effectiveness of the curriculum, while at the same time giving students the ability to track their own progress and improve on their skills accordingly.

Why are tests and quizzes a vital part of e-Learning?

Tests and Quizzes play an important role in e-Learning and provide an array of benefits for both the learner and the instructor. Let's first look at how they improve the experience of the instructor.

Less work to be done

Remember school, when tests lasted an hour at a set time of day and the instructor usually had to stay up late to grade them and then write detailed feedback for each and every individual student?

We've already gone through how e-Learning alleviates the need for testing to be done at a specific hour, but it also makes testing a hassle-free task as corrections are automated with a LMS. In the cases of "Essay Question" tests, e-Learning systems are usually equipped with keyword tracking tools that grade depending on what has been mentioned in the essays. This isn't a fool-proof system but it helps save some time in comparison with long grading sessions.

Unique Tests

Testing and quizzing can be made unique in a LMS by randomizing question and answer order. This is especially useful when a learner has to re-do a test which he/she previously had poor performance on so that the test is not completed by memory, but rather by actually thinking through the correct solution once again. This feature is also useful to produce more variety by using a large pool of questions from which testing can be done, rather than recycling the same questions over and over.

Instant grading and feedback

Grading and giving feedback is probably the most time consuming task for the instructor. It's where the instructor has the ability to comment on the strengths and weaknesses of a learner and enable learning to actually take place! Feedback needs to be good. A LMS will usually allow the instructor to create dynamic feedback depending on the answer a learner will give to a specific question. For instance, in a multiple-choice test if the learner chooses answer B over the correct answer C, the appropriate feedback will be given back to the learner, indicating fault in the thought process, or hints as to why another answer would be more appropriate. This complements point 1 above (i.e.: "Less work to be done") by the instructor because it allows the learner to get instant feedback on a correct/ incorrect answer, and it saves time for the instructor who can take advantage of automated feedback.

In-depth analysis readily available

Tests have to be gathered and graded, and feedback has to be written for the individual learner to take back and improve on particular areas. Learning Management Systems give the instructor even more analysis though. Through a reporting system, a LMS gives the instructor an overview of test scores, progress and growth with graphical representation to make the analysis even easier to grasp especially when the class-size is very large. That way, an instructor has the ability to analyze which students scored highest/ lowest, and which questions were hardest/ easiest for the majority of students. Reporting is a handy tool that allows the instructor to see trends and act upon them to improve the curriculum.

It is also environmentally friendly!

Going from hard-copy tests/ quizzes to offering the same capabilities online reduces consumption of goods such as paper - especially important when the online classroom is large and growing!

Now, let's see how tests and quizzes improve the experience of the student:

Self-assessment tool

Testing and quizzing online will usually provide the user with results instantly. This is good for students because it allows them to know what they did wrong immediately, what they need to focus on, and how to improve, should they have to retake the test.

Keeps learners engaged

Tests and quizzes have always been a motivator to study harder when students know that their progress will be judged upon an exam, a performance review etc. It sets a deadline for when material is due to be learned and diligent students know they must adhere to that.

Further considerations

The use of different forms of testing, such as multiple choice tests, fill-in-the-blanks, true or false, or essay questions can also be used to assess the progress of students with different learning styles. Catering to the needs of different learning styles is an important aspect of e-

Learning which gives it the edge over traditional learning models. It is a good idea to use different types of material, and varying types of tests and quizzes to engage everyone in an online class.

An important note to remember when creating online quizzes and tests is the ability of a learner to research the web for answers. If something is too hard and/or a little off topic in terms of the material taught, it is likely to be researched online. If the tests are too easy, they will be dismissed and passed over without much being learned. Thus tests should be structured in a way to encourage learners to think back to the material taught within the course rather than looking for answers elsewhere.

How to make e-Learning effective

Anyone may be able to create a simple online course, however creating an effective e-Learning course is very different. An effective course takes a good deal of time, hard work, and commitment to high quality content to create.

Here are some tips that can help you create a highly effective e-Learning course regardless of the material or curriculum:

Know your subject material well!

There is no golden rule on how much time you need to put into creating the ideal content, but one thing is certain - you need to take your time to research material before making it available to your learners. The reasons are simple, you want to be prepared to back up any claims made within your course material, not all learners digest information the same way, and some may need more explanation through examples or further proof.

Online courses provided should appeal to all learning styles

The design of the online course should take every learning style into consideration. For example, while one student may benefit from visual multimedia presentations of coursework and lessons, another student may be able to better absorb the information when it is presented in text form. An effective e-Learning course always takes these various learning styles into account when the lessons are being created.

Facilitate Contact

Students and teachers should be able to establish an open line of communication. Also, teachers should specify which means of communication they prefer and during which hours. This will ensure that expectations are met and that the student receives the help or support that they need. Also, students should have contact information for the systems IT support staff, and have access to a member of staff on a regular basis if needed. Examples of how students can communicate with their instructors are: discussion forums, social media, chats, email, video conferencing and other VoIP technologies.

Platform should be easy to navigate and fully functional

When designing the site and e-Learning platform, the ease of navigation and functionality should be top priority. A well organized and intuitive web-based learning platform enables students to focus on the coursework rather than having to sort out technical issues that may arise from poorly designed sites and systems.

Course documents should be available to every student enrolled

Course documents like the syllabus must be available for students to view, particularly at the beginning of the term. This will ensure that the student knows which lessons will be covered throughout the course, and can use the syllabus as a guide throughout the entire course. It provides teachers with an effective road map as well, and helps structure their lesson plans.

Set and communicate clear goals

A point we can't stress enough: one of the reasons teams are unable to achieve their goals is due to their lack of clear guidelines on how to reach them. Part of the curriculum of any course should be what will be done, when it will be done, and what is needed for the successful completion of tasks. It is therefore important that all instructors set and communicate clear goals to their learners in a manner in which they are sure they will understand and will be able to put into action.

Tools to create an online course

If you are considering creating an online course to upload and sell online, the process may not be as challenging as you might think. As a matter of fact, thanks to advancements in modern technology, designing a simple and straightforward e-Learning course can be relatively stress-free (as long as you already have a clear concept of what content you'd like to include and a solid core curriculum). Here are a few online tools that can help you to create an e-Learning course.

The LMS

Most people in the online course industry will tend to side with a LMS - especially when new to the scene - because it offers a large array of embedded tools that provide the administrator with the ability to create, curate and enhance content in ways that are more cost-effective than using individual tools would be. Also, the benefits of using a LMS include the all-in-one element which enables the user to create the platform (website) and the content all in the same space without needing special network administration or website management skills. Another attractive feature is the ability of the system to automatically calculate exam results and generate reports which help both the instructor and learner.

Website creation platform

There are a variety of free or low-cost website creation platforms online today. Even if you are not going to be offering strictly online courses, but are planning on providing CD-based courses, creating a high impact website that is easy to navigate and is aesthetically appealing can help you to promote your product. For those who are offering online courses,

having a well-organized and intuitive website can hold the key to an effective e-Learning online learning experience for both teachers and students. There are also a myriad of companies that offer e-Learning website design services if you simply do not have the time or know-how to create your own.

Course design tools

Many companies now provide affordable course design tools which enable you to upload the content of your courses and then design effective presentations. There are even free platforms that you can use today, for example, Google now has an e-Learning design platform that is free of charge. Even those who are not well versed in coding or course design can now share their knowledge with the world.

Multimedia production tools

The key to having a truly interactive and engaging e-Learning course is by using the various multimedia resources that are available today. In our technological age, we now have access to instant streaming video, crystal clear recording capabilities and instant chat support services. Moreover, you can rely upon a myriad of highly interactive multimedia production tools, such as design software and high definition cameras to record informative courses for your audience. There are even editing tools that give you the power to turn raw footage into a masterpiece in just a matter of minutes.

Blended learning

Blended learning is a combination of offline (face-to-face, traditional learning) and online learning in a way that the one complements the other. It provides individuals with the opportunity to enjoy the best of both worlds. For example, a student might attend classes in a real-world classroom setting, and then supplement the lesson plan by completing online multimedia coursework. As such, the student would only have to physically attend class once a week and would be free to go at their own pace (and without worrying about scheduling issues).

Blended learning is often also referred to as “hybrid” learning, and can take a variety of forms in online education environments. While some organizations may only use blended learning techniques on rare occasions, others might utilize it as a primary teaching method within their curriculum. There are two key principles commonly associated with blended learning (which are the “secrets” to its success): students who can share information and work with other students directly in a collaborative setting have a more enriched learning experience, and collaboration between students can be improved upon if group activities rely on information gathered from online resources or lessons. It's also been suggested that students who complete online coursework followed by interactive, face-to-face class activities have richer educational experiences. Tools and platforms that complement blended learning include LMSs and mobile devices such as tablets and smartphones.

Social and collaborative learning

Collaborative learning is an e-Learning approach where students are able to socially interact with other students, as well as instructors. In essence, learners work together in order to expand their knowledge of a particular subject or skill. In e-Learning environments, this is typically done through live chats, message boards, or instant messaging.

Collaborative learning is based upon the principle that students can enrich their learning experiences by interacting with others and benefit from each others' strengths. In collaborative learning situations, students are responsible for each others' actions and tasks which encourage teamwork.

5. Additional Readings

Here are 10 examples of e-Learning. They are all free to access, but more importantly they demonstrate the use of a wide range of learning technologies for both formal and informal learning as well as for performance improvement and support.

1. Blood Typing – In this educational game from the Nobel Prize website, you have to find the blood type of 3 patients and give them a blood transfusion to save their lives. This is a great example of a simulation where you can apply and test your knowledge in a safe environment. These simulations are very useful insituations where you do not want people practicing on real systems or people! Hence the popularity of tools like flight simulators. Games and simulations are also very useful for boring or complex subjects and are especially valuable for the so-called Net Generation who have been brought up on video games and would otherwise find traditional linear based learning uninspiring. Although games and simulations like this can be quite complicated to design and develop for specific situations, ready-made role playing and strategy games are available for a variety of generic business situations, like applying the laws of demand and supply to running a successful business.
2. Make documents look good in Word 2007: This is a demonstration from Microsoft to show you how to use Word to turn a plain-looking document into one that looks professionally designed. This short software application demo, also known as a screencast, is a handy way of finding out how to carry out a software task by simply watching and listening to how it is done. Microsoft also provides some textual instructions which you can print out to have by you when you attempt the task yourself. How much more useful it is to get the information you need to carry out a software activity when you need it, rather than to have to wait to take a complete course that covers all its functionality – and possibly forget what you learnt by the time you need it! Screencasts like these are therefore invaluable performance support resources. People can just reach for them when they need them. Screencasts of generic software are freely available, and if you use custom software in your organisation, then they are quick and easy to produce.
3. Learn to play the piano – As in the previous example, there's nothing quite like watching how something is done, and this example demonstrates the power of video. It is clear from the popularity of sites like YouTube that video is a very compelling medium. It is therefore a very useful format for resenting information or providing instruction. This might simply be a senior manager delivering a company briefing or a product demonstration from a sales person, or it could be a lesson where observation of a skill is essential. In all cases, video adds that extra dimension, and if the presenter is charismatic, it will undoubtedly be very engaging. Only a few years ago, video on the Web was pretty impracticable, but now it is very easy not only to record it, but also to host and deliver it widely.

4. Espresso Shots of Business Wisdom: Sometimes full-blown video is not a necessity, for example if you want to present a number of theoretical points or if the topic is not easily filmed. A set of images or textual pointers may be all that is required. However, slides on their own are not sufficient – even if they are visually appealing; a voice-over is really essential to make sense of them. This example is a short (5 minute) narrated presentation that makes a couple of significant points and provides some effective slides as visual aids. Narrated presentations like this can be successful e-Learning resources if well designed and executed. “Death by PowerPoint” can be avoided if some basic design principles are applied. The voiceover also provides a personal touch.
5. HBR IdeaCast: This is a free podcast series from Harvard Business Review that features “breakthrough ideas and commentary from leading thinkers in business and management”. You can either listen to the audio on the website itself using the embedded player or subscribe to the podcast series using your RSS reader or via iTunes. This means that you get the new podcasts sent to you when they become available. There are a number of reasons why this is an example of effective e-Learning. Firstly, it demonstrates that in some cases audio is all that is required, in other words that presentation slides or video aren’t always essential. Secondly, it shows the versatility of audio as the podcasts can either be played on a computer or an iPod or other MP3 player. This means that it is up to the listener to decide when to play them and on the device they prefer. It might be at the desktop, in the car or even whilst jogging! Thirdly, RSS technology means that a regular stream of content arrives automatically, with very little effort on the part of the subscriber. From a training perspective, podcasting is therefore a very efficient way of “pushing” both informational and instructional content to employees on a regular basis in a flexible format.
6. iNatomy: This example demonstrates further how valuable mobile devices like iPods are for learning. In this case, an iPod can be used for storing and reading anatomy facts in bite-sized notes, as interactive flash cards. Mobility is an important factor to consider nowadays; we are all moving around a lot more, in fact it seems that half of all employees now spend up to half of their time outside the office. There is also quite a bit of evidence to show that people would like to make use of this “dead time” more productively. Moreover, mobile devices are now ubiquitous, which means they are always “to hand” (unlike a computer) and can therefore be used for a variety of purposes. They might be used for formal learning purposes as in this example or for performance support, that is for delivering information and support just-in-time. For instance a sales person could use their iPod to store bite-sized notes about products and services as aide-memoires when dealing with customers.
7. The Diary of Samuel Pepys: This example is a presentation of the diaries of Samuel Pepys, who lived in London in the 17th century. The interesting thing to note about this site is that it uses the blog format to publish the diaries each day over the course of several years. Like all blogs you can either read the site by going to it daily, but it is

much easier to subscribe to it and receive the daily entries via RSS or by email. This is therefore yet another great example of how to deliver a continuous drip-feed of information or instruction to your people. Within a corporate context, blogs can be used for a variety of purposes, but one significant way is to use them to provide a communications channel to others in the organisation about what is happening, e.g. in product development, in sales, marketing and so on. Many traditional training situations could be avoided if employees were just kept up to date with the developments in the other parts of the business that impact their own working lives.

8. WikiHow: This is a collaborative writing project to build the world's largest, highest quality how-to manual. The important point to note about this example is that this manual is being created by many people working together sharing their knowledge; it is not the work of a few so-called "experts" who control the content. The principles of collaborative working and writing can easily be applied in your business. For example, employees could share information and resources and collaboratively produce an Employee Manual to provide the type of information newcomers really need to know when joining a company.
9. SoZiety is a language learning social network designed to help people to improve languages. SoZiety describes itself: "you may think that we are some kind of language academy, but that is not the case. What soZiety wants is you to enjoy learning, and thus you want to continue learning. Instead of taking a lot of boring lessons we propose you to learn or improve a language the natural way: speaking with other people. Okay, not with any other people, but with people sharing your same interests." SoZiety is a fine example of how "learning" isn't always about content, but as much about people coming together to help and support one another. This principle can work in an organisational setting too; individuals can build a community to assist one another, e.g. a large, distributed sales team might set up a social network where they can support one another by sharing sales experiences and know-how. An other key feature about Soziety that is noteworthy is that the members of the community use Skype to communicate with one another. Members choose when to make themselves available, so that others can see who is currently online and ready and willing to chat.
10. Powerful Performance Management: Finally, this example is at the other end of the spectrum from the first one. It is very low-tech but yet still very effective. It is an email course where classes start every week and run for four weeks. You receive the weekly study guide on the same morning on which you signed up to have the course delivered to your email address. With an email course, the course materials might be embedded within the email message (with text and multimedia materials). They are very useful for self-motivated people who require little support and intervention from others. Email courses are simple to design and deliver and may well meet the needs and expectations of your targetted group of people.

- **CLOUD COMPUTING**

Cloud Computing is a technology that has started revolutionizing the way we deliver learning. The concepts of Cloud Learning, Cloud Classrooms, and Cloud Campuses are catching up like wild fire today. More and more universities and institutions are gearing up to move on to embrace this innovative technological opportunity that promises many fascinating features and benefits over the traditional brick-and-mortar model that they had been following.

Cloud Learning refers to learning in a virtual world that is interconnected through the web or mobile networks. Many universities and higher education institutions are moving towards Cloud Campuses – virtual campuses through which they could deliver learning programs in a highly efficient way. Cloud Learning Systems, with the combined power of Big Data, could transform education and learning to the most personalized and adaptive levels. Cloud technology offers a powerful and smart system that could help mould our learners into highly productive citizens of today in the most cost effective way.

Massive Open Online Course (MOOC) is a recent development that is powered by Cloud Computing technology. MOOC promoters (such as 'Coursera' which is known as 'the Amazon of education') offer a wide range of educational programs from leading universities online for free. Though there are questions being raised regarding their pedagogical qualities and effectiveness, this surely is going to evolve as one of the most effective delivery models for education, if properly planned and designed by including engaging e-Learning components. In fact, MOOCs have started threatening the rigid and inflexible model that the higher education institutions follow presently. Many predict that the future of learning delivery lie entirely within the cloud. We believe that Cloud Technology is one of the most disruptive technologies that is set to transform education and learning.

This certainly is an exciting time for learning professionals. Most of the market research reports portray a very positive picture for e-Learning. Below are the key points that they make regarding the growth opportunities:

- More and more e-Learning companies are being established
- More and more people are going mobile (smart phones and tablets)
- The corporate e-Learning market is growing incredibly due to the increased awareness of the benefits of its adoption
- More and more companies have started accepting the significant role of informal learning.

It is also an equally challenging time. Many reports highlight the fact that organizations are too slow in adopting emerging trends and technologies, thereby missing the benefits and advantages they offer. This brings an important question: What is the right space and the correct tools that learning professionals have to use in order to efficiently address the challenges posed by the new dynamic situations?

- **Accessibility**

Accessibility is many times overlooked. This creates negative discrimination as that, which is easily used and accessible by the lay person becomes a difficulty and a pain for somebody else. Here, we will be addressing the accessibility and ease of use of websites and other technological applications to people who have an impairment of any sort and possible ways of making it possible for all to make full use of the potential that each user should be presented with. The kind of accessibility that we are talking about here should be present in all devices that are being used in this day and age, be it laptops, computers, tablets and in this case, even more so in mobile phones.

When talking about accessibility, one cannot ignore the W3C standards which aid in the creation of an Open Web Platform for application development that has the potential to enable developers to build rich interactive experiences, powered by vast data stores, and are available on any device. These standards include the following guidelines that aid in the development and creation of applications that are accessible to people with disabilities. These important guidelines include:

- WCAG (Web Content Accessibility Guidelines) covers web pages and web applications, including content used on mobile devices. In fact it is mainly intended to web authors, page designers, authoring tools developers, Web accessibility evaluation tool developers and others who want or need a standard for web accessibility
- UAAG (User Agent Accessibility Guidelines) covers web browsers and other 'user agents', including mobile browsers as well as developers of media players, assistive technologies, and other user agents.
- ATAG (Authoring Tool Accessibility Guidelines) covers software used to create web pages and applications, including for those for mobile phone applications. It is in fact aimed for developers of authoring tools such as web page authoring tools, software for generating websites, software that converts online content materials using web 2.0 technologies, multimedia authoring tools, websites that let the users add content themselves such as social networks, and so on.

In the past decade the introduction of mobile smart phones has taken over our daily lives. Most people do not only possess a simple mobile phone like those that we used to see in the late 1990s, early 2000s. Now, everyone is looking for the best and most updated smart phone; one that can be connected to the Internet and can perform anything under the sun. Having said that, one has to appreciate that such smart and complex devices, which amongst others, include tablets, have presented problems, not only to those who have physical or mental impairments, but also to those who are becoming overwhelmed with such a fast changing technology. This becomes an issue of accessibility and one of the many steps to counteract this is through the work of developers who put their time and effort in testing even the simplest of websites, not only on different browsers, but also on different operating systems that are usually found in tablets, and mobile phones such as iOS, Windows and Android. Likewise in importance, developers have to take into account the target audience who is using the different devices. However this point will be better discussed further on in this document.

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6. Conclusions

Inclusive and accessible education and training should aspire to include all learners, and mobile learning appears to have the potential to do just that. Mobile learning technologies offer excellent opportunities to open up VET to many who have long been excluded from it. This effort, however, will involve the development of new creative techniques for relatively simple technologies and the design of universally accessible educational materials (e-content) for them. These challenges should force educators to rethink their current approaches to teaching. They should not look exclusively for the next great technological advance but rather should focus on the accessible design of training materials using tools that are simple in use and currently available. Intensive work is needed to consider the ways in which appropriate technologies and solid pedagogical approaches can remove the barriers to VET diversity. Mobile learning and the principles of related instructional design will play a valuable role in this process.

Mobile learning needs to catch up with the mobile industry at large. m-Learning needs integration as part of a complete learning environment, including a Learning Management System (LMS), authoring, collaboration and informal learning management tools, and both "push" and "pull" learning delivery technologies. It is time VET educators get ready for mobile learning initiatives, starting with trying various approaches off designing m-Learning courses and testing them on various types of mobile devices, using different virtual learning platforms and environments.

What are the advantages of collaborative learning online?

This method of learning can be conducted either offline or on the web, and can be done asynchronously or synchronously. It allows students to learn from the ideas, skill sets, and experience of others enrolled in the course. By engaging in a shared task (whether it is a project or lesson) pupils gain the opportunity to learn a variety of skills, such as group analysis and collaborative teamwork building skills.

In addition, even students who are unable to attend a live event online can participate in collaborative learning, thanks to online forums, message boards, and other various posting sites that don't rely on real-time interaction.

The most effective e-Learning solutions can often be the simplest ones. A "course" is not the answer to every learning or performance need or challenge. The most appropriate solution will depend on a number of factors, not the least people involved, the technological infrastructure in place, and your budget – but selecting the most appropriate solution will undoubtedly be the key to success. As the saying goes "one size doesn't fit all", so you need to have an armory of different solutions at your disposal – from which to select the right one at the right time!



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Project Coordinator:

Across Limits Ltd.
Gateway Centre,
Kappillan Mifsud Street
Hamrun
MALTA
Tel: 00356 2122 4900
Fax: 00356 2333 1210
www.acrosslimits.com

Project Partners:

Infoart EOOD
Bulgaria
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e-Training Solution UG
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MobIVET2.0



MOBIVET2.0 Project

Mobile Web 2.0 e-Training
for Vocational Education Trainers
(LLP/LDV/MT/TOI/02/2012)

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.