COURSE 1 – MOBILE TECHNOLOGIES FOR TOURISM

MOBILE LEARNING

DEVELOPMENT, ADAPTATION, TEACHING AND EVALUATION

December 2007
1. INTRODUCTION TO THE M-LEARNING COURSE EXPERIENCE WITHIN TECMINHO

In this project we developed a technological framework to support the design, implementation and delivery of m-contents for learning within e-courses that are available through TecMinho e-Learning Centre. The technologies developed are based on open source software comprising an Authoring Tool to help teachers create e-learning content in an easy way and an Open Educational Resources Tool to make possible the trouble-free upload of learning content in a standard format. Additionally, the project intended to design and deploy an m-course, to provide the project team with the knowledge and practice of mobile learning and e-content design for small screens. Ultimately, all the knowledge produced by the experts involved in this project will be published in a book with the purpose of disseminating to the Portuguese speaking community new operational knowledge about mobile learning.
2. TECMINHO LEARNING FRAMEWORK

The technical basis for the processes of creation, classification and manipulation of learning content is a computer scheme (framework) that TecMinho developed, adaptable to the learning requirements of each curricular unit of different courses and themes, different learning modes (face to face, e-learning and m-learning) but with a stable and common support structure.

The computer application for the creation of content – Authoring Tool eXeLearning was developed for Teachers eXeLearning Open Source project developed by a University based in New Zeland. TecMinho adopted this technology for use in its elearning courses. The Authoring Tool is based on this support structure, so that it is not necessary to make major adaptations for the many thematic fields and learning scenarios. Authoring Tool eXeLearning+

The Repository of Learning Objects is the computer application that will allow the organisation and management of these “learning objects” that make e-content adaptable to the various e-courses, according to the model of Open Educational Resources (OER). TecMinho LOR Learning Object Repository – E-Repository – is based on a Open Source Technology developed origanal by MIT named DSPACE. This open source tool is used to store the learning objects or artefacts only once! [http://e-repository.tecminho.uminho.pt]

TecMinho adopted the Learning Management System (LMS) – Moodle – for e-Learning, b-Learning and to complement face to face training. [http://formar.tecminho.uminho.pt]
The e-trainers/e-authors do not require much knowledge in technology to use the authoring tool and the repository, which are developed according to “friendly” criteria, thus allowing easily developed content in their specific scientific fields.

The content can thus be developed in the authoring tool, setting up multimedia learning objects that are classified using a system of metadata (Dublin Core) that can be directly exported to the Repository of Multimedia Learning Objects. This content can then be modeled into courses, packaged according to the norms (SCORM) and integrated into LMS (such as Moodle and Blackboard) in order to offer e-learning, b-learning and even class Courses or Curricular Units.

The courses or curricular units can then be implemented into any e-learning platform (given that the creation of the e-content and the platforms used follow international norms and standards).

The whole development process of e-learning courses abides by a set of course design, content design and specification and adequacy procedures to learning contexts.

m-learning is seen as a upgrade to the system allowing users to have available a different channel of access to content and activities.

Dias (2006) refers that the design of learning that each teacher can develop depends on the quantity of existing independent variables – what knowledge you want to teach, what learning pedagogies can be put into practice and the motivation you can stimulate. In this sense, one can say that the amount of possible “learning designs” is infinite, meaning that we can have a learning design based on case studies involving this or that group of students (according to their learning style), developing collaborative strategies, making available certain sites and/or content, communication tools, etc, or we can have another learning design based on games or simulations or, yet another based on the development of projects or resolution of problems (project/problem based learning).

The case studies, simulations, games, exercises, evaluation questionnaires or learning activities designed by the teachers are learning content that must be conceived according to pedagogical assumptions. The use of computer tools facilitates this process but also the use of mobile phones can ease the access of students and teachers to the course anytime anywhere and on the move, so facilitating a real just in time learning.

The life cycle of the content begins with the design/conception of the learning content by the author, which in this case is the trainer or teacher.

The author is supported by the Content Creation Tool (Authoring Tool) to conceive the content and structure the pedagogical path the students should follow. Thus, the teacher should create the content directly onto the authoring tool or re-use the content already available in the repository. After the content has been created, by using the authoring tool the author can attribute the corresponding metadata and can upload them onto the Repository of Educational Content in various formats, namely in the “package” format, in the IMS-CP or SCORM specifications. The author can also export the content in “web-page” format.

The upload process in the Repository of Educational Content can be carried out directly by using the Authoring Tool, given the user has permission to upload. The organisation of content in the repository is carried out through the Dublin Core metadata scheme, which can be directly inserted into the authoring tool (metadata option) or into the upload process.
Once the learning content is made available on the Repository, they can be accessed from anywhere by accessing the Repository site or by using the single address system (Handle) that allows the “content” to be referenced from any other internet based system.

This aspect will provide the link between the Repository of Content and e-Learning Platforms (LMS). Thus, the trainer does not need to transport/upload his/her content onto the e-learning platform, but rather indicate the “single” address of the content (“handle”) on the platform and his/her content will be automatically included.

http://www.tecminho.uminho.pt
3. USING M-LEARNING WITHIN A FACE TO FACE COURSE:

TecMinho within this project have tested and experienced the use of m-learning content within an existing face to face course.

The course was a face to face course (professional training) delivered to graduate professionals working as public servants in Municipalities in the North of Portugal.

The course aimed to introduce the use of mobile technologies within tourism sector.

**Course title: mobile technologies for the tourism sector**

- Face to face course: Mobile Technologies for Regional Tourism
- 32 hours
- **6,5 hours per day – 5 Days**
- Course Modules
  - Introduction to Mobile Computing
  - Mobile Applications in the tourism sector
  - Case Study
- Start: 16 November, End: 14 December;
4. STRATEGIES FOR THE COURSE DESIGN AND IMPLEMENTATION

According to the needs of this project TecMinho team decided to work out some strategies that should be followed for the project to be implemented with a certain rule and aiming specific results that TecMinho should found from the experimentation. Thus the following strategies were established:

**Strategy1: m-learning to be used as a compliment to face to face and e-learning**

TecMinho is a provider of face to face and e-learning in Portugal. Being a new comer to m-learning it was decided that for this project we should integrate the m-learning experience of our trainees with existing projects of Continuous Training that are currently running at the institution.

**Strategy2: m-learning content to be downloaded from platform**

The content of a lesson of 6,5 hours in the classroom will have an online extension in the e-Learning Platform that can include complementary work by the students during the week.

Some of the content available for the course - face to face and on the e-learning platform - will be also available for download in the mobile device of the students allowing a degree of mobility in their learning process. The m-learning content will be available on the e-learning platform.

**Strategy3: m-learning content to be shorter (summary)**

The mobile learning content should be shaped for a mobile phone screen size, with the idea that the mobile phone is a different channel of communication - so content should be different in shape from the content produced to face to face or to e-learning channels.

If the content is text based like a manual for instance, the content of a mLearning module should be more like a “compressed manual” because it will be accessed and read over the screen of the mobile phone. It does not make sense to have long manual or long contents because they are to be used during small slots of time and they should be sintetic and fast to consume giving some added value to the other types of distribution channels.
5. LEARNING DESIGN AND CONTENT THAT SHOULD BE MOBILIZED

5.1 CALENDAR OF THE COURSE

<table>
<thead>
<tr>
<th></th>
<th>NOVEMBER</th>
<th></th>
<th>DECEMBER</th>
<th></th>
<th>JANUARY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Friday 16</td>
<td></td>
<td>Friday 7</td>
<td></td>
<td>Results</td>
</tr>
<tr>
<td></td>
<td>Lesson 1</td>
<td></td>
<td>Lesson 4</td>
<td></td>
<td>Thursday 10</td>
</tr>
<tr>
<td></td>
<td>Friday 23</td>
<td></td>
<td>Friday 14</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Lesson 2</td>
<td></td>
<td>Lesson 5</td>
<td></td>
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<tr>
<td></td>
<td>Friday 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lesson 3</td>
<td></td>
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</tr>
</tbody>
</table>

5.2 LEARNING DESIGN (MOBILE CONTENT)

4 weeks » 5 lessons converted into 4 learning modules.

- (lesson 1) In the first face to face class someone from the team of m-learning project will present the new concept of learning with mobile learning. Explanation of the way the participants will learn.

- (lesson 2) during the week after lesson 2 the students should use the “mobile contents” available to learn via their mobile devices some issues related with module 1 “introduction to mobile computing” (the idea is to develop an Index of vocabulary related to mobile communications)

- (lesson 3) during the week after lesson 3 the students should use the “mobile contents” available to learn via their mobile devices some issues related with module 2 “mobile applications in the tourism sector” (Video of an example of marketing in Tourism)

- (Lesson 4), during the week after lesson 4 the students should use the “mobile contents” available to learn via their mobile devices some issues related with module 3 “case study”, students will have a set of pictures that support the case study presented in the classroom (from a PowerPoint file for example).

- (Lesson 5) during the week after lesson 5 the students should use a questionnaire in their mobile phone to “test” their knowledge about. lessons learned.
### 5.3 LEARNING DESIGN OF THE COURSE (FACE TO FACE+ E-LEARNING + MOBILE CONTENT)

<table>
<thead>
<tr>
<th>Face to Face Course</th>
<th>e-Learning Platform (online access to course content)</th>
<th>M-Learning (mobile content)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Modulo 1</strong></td>
<td>- PDF presentation</td>
<td>- Mobile Glossary: content summary + schema</td>
</tr>
<tr>
<td>- Power point presentation- Introduction to Mobile Computing</td>
<td>- Glossary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- LINK to mobile content (throughout the access to the open access repository)</td>
<td></td>
</tr>
<tr>
<td><strong>Module 2</strong></td>
<td>- Mirror of the face to face course, plus</td>
<td>- videos for review in mobile phone</td>
</tr>
<tr>
<td>- tourism marketing videos</td>
<td>- LINK to mobile contents (videos)</td>
<td></td>
</tr>
<tr>
<td><strong>Module 3</strong></td>
<td>- Mirror of the face to face course, plus</td>
<td>- case study illustration</td>
</tr>
<tr>
<td>- case study illustration (flash .swf)</td>
<td>- LINK to mobile contents (case study illustration)</td>
<td></td>
</tr>
<tr>
<td><strong>Module 4</strong></td>
<td>- Mirror of the face to face course, plus</td>
<td>- Quiz</td>
</tr>
<tr>
<td>Evaluation</td>
<td>- LINK to a mobile quiz</td>
<td></td>
</tr>
</tbody>
</table>

### 5.4 MOBILE CONTENT FORMATS

- **JAVA**
  - 1 File
  - Static

- **FLASH LITE**
  - Animation
  - Few mobile phones

- **XHTML**
  - Many files
  - Web

[http://www.tecminho.uminho.pt]
6. EXAMPLES OF MOBILE LEARNING DESIGN AND IMPLEMENTATION

Module 1 – Glossary
- Some vocabulary with the definitions of the news concepts in mobile communication
- GPRS - O GPRS - General Packet Radio Service
- GSM - GSM (Global System for Mobile Communications)

Module 2 – Video (VideoCast)
- An example of some videos for Tourism marketing.
  - Example: http://www.youtube.com/watch?v=lVU-8y2kbZw
  - http://www.youtube.com/watch?v=lVU-8y2kbZw

Module 3 – Images OR Sound (podcast)
- Examples of some case study
- Images from a PowerPoint file.

Module 4 – Pedagogical Game (questionnary)

7. CONTENT OF M-LEARNING MODULES

The content may be adapted or created specifically for mobile devices. In the case of this project TecMinho made the following options:

XHTML

TecMinho developed some contents based on XHTM mobile 1.0. One of the advantages of this format is that it can be presented on any browser of a handled device or on a PC browser and it can be stored on a memory card or in a web server.

When we talk about XHTML, we are talking about a website, so we are talking about hypermedia and connections between content, in this case, pedagogical content.
First approach was to use a sequential structure of the content, so we will have a set of web pages connected by two links (“next page” and “last page”):

![Diagram showing the sequential structure of web pages]

Then we look at the content we will create for the first module (a glossary) and we verified that this hypermedia type was not the best solution. We create an alternative structure of the content:

![Diagram showing an alternative structure of web content]

The content of these pages can be analysed in detail in the following schema:
The main page is like presentation of the content that follows. In this case, we present a logo of TecMinho

The title of the course and a little description.

The name of the module of the course that the content is related with a little description.

A link to the INDEX of the pedagogical content.

<table>
<thead>
<tr>
<th>Título do Conteúdo</th>
<th>The INDEX of the content has the title of the content, a set of links to all the pages and the first page of the content.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal</td>
<td>Imagens</td>
</tr>
</tbody>
</table>

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After some tests, the final results of the contents for module 1 are:

Introduction page:
Glossário - Tecnologias Móveis

Seja bem vindo ao Glossário de termos sobre Tecnologias Móveis. Escolha um termo selecionando uma das iniciais disponibilizadas na barra superior.

Principal

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Glossário - Tecnologias Móveis

**Bluetooth**

Tecnologia que suporta a comunicação sem fios entre dispositivos eletrônicos a pequenas distâncias (10 metros na versão 1.1 ou 100 metros nas versões 1.2, 2.0 e 2.1) e com baixos custos. Começou a ser desenvolvido em 1994, pela Ericsson, e a partir de 1998 pelo Bluetooth Special Interest Group (SIG), consórcio inicialmente estabelecido pela Sony, Ericsson, IBM, Intel, Toshiba e Nokia. O consórcio integra hoje mais de 2000 empresas.

O nome Bluetooth é uma homenagem ao rei da Dinamarca e Noruega Harald Blåtand (Harold Bluetooth em Inglês; traduzido como dente azul, embora em dinamarquês signifique de pele escura). Blåtand é conhecido por unificar as tribos norueguesas, suecas e dinamarquesas. Da mesma forma, o protocolo procura unir diferentes tecnologias, como telefones móveis e computadores. O logotipo do Bluetooth é a união de duas runas nórdicas para as letras H e B, suas iniciais.

Principal

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VIDEOS FOR M-LEARNING

TecMinho team have selected and used some videos within the course in order to trainees to analyse and have experience in the use of video in the mobile phone and at the same time learn about the illustrating videos for tourism promotion.

These videos were found on the internet and are used to promote Portugal as a touristic destination.

TecMinho used the existing videos available in the Internet and provided some contextual information.

EXAMPLES OF CONTENT CREATED

- Glossary
- Flashlite
- Videos
8. IMPLEMENTATION, ANALYSIS AND EVALUATION OF THE PILOTE COURSE

After planning and development of materials for the pilote course experimentation, Tecminho have developed a questionnaire to be used with the learners in order to measure the success of the implementation (annex I). At the same time in the first face to face class project team members have presented the pilote experience were within this course, besides face to face and e-learning platform use, students would be able to experiment the use of their mobile devices to learn. At the first moment the mobile devices of the students were analysed and the list of equipment that students had was listed.

The information of the mobile devices owned by the students was crucial, because at that moment we were obliged to change some of our strategies and produce the content in formats and make available the access in a way that allow students to use the mobile content.

8.1 LEARNERS MOBILE PHONES (USED WITHIN THE EXPERIENCE)

The students were using a variety of mobile phones. In some of the devices the contents developed were working (9) and in some others the mobile course was not working. In Annex II there is the list of the equipments owned by the students and the ones that worked and didn’t work with the contents.

<table>
<thead>
<tr>
<th>WORK</th>
<th>DON'T WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Mobile Phones Working" /></td>
<td><img src="image2.png" alt="Mobile Phones Not Working" /></td>
</tr>
</tbody>
</table>

8.2 PROBLEM SOLVING

Due to the difficulties arised and to the variety of learner’s mobile devices, TecMinho team decided to change some development and have 3 different ways for learners to access to content on mobile devices:

- For devices with memory card:
Mobile content was available for download and students should download it to their media cards to store the content.

- For older mobile devices
  - It was necessary to transform XHTML to Java (with J2ME Polish)
  - (Many files to 1 file)

### 8.4 EVALUATION

The questionnaires were very clear concerning students views about the use of mobile devices they all think it is a very useful tool and it make sense to use it for learning.

Some of the issues that were asked within the questionnaire were related with learners perception about the potential of this tool and in this case they all agreed that it is a very powerful tool.

In some extent the experience was not very successful due to:

- The majority of learners have simple mobile devices (2G) rather than smart phones or PDAs
- The majority of learners do not have a connection to internet on their mobile devices
- Costs of mobile internet access is still prohibitive in Portugal
- Variety of students’ equipment
  - Different technologies
  - Different Operating Systems
  - Different Screen Sizes
- Learners didn’t have Wireless equipment
- Lack of competencies using m-devices

Please not that the learners did not had Internet Access on their mobile phones, due to its high costs in Portugal. As a consequence some of the latest technologies and possible pedagogies for mobile learning could not be tested in this pilot course.

Another very important conclusion is that the majority of the students did not add competencies to use the devices.

- Lack of competencies using m-devices
  - The learners that have smart phones and PDAs do not have the skills to use their mobile phones properly (for the purpose of downloading content from a website to their mobile phone).
  - Face to face instructions and instructor led learning was needed to teach the learners to use their mobile learning content on their devices
  - Learners have basic mobile phone and are using basic function (they are able to use SMS and transfer images but not much more.)
  - If the mobile content is not simple to use/transfer it is not used.
8.5 CONCLUSIONS

At the moment, when m-learning is of great importance, the unquestionable domain of training could not separate itself from a new branch of action. Thus, the didactic resources herewith presented will permit the application of integrated training methods and processes, given that they bring together classroom training and distance training, complementing each other.

The software being developed, namely the Authoring Tool for Teachers and the Repository of Learning Objects, on the one hand, permit the creation of learning objects and, on the other, to organise and manage the “learning objects” that make up the movable content for the various courses and using different formats and ways to access them.

The production of learning content according to the international norms and standards, guarantee that the content is developed following “granular” criteria (multimedia learning objects), content “portability” criteria and content “re-usability,” meaning that content can be deposited in the e-learning Repository once and then re-used according to the needs of the courses to be designed and offered through the e-learning platform.

This experience was very important to understand that on the one hand technology available by learners’ is not yet the mature technology for m-learning. On the other hand this type of experience demanded customised solutions (and programming) to be able to develop the content for up-load to different mobile devices with different operating systems. Plus the learners did not have the necessary skills to operate their mobile phones together with the e-learning platform, so they could not download materials in a self learning way.

The results of this pilote course will be further disseminated and will be part of a Book with include a set of innovative didactic products in Portuguese that will certainly serve as a basis for the training of trainers, authors and designers about m-learning, creating a chain of dissemination and multiplication of the results of this project.