



CRE8IVE Project

Output 1 - Research

Best practice in the design of e-learning environments and best practice where the development of MOOCs is concerned

Research background and goals

This document was created by Innoventum as part of research work for the Cre8ive project. The goal of the research was to cover four areas that are of particular importance to the CRE8IVE project; 1) best practice where the design, development and provision of accredited train-the-trainer programmes is concerned and the issues to be addressed in the proposed curriculum; 2) the individual resources to be developed to support acquisition of key competences; 3) best practice in the design of e-learning environments; 4) best practice where the development of MOOCs is concerned.

One of the goals set for Partner Meeting 2 is to agree the functionality for the e-learning portal and the design theme for the MOOC.

In this document we cover the areas 3 and 4 of the research - E-learning Environments and MOOC:s to aid in the following functionality requirement specification and MOOC theme design processes.

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Terms and definitions

E-learning Environment

E-learning Environment or a *virtual learning environment*, *VLE*, is a Web-based platform for the digital aspects of courses of study, usually within educational institutions. VLEs typically: allow participants to be organized into cohorts, groups and roles; present resources, activities and interactions within a course structure; provide for the different stages of assessment; report on participation; and have some level of integration with other institutional systems.^{1 2}

For those who edit them VLEs may have a de facto role as authoring and design environments.³ VLEs have been adopted by almost all higher education institutions in the anglosphere.⁴

LMS

A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs.

LCMS

A learning content management system (LCMS) is a related software technology that provides a multi-user environment where developers, authors, instructional designers, and subject matter experts may create, store, reuse, manage, and deliver digital **educational technology** (also known as e-learning) content from a central object repository. LCMS focuses on the development, management and publishing of the content that will typically be delivered via an LMS. Users can both create and re-use content and reduce duplicated development efforts.

MOOC - Massive Open Online Course

a course of study made available over the Internet without charge to a very large number of people.

¹ https://en.wikipedia.org/wiki/Virtual_learning_environment#cite_note-1

² https://en.wikipedia.org/wiki/Virtual_learning_environment#cite_note-2

³ https://en.wikipedia.org/wiki/Virtual_learning_environment#cite_note-3

⁴ https://en.wikipedia.org/wiki/Virtual_learning_environment#cite_note-4

State of the Art

There are currently at least more than 500 different platforms available, that categorise as LMS. Their development and service models vary from open to closed source, and downloadable installation packages to hosted solutions (SaaS model).

Capterra.com for example lists 324 different LMS products, with option to filter results based on required features and deployment type⁵. They have also ranked 20 of these systems by popularity, based on number of organisations using the products and number of users on the platforms, as well as how they appear on the three top social media services Facebook, Twitter and LinkedIn⁶. This comparison, as well as many others found on the Internet show that the two systems that held most of the e-learning market nine years ago⁷ - the Open-Source Moodle and commercial Blackboard have received a lot of competition in the market.

Another party tracking the usage of different systems is edutechnica.com, who have released a review of LMS usage in higher education in the United States, in institutions with enrollment exceeding 2000 students in 2014⁸, also showing Blackboard and Moodle summing to 50% share of the market. The report also reveals that smaller institutions are more likely to use a non-traditional LMS or Moodle than Blackboard.

Overall, the listings show that the offering of platforms is currently very wide, varied and that making an educated decision between them can potentially be very challenging.

When it comes to best practices in the e-learning environment design, most environments seem to follow the same basic, proven concepts in the User Interface layout and navigation. There is a lot of variation in how the administration systems are built, from the data models used in the application logic, to the structural hierarchy of administration tools. The platforms and websites offering course contents as a service that have entered the market in the past few years benefit from focusing more in the User Interface and User experience (UX) design in their development process.

A relative newcomer to the market, Udemy⁹ has a particularly easy-to-use interface, but also well-guided tools for learning content creation online. Their business model is to offer a Learning Record Store and LMS for learning content providers, and charge commission of the course fees. Udemy report already having more than ten million students and 10 000 courses available.

⁵ <http://www.capterra.com/learning-management-system-software/>

⁶ <http://www.capterra.com/learning-management-system-software/#infographic>

⁷ <http://evicab.aalto.fi/outcomes/delivera/wp4revie.pdf>

⁸ <http://edutechnica.com/2014/09/23/lms-data-the-first-year-update/>

⁹ <http://www.udemy.com>



Competitors to Udemy include Teachable¹⁰, Schoolkeep¹¹ and Skiljar¹², the latter two focusing in business market and offering a brandable LMS with SaaS model. They all have very visual and intuitive user interfaces, made with responsive web design (RWD) design patterns.

¹⁰ <http://www.teachable.com>

¹¹ <http://www.schoolkeep.com>

¹² <https://www.skilljar.com>

LCMS and LMS Features

Features available vary from system to system and many providers offer their own feature checklists for comparing to others in the market. A feature checklist based on requirement specification can be used as a tool for platform selection.

Features to consider include

- Learning Content management
 - Creation process
 - Storage
 - Reuse
 - Importing and exporting contents
- Administration
 - User registration and administration features
 - Access privilege management model
 - Automatic maintenance options
- Communication
 - Many Learning Management Systems provide communication tools that allow students and instructors to ask questions and provide feedback. These tools may be asynchronous (e-mail and forums) or synchronous (teleconferencing and instant messaging).
 -
- Collaboration
- Assessment
 - Adding Quizzes: Quiz authoring tools allow student understanding to be tested. In addition to a variety of quiz formats (multiple choice, fill in the blank and essay), many LMS systems also support creation of student surveys and other types of assessments. Student grade management is often tied into student assessment tools.
- Tracking
 - Student progress tracking
 - Information about each learner's activity should be available via an LMS student tracking tool. Many systems track progress by reporting when course content was accessed and how much time was spent during each learning session. More advanced systems can provide analytics that help identify student knowledge gaps, detect cheating, assess the difficulty of quiz question and so on.
 - Resource usage tracking
- Reporting
 - Progress reporting
- Certification Management

While each platform takes their own approach to implementing the features as well as the actual learning paths, many adhere to some common standards to support operation across environments.

The Experience API standard¹³ is a specification that defines format for e-learning content and also learning goals and plans, allowing exporting and importing learning contents between systems. The format is widely supported within the e-learning technology industry¹⁴.

The Mozilla Open Badges¹⁵ initiative is an increasingly popular ecosystem for recording and displaying informal education achievements and skills.

Hosting models

There are three distinct models for acquiring an e-learning environment; Proprietary, Open-Source, and Cloud-Based. Of these the last one is not so much about acquiring a single environment, but using multiple cloud-based services to achieve the same goals as with using a single platform - with lower license and / or server management costs.

The Educause Review article "*Selecting a Learning Management System: Advice from an Academic Perspective*"¹⁶ from 2014 explains these models and considerations to take in the selection process with case samples.

Any of the three options should allow the course content to be safely stored and viewed online, including existing documents and files that have been uploaded. Standard file formats such as PDF, PowerPoint, Word and jpg should be supported. Content should be automatically viewable in a standard Web browser on a wide variety of platforms, including PCs, tablets and mobile devices.

¹³ [https://en.wikipedia.org/wiki/Experience_API_\(Tin_Can_API\)](https://en.wikipedia.org/wiki/Experience_API_(Tin_Can_API))

¹⁴ <http://tincanapi.com/adopters/>

¹⁵ <http://openbadges.org/>

¹⁶

<http://er.educause.edu/articles/2014/4/selecting-a-learning-management-system-advice-from-an-academic-perspective>

LMS samples

Moodle¹⁷

Moodle is an elearning platform with one of the longest development histories and it appears as one of the most used in different surveys. It represents an open-source e-learning environment that has a lot of features and an active community available for support, but is also technically scattered, slow to tailor and can be cumbersome to administer.

Chamilo¹⁸

Instance of the Chamilo platform has been created for the CRE8IVE project at <http://chamilo.cre8iveproject.eu>.

This instance can be used for benchmarking against the features, functionality and the user experience produced for the CRE8IVE Learning Environment.

Further reading

The Food and Agriculture Organization of the United Nations (FAO) have produced an excellent and easy to read publication "E-learning methodologies A guide for designing and developing e-learning courses"¹⁹ in 2011. While the main focus is in designing course contents, chapter 9 also covers definition of learning platforms and includes a comparison table of some of the most popular Open Source alternatives.

¹⁷ <https://moodle.org/>

¹⁸ <https://chamilo.org/>

¹⁹ <http://www.fao.org/docrep/015/i2516e/i2516e.pdf>

Massive Open Online Courses

As MOOCs are educational products more than technical platforms, provided on VLEs capable of servicing a large audience, this research report focuses in mapping the availability and State of the Art of the European MOOC contents.

MOOC platforms and providers

OpenupEd²⁰

OpenupEd considers to be the first, and, thus far, the only pan-European MOOC initiative.

They currently list 190 courses on the site, of which 82 are available in English, from 13 different institutions. The website works as an aggregate for MOOC courses actually created and hosted by these institutions.

EMMA project²¹

Funded by the European Union's Competitiveness and Innovation framework Programme, The European Multiple MOOC Aggregator called EMMA for short, is a 30 month pilot action supported by the European Union. The project consortium consists of 11 different European universities. They attempt to provide a system for the delivery of free, open, online courses in multiple languages, but the pricing system after the project finishes in July 2016 is not revealed and the MOOC platform is invite-only.

OpenEducationEuropa

Another European Commission funded attempt to disseminate the available MOOCs in the EU region is the OpenEducationEuropa website²².

The current availability map²³ shows only a few countries with more than 10 courses, 30 MOOCs being offered in Spain, 37 in France, 40 in the UK and 14 in the Netherlands, but when we look at the other examples, this seems to be more due to the portal's inability to attract some of the MOOC providers than actual lack of available content.

²⁰ <http://www.openuped.eu/>

²¹ <http://platform.europeanmooocs.eu/>

²² www.openeducationeuropa.eu

²³ http://www.openeducationeuropa.eu/en/open_education_scoreboard

Futurelearn²⁴

Launched in September 2013, their website reports that since that date more than three million people have joined FutureLearn. It is owned by Open University and has 84 partners from around the world, European partners include universities from the U.K, Switzerland, Spain, Netherlands, Sweden and Norway.

Coursera²⁵

Coursera describes itself as “an education platform that partners with top universities and organizations worldwide, to offer courses online for anyone to take” and reports having more than 18 million users and 1818 courses from 140 partners

OpenHPI²⁶

European MOOC providers also include OpenHPI provided by the German Hasso-Plattner Institut, which currently has 79 courses listed.

²⁴ <https://www.futurelearn.com/>

²⁵ <https://www.coursera.org/>

²⁶ <https://open.hpi.de/courses>

Best Practices

Web applications are dynamic, interactive systems that help organisations perform tasks and that increase and measure their productivity. Thus, the primary role of a Web application is to perform a function that serves the user's tasks and according to defined business rules. When considering best practices in designing VLEs, same core principles and best practices apply to program structure design, User Interface and User Experience design, and the management of the application design and production work as to any other web application. Agile working methods allow better coping with changes than the classic waterfall method, and when creating a new application, sketching can be used for exploring different UI models and so on.

Best practices in User Experience provide the framework for a repeatable process, a way for us to deliver the value of user experience in a reasonable amount of time, without making the mistakes of those who followed in our past.

User Interface (UI) Design focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate those actions. UI brings together concepts from interaction design, visual design, and information architecture.

Best Practices for Designing an Interface

Everything stems from knowing the users, including understanding their goals, skills, preferences, and tendencies. With this in mind, points to consider include

- Simplicity of the UI
- Consistency and usage of common UI elements
- Purposeful layouts
- Usage of typography in creating hierarchy and clarity
- User interaction and informing the user of state changes and possible actions

Above the Fold captures and describes the main aspects and general rules to follow in UX and UI design and front-end development (as opposed to back-end, or server-side logic development) in their small book "50 user experience best practices"²⁷

Based on this research, we have chosen to use two of the currently very popular online course providers, Udemy and Teachable, which are also accessible without a purchased monthly plan, for benchmarking the eLearning features UI design in the CRE8IVE project.

²⁷ <http://userexperiencedesigns.com/assets/pdf/50-UX-Best-Practices.pdf>

E-learning and MOOC in the scope of the CRE8IVE Project

Requirements

The E-learning environment for CRE8IVE project should include sufficient tools for creating and managing the learning contents, administering the users and user profiles (learner, tutor, administrator), communication and collaboration between the users, and tracking the learning process.

Progress tracking is very important to the project, as the Project plan states

“ the most important element for ensuring an on-going impact for the Cre8ive project is the **user tracking capability that will be built into the e-learning portal**. This tracking of user activity will provide essential information regarding (1) the relevance of content provided on the portal; (2) the popularity of individual learning areas or resources; (3) the most popular learning formats. This will allow partners to further develop the learning experience for registered users based on their past activity preferences. This tracking capability is also critically important for assessing the immediate impact of the project and information that partners will be able to extract from the use of the e-learning portal will be vital to demonstrating this impact and encouraging further exploitation.”

The expected learning contents, at the time of the research based on project plan, are digital media, drama, storytelling and music based learning resources. This suggests the content type can include different types of text files, pictures and audio and video media files, as well as powerpoint-type presentations.

Project partners will be provided with a checklist survey for evaluating which e-learning platform features each partner regards as critical for the success of the CRE8IVE project. The results of this survey are used as basis for discussing the requirement specification in the second Partner Meeting.

Limitations

Limitations set by the project scope, timeframe and budget

- First Prototypes should be available by end of month 6 for testing
- Final versions on-line by month 12
- 55 technical staff days reserved, including development of the project website.
- No budget set for external licensing fees

Delivery model

As stated in the Project plan (Output 2), the e-learning and MOOC features will be embedded as a module of the project website and built on the iCMS Content Management System

"Embedded in this project website will be 3 additional components;(1) an e-learning portal to facilitate access to the new CRE8IVE Train-the-Trainer curriculum resources and the suite of new key competence development resources; [...] (3) a Massive Open On-line Course (MOOC) that assembles the widest compendium of key competence learning resources that use the creative disciplines for enquiry-based and embedded learning approaches."

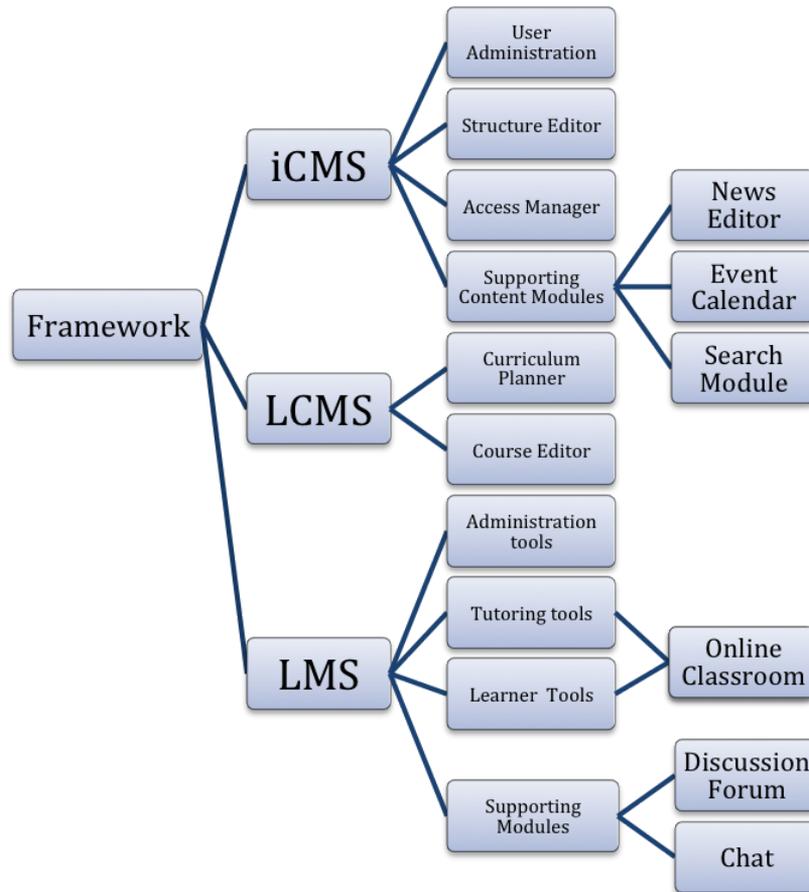
"These additional environments will be on-line hosted learning environments running on a web server tailored for the purpose. They will be built on iCMS Content Management System"

The division of tasks is planned as follows:

- Innoventum will develop and update all on-line infrastructures throughout the project life-cycle and transfer administration rights and hosting rights to relevant partners in each country at the end of the project life-cycle.
- Meath Partnership and CARDET will support design work on all the web based environments.
- AESD and BDA will draft and update the text for the web based platforms throughout the project life-cycle.

Initial design - Platform structure

The eLearning Platform combines three main systems into a fully functional web service



1 - iCMS Content Management System for the website structure, page contents, user accounts and groups (profiles) and their related access privileges.

2 - Learning Content Management System for creating the curriculum of available courses and managing the course contents and their meta information, as well as features related to them.

3 - Learning Management System for tracking and managing the Learning process from three different perspectives: the Learner, the Tutor and the Administrator

iCMS Content Management System

The iCMS 3.1 system and its extension modules comprise a versatile and scalable service platform. The existing modules include discussion forums, feedback channels, user management as well as product catalogues and payment gateways. The first version of the iCMS was published in 2003. In 2009 Innoventum adapted a service model of continuous development, where updates automatically applied for all hosted platform instances.

User and Access Management – the User Administration Module

Integrated in the eLearning Platform, the iCMS provides tools for flexible management of the User Accounts and their Profiles (such as the Learner, Tutor and Administrator profile). The Access Privileges management is not limited to fixed privilege sets, but new Profiles (or User Groups) can be freely created and a single User can be part of more than one Profile. The Access Privileges can be set on a per-profile as well as per-user basis. The User will automatically inherit highest privilege available through their personal privileges and the Group Profiles they are part of.

Site Contents and Structure Management – the Site Structure Editor Module

The Site Structure Editor enables creating new content pages and freely relocating existing pages in the Site map. Access Privileges can be defined for each page, which allows for extranet sections or limited-access tutor zones when needed.

Supporting Modules

News

Create, Publish and Manage news items on the site. News can be categorized and categories to display can be chosen per content page. The News Editor allows creating news dated into the future, which can be used for timed publication of News Items. Users (for example people in the Administrator Profile) may be given the access to write news items.

Event Calendar

Event Calendar feature is similar to the news, except that the events are displayed in a graphical calendar view – with possibility to list both upcoming and past events and courses.

Content Search

Content Search module enables keyword search that is used to query different types of contents – the text on the web pages and the Course Contents, as well as Meta information related to Files and Images uploaded on the eLearning Platform.

Image Bank and File Archive

These administration modules host the materials uploaded on the Platform, making it possible to both edit their information – and even edit the Images – and share them on the site where needed. The File List, Image Gallery and Image Drum Content modules are special features used to automatically generate views of the uploaded materials. The LCMS uses the Image Bank, the File Archive (and when enabled, the Video Archive) to store the related Course Contents.

Learning Content Management System

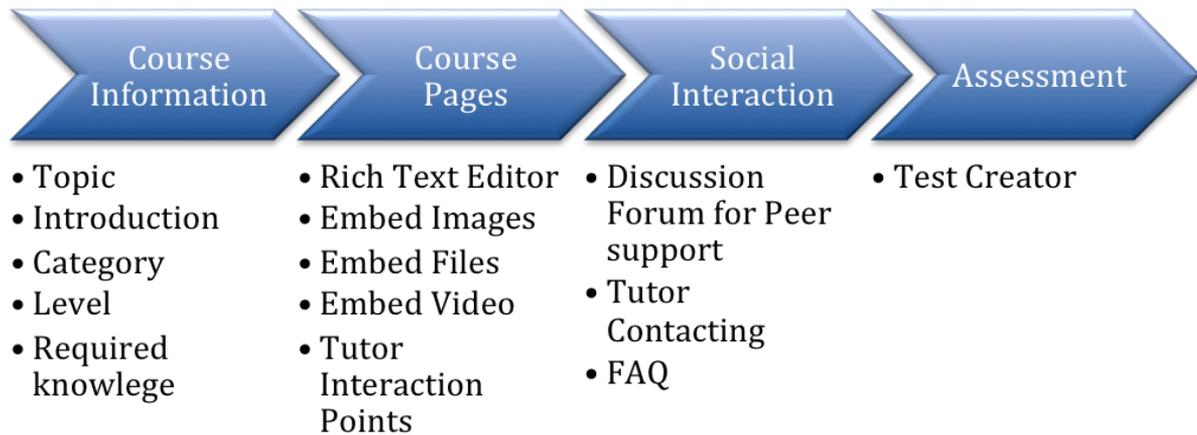
The LCMS is the toolset for creating the Learning Curriculum and the Course Contents it consists of.

The Learning Curriculum

- List of courses available
 - Search options
 - category, level, language, keywords, localisation, writer

The Course Editor

The Course Editor follows a four step structure for entering the required meta information, creating and uploading the contents, defining the social interaction available for each course and finally creating tests for assessment.



Learning Management System

The LMS features contain the functionality for tracking, management and interaction in the actual learning process. There are three main profiles to the LMS – the Provider, Tutor and Learner (or Student) profile.

The Provider is responsible for authoring the Learning Content, defining the possible Entry Requirements for the content, and in the end, providing the Qualification based on the Final Assessment.

The Tutor interacts with the Learner and evaluates the progress as they work with the Lessons.

The Tutors, as well as the Providers can easily follow the Learner through the Activity Overview where all the Learner Activities are logged.

The Learner has the possibility to Rate and Review both the Lessons (Content created in LCMS) and the Tutor work, providing a feedback channel for continuous evaluation of the process.

The learning process tracking and notification points will be tailored to fit the needs of the target learning scenarios.

LMS Features

- Curriculum and Course Contents Planner
 - Categorised list views of courses available – as created with the LCMS
 - Learner Specific Learning Paths – Courses may be chosen based on previous courses taken and / or fields of interest
 - When Course structure has optional components, Learner may choose which modules to take
- Learner Activity Log and Overview
 - All Learner Activities and time spent on courses are tracked in the Learner Activity Log
- Learner Profiling
- Course Status Tracking
 - Overall history information and statistics of the Course
 - Per Learner Status Tracking
- Interactivity features
 - Assignments,
 - § Assignment creation
 - § Assignment submission
 - § Assessment and feedback
 - Online Classroom
 - § Live Video option for Tutor / Teacher
 - § Chat feature with history logging
- Tutor – learner interactivity history