

Teaching creativity in engineering

TECRINO

538710-LLP-1-2013-1-CY-LEONARDO-LMP

LEONARDO DA VINCI Multilateral Projects for Development of Innovation

**WP3 Report 3.1.
Technical requirements for the content definition and
realization**

3.1.1. Introduction

In WP3 reports a set of actions are reported in relation to the content definition covering the technical aspects and the methodology based on which content will be defined, organised and maintained. It also covers the definition of the required materials for the tutor and teacher education.

In report **Technical requirements for the content definition and realization** set of technical aspect covering content implementation on e-learning platform and its applications in learning process are presented. Tecrino course materials will be used as learning support for "Face to Face" and e learning. On-line teaching can be implemented in several ways. For the steady progress of the students is necessary to select synchronous and asynchronous models of communication and provide organizational support for their implementation. Tutoring could be applied as a very effective measure to improve efficiency of e-learning process. Further LMS (Learning Management System) selection will elaborated and definition of meta data content description according to Accessible instructional materials (AIM) standards.

In preparation of this report major contribution was from Inercia Digital S.L., The "Dunarea de Jos" University of Galati and University of Zagreb end including comments of others partners.

3.1.2. Educational model

Educational materials for TECRINO course will support distance education and “Face to Face” teaching.

“Face to Face” educational model will be supported by teaching materials in form of a classroom aids. Course content will be organized as a set of PowerPoint presentations with support of web based teaching materials.

Distance education model will be realized as TECRINO Web-based e-learning course. Learning management system will enable development, delivery and course implementation.

3.1.3. LMS (Learning Management System) requirements

In e-learning LMS consolidate important roles in learning process implementation such as course development, course structure, student support and other important function like evaluation and assessment.

Course content should be organized in clear organized structure. The content in the course should be divided into lessons and chapters or other units justified from the methodological point of view. Each more significant part of a course (e.g. chapter) starts with Introduction (presenting specific goals/objectives to be attained) and should ends with a Summary (e.g. specific information on completing a given module).

In realization of web pages are organized so that have uncluttered screen space with reasonable proportions of text and images and big empty spaces on the page should be avoided. Images must be related to the contents and illustrations, diagrams and pictures with greater number of details include a button displaying a popup with full size image.

Considering typography basic recommendations are to use ways of text formatting (e.g. headlines, bold, italics, colours) as long as they convene with general usability principles supporting clarity of division and space between different areas (text column, illustration, instruction). It is recommended to have maximum length of the line is 70 characters. Font colours should provide the best possible contrast in each conditions and each type of display. Text fields/boxes should be surrounded by protective areas so that graphic elements would not overlap the text.

All visual elements should meet general standards of panning, hue saturation, contrast, white balance, sharpness, optimum compression.

For online courses it is requested that multimedia file bigger than 50 kb must have preloaders.

Recommended file formats are for images JPG, PNG, GIF, for animations: swf, flv and for audio mp3 (stereo 128 kbit/s).

A course contains a separate button opening popups or a set of buttons for different popup types. Pop-ups include Hide/Close button and a scroll to move the text up and down. Popup windows hide one another.

Audio/video players should have Play/Pause button, Stop/Reset button, a counter showing current playback time and the length of a resource, a slider to fast forward and rewind films, a preloader and a button to switch subtitles on/off.

Slides/screens should be accompanied by a narrator's voice (which can be switched off). Narrator should not read the whole text which is displayed on the screen.

LEONARDO DA VINCI Multilateral Projects for Development of Innovation

The course navigation should use a course map showing where a user is. Navigation elements showing where a user has been will be a change of colour of numbers/symbols of visited pages. After leaving the course and coming back, the course resumes from the moment it was left.

Buttons on the screen should have three different states and change according to neutral, mouse over and on click. Considering clickability if there is no info on the button as to its function, there should be a tooltip with suitable information. When a given element is clickable, it should be indicated by a suitable animation of this element. Fixed elements of the course, which are not active in the current moment should be greyed out.

There is a choice of on-line teaching implementations. Very efficient way to improve progress of students in e-learning process is tutoring. Students and tutors should have choice of synchronous and asynchronous models of communication.

3.1.4. LMS (Learning Management System) selection

For Tecrino project LMS (Learning Management System) Moodle is selected. Moodle (the Modular Object-Oriented Dynamic Learning Environment), is one of the world's most used learning management system. It presents several advantages that we think they make Moodle the perfect fit for our needs.

First of all it's open source, so it can be modified and adapted to our requests if this was necessary. On the other hand being a popular open source project gives you a guarantee of its security and integrity (after all, it has thousands of eyes over it).

Its popularity also means a huge troubleshooting database. If a problem arises there's a huge chance someone had it before we did and that the solution is already available. There's also a big database for plugins, allowing us to extend the platform for new features without having to develop it or modify the source code.

Its requirements are, essentially, a webserver that supports PHP and a database that could be just MySQL, so it's highly portable from a machine to another and the costs to maintain it aren't too high.

And last but not least, it supports a wide variety of standards for course development, like SCORM 1.2, SCORM 2004, IMS or its own format.

A series of communication tools will be used through the whole training process, which would be either synchronous or asynchronous that will enable the tutor-student interaction as well as between the whole students group itself. These will allow the students guidance.

Moodle supports complement set of communication tools.

Chat module (synchronous communicative tool)

The chat activity module allows participants to have a real-time synchronous discussion in a Moodle course.

At pedagogical level the chat can be used for discussion meetings, or monitoring of group work and also in brainstorming sessions.

This is a useful way to get a different understanding of each other and the topic being discussed the mode of using a chat room is quite different from the asynchronous forums. The Chat module contains a number of features for managing and reviewing chat discussions.

Forum module (asynchronous communicative tool)

The forum module is an activity where students and teachers can exchange

ideas by posting comments. There are four basic forum types. Forum posts can be graded by the teacher or other students.

The forum is one of the most used tools in the courses. The forums can have different functionalities:

1. **Course management.** The forums allow the open public information exchange about the management and administration of the course between students and teachers. In that sense, Moodle has a default forum called 'News' which is used as announcements board where the teacher can post several information related to the course.
2. **Learning.** Through the forums the students can think about the readings, debating on a topic by arguing their positions, etc.
3. The forums is a good resource for the **debate**, considering that the contributions exposed on them are more elaborated than the other ones exposed in a chat (synchronic). This is the fact that the asynchronous forum character provides more time to think about before the participation on the forum. As a result, more elaborated messages either in form or content are included.
4. **Students support.** It can be used to solve the student doubts by the tutors so these aims will be accessible by the rest of the students. However, it is more interesting that their own classmates can solve the students' doubts, making easier the creation of a cooperating and helping environment between the course participants.

A forum can contribute significantly to successful communication and community building in an online environment. You can use forums for many innovative purposes in educational settings, but teaching forums and student forums are arguably the two more significant distinctions.

Instant messenger (synchronic communicative tool)

Instant messenger allows us to send short messages to one or several course participants. It can be used either by teachers or students; however this last participant can only send messages to one person not to several at the same time. Messages are a short, efficient and habitual communicative channel that is used to accomplish a concrete notification or to give an answer to a specific

issue. The efficiency and the speed of this messenger system is determined by how it works since when an user connects to his Moodle course, all the new received messages are shown automatically.

Moodle is based on features elements which together assist in the learning process are such as: Activities, Resources and Blocks.

An **Activity** in Moodle is a feature where students learn by interacting with each other or with their teacher. They might for instance contribute in a forum, upload an assignment, answer questions in a quiz or collaborate together on a Wiki.

A **Resource** in Moodle is an item that a teacher can add to a Moodle course to support learning, such as a file, a video or link to a website. A resource differs from an activity in that it is static; i.e., the student can merely look at or read it, rather than participate.

A **Block** in Moodle is an item that a teacher can add to the left or right of a Moodle course page. They provide extra information or links to aid learning. Blocks are a bit like "widgets" elsewhere online and can contain; for example, RSS news feeds, quiz results, a calendar, links to blogs, glossary terms or private files.

3.1.5. Definition of meta data content description according to Accessible instructional materials (AIM) standards.

Many different metadata schemes are being developed as standards for different disciplines, from e-commerce to library science, education and archiving. Metadata schemes that are developed and maintained by international standard organizations (such as ISO) or international professional organizations (such as the Dublin Core Metadata Initiative) are called metadata standards.

Metadata elements grouped into sets designed for a specific purpose, e.g., for a specific domain or a particular type of information resource, are called metadata schemes. For every element, the name and the semantics (the meaning of the element) are specified. Content rules (how content must be formulated), representation rules (e.g., capitalization rules), and allowed element values (e.g., from a controlled vocabulary) are also specified on some occasions. Majority of current schemes use Standard Generalized Markup Language (SGML) or XML to specify their syntax.

The Tecrino course will be published in SCORM (Shareable Content Object Reference Model) format (1.2/2004).

Sharable Content Object Reference Model (SCORM) is a collection of Accessible instructional materials (AIM) standards and specifications for web-based electronic educational technology (usually called e learning). It defines communications between client side content and a host system (called "the run-time environment"), which is commonly supported by a learning management system. It enables that same SCORM module can be used on different computer hardware within different Learning Management Systems.

SCORM is a specification of the Advanced Distributed Learning (ADL) Initiative from the Office of the United States Secretary of Defense.

SCORM 2004 introduced a complex idea called sequencing, which is a set of rules that specifies the order in which a learner may experience content objects. In simple terms, they constrain a learner to a fixed set of paths through the training material, permit the learner to "bookmark" their progress when taking breaks, and assure the acceptability of test scores achieved by the learner.