

## **Designing e-Content: A Challenge for Open Educational Resources**

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### **Abstract**

In this paper we present the project *Design of e-Content for Learning*, in partnership with Universidade do Minho (Braga), Universidade Aberta (Lisbon) and other institutions. In this project we developed a technological framework to support the design, implementation and delivery of e-contents for learning within e-courses that are available through TecMinho e-Learning Centre. The technologies developed are based on open source software comprising a *Learning 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 e-course on the *Design of e-Content*, to provide teachers with the knowledge and practice of learning design and e-content design. Both the *Authoring Tool* and the *Open Educational Resources Tool* were used in this e-course. Ultimately, all the knowledge produced by the experts involved in this project was published in a book with the purpose of disseminating to the Portuguese speaking community innovative operational knowledge about e-content design.

**Keywords:** e-content design, e-courses, e-learning, Open Educational Resources

## 1. Introduction

In the realm of distance education and in opposition to traditional face-to-face situations, there is no room for improvisation to save the day. The learning material to be used, for instance exercises, activities, reflection questions and case studies, should be pedagogically engineered, well organized and fully structured before the course begins. It's for this reason that, while in face-to-face education one usually speaks of course "design", in distance education one should also mention course "production", even though during its implementation the production may be subject to readjustments according to the needs of the learner groups. As a result, the material for e-learning, which we call e-content for learning purposes (e. g. manuals, exercises, learning activities, etc.), take on a pivotal importance in the success/efficiency of learning. Naturally, the teacher/trainer's role as e-moderator will bring an added value to the e-activities necessary to create the context of each course, this being the crucial aspect that separates useful e-learning content from *Open Educational Resources (OER)* that merely reside in a repository. This is also the justification for this paper, covering the outcomes of a Portuguese project on the design of e-content and the establishment of an *OER* repository.

The institutions or companies that start up an upward process of e-learning production and distribution (in most cases former face-to-face training organizations) have the actual need for tools and instructional material that allow them to meet the demands of a growing market, while facing the challenge of becoming more flexible organizations, adapted to new information and communication technologies and to the needs of authors/trainers and students, as well as, the needs of technical staff and needs generated by new processes. In a broader perspective, the evolution towards a knowledge-based society with emphasis on scientific and technological innovation, and the relationship between knowledge and professional performance, highlights the importance of the trainer as "author of e-content" and as "learning designer" (not simply as moderator of e-learning).

New technological and scientific challenges emerge today and new opportunities are currently being explored by training organizations schools and universities, mainly by those that are more innovation-based and likely more predisposed to complement training activities or distance education with e-learning or b-learning models, expectantly looking on to adequate learning designs and pedagogically sound activities. The capability and knowledge of the authors/trainers in this field are the essential elements for the success of any learning process that can be described as dynamic, flexible and innovative.

The project *Design of e-Content* aimed to create advanced technological and learning resources necessary to support and guide the trainer/author in the process of designing learning material, integrating new pedagogies in a technology-supported environment, thus contributing to the migration from classroom training to e-learning.

Within the project we developed a number of products and technologies to support the dealings between pedagogy and technology, as follows:

- Development of the course *Design of e-Content for e-Learning* and relevant support manuals, namely:
  - Course Reference
  - Student's Manual

- Trainer's Manual
- Annotated Bibliography
- Development of two software applications (tools) to support e-learning:
  - *Learning Authoring Tool* to support the creation of learning content by the teacher;
  - *Repository of Educational Content* enabling the upload, classification and access of multimedia learning objects (as *Open Educational Resources*);
- Publication of a book on *Design of e-Content*.

The development of course resources and software applications was based on two assumptions:

- (1) They should be based on criteria of utility, portability and scalability.
- (2) They should be practical tools, easy to use by the teachers themselves and by training organizations.

Additionally, the computer applications developed within the project were based on open source tools and complemented by the e-learning technologies already used by TecMinho and the University of Minho, inter-operating with each other. The integration of the new applications (*Learning Authoring Tool* and *Repository of Educational Content*) with databases and e-learning platforms (*MOODLE*, *Blackboard*) is currently underway.

## 2. The right tools

The process of design, organization and management of learning content is supported by specific software tools, adaptable to the learning requirements of each curricular unit of the different courses available, with a stable and user-friendly interface.

The software application for the design of e-content – simply called *Learning Authoring Tool* – is based on a flexible open source interface, so it is not necessary for authors to make major adaptations in the various thematic areas and learning scenarios.

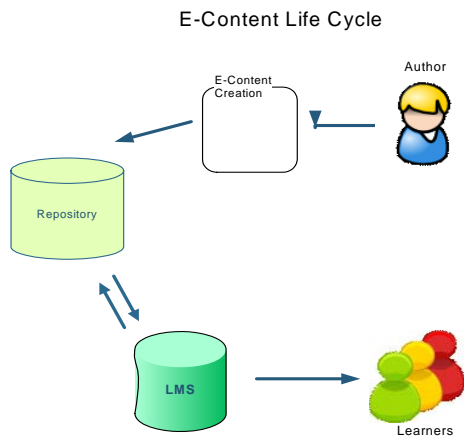
The *Repository of Educational Content*, also referred as *e-learning Repository*, is the software application that will allow the preservation and retrieving of “learning objects”, making possible the use of the same e-content elements in different courses and contexts. The use is free in terms of deposit, preservation and retrieval, following the proved model of *Open Education Resources (OER)*.

The e-teachers/e-authors do not require much knowledge of technology to use the *Learning Authoring Tool* and the *e-learning Repository*, which are developed according to criteria that facilitate the development of content in their specific scientific fields.

The content can thus be developed with the *Learning Authoring Tool*, enabling the creation of multimedia learning objects that are identified and described adequately using a system of metadata (Dublin Core) that can be directly exported to the repository. This content can then be further assembled as e-courses, packaged according to specific norms (SCORM and IMS) and integrated into a LMS (such as *MOODLE* or *Blackboard*) in order to offer e-learning and b-learning programs, and even face-to-face courses with specific curricular units. The e-learning courses or curricular units thus produced can be implemented in any e-learning platform that follows the two widely used international standards SCORM and IMS.

The development of e-learning courses implies the use of a number of specifications covering e-courses and e-content design in a particular context. Dias (2006) refers that the learning design a teacher can produce depends on a number of independent variables: the nature of knowledge we want to teach/pass on, the learning pedagogies that can be put into practice and the learner motivation. One can say then that the amount of possible “learning designs” is infinite, meaning, for instance, that a learning design may be 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, current communication tools, etc, or that another learning design is set on games and simulations or, yet another, may be supported by the development of projects or resolution of problems as in *Project/Problem Based Learning (PBL)*.

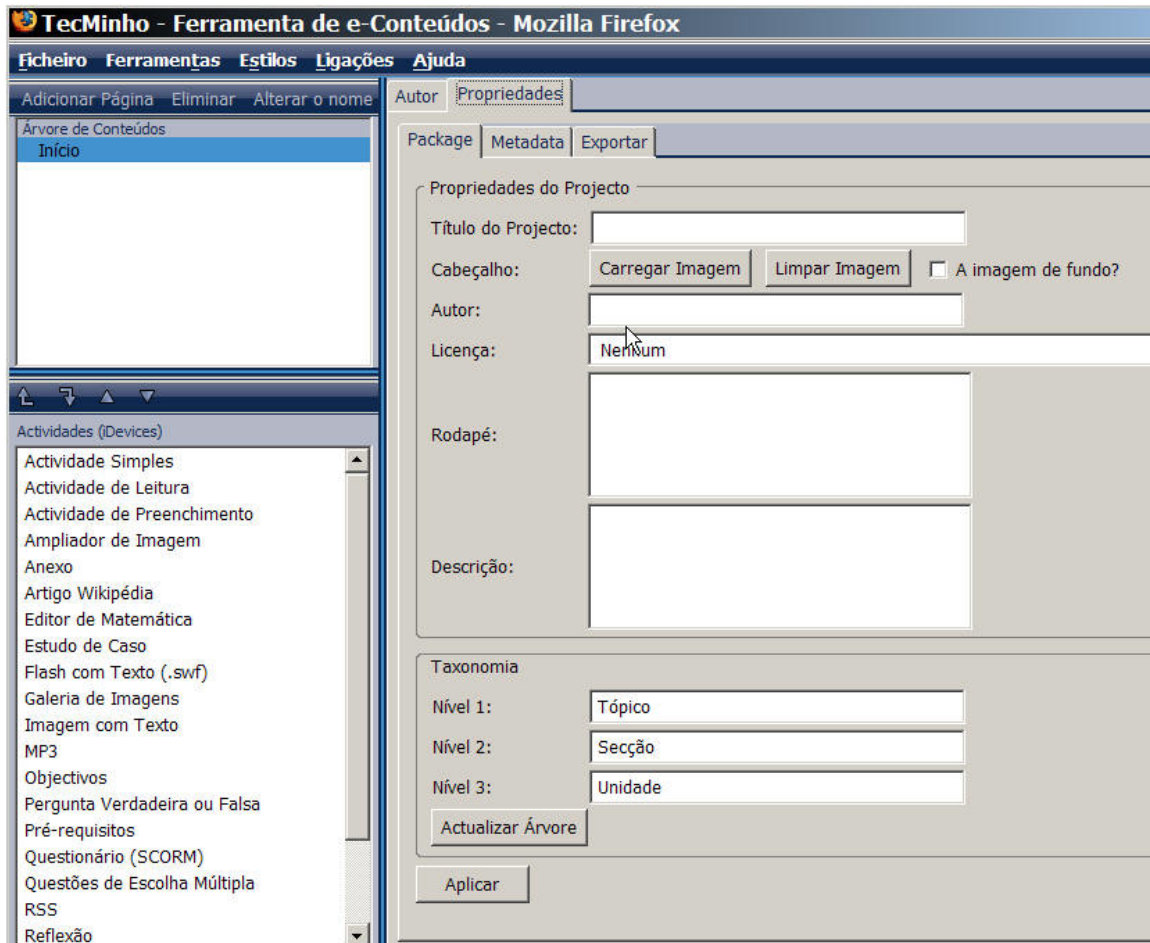
The case studies, simulations, games, exercises, evaluation questionnaires or specific learning activities selected by the teachers must be designed according to sound pedagogical assumptions. The use of user-friendly software tools facilitates this process. To better understand this process, we illustrate in figure 1 the representation of a typical lifecycle in the development of “learning content.” The aim of such content is to be used by students in a specific learning context under the monitoring and orientation of the teacher.



**Figure 1:** Representation of a typical lifecycle in the development of learning content

The whole process starts with the design/creation of the learning content by the author, which in this case is the trainer or teacher. The author uses the *Learning Authoring Tool* to create the content and organize the pedagogical path the students have to follow. Thus, the teacher builds the content directly in the authoring tool environment and may re-use the content already available in the repository. After the content has been created, the author can fill in the corresponding metadata and can upload the full package to the *Repository of Educational Content* in preset formats, namely IMS-CP, SCORM, Web-HTML specifications. The author can also export the content to a folder or directory.

The upload process to the e-learning repository can be carried out directly by using the authoring tool, given that the user has permission to upload. The method of content management in the repository is carried out from beginning to end with support on the Dublin Core metadata system, which means that data can be directly inserted with the *Learning Authoring Tool* (figure 2) or when the upload process is used.



**Figure 2:** Interface of the *Learning Authoring Tool*.

Once the learning content is made available on the repository, it can be accessed from anywhere through the *Repository Portal* or by using the single address system (*handle*) that allows the “content objects” to be accessed from any other internet based system. In this way, the system will provide the link between the repository and the e-learning platform (LMS). Thus, the trainer does not need to transport/upload his/her content onto each e-learning platform, but rather indicate the address of the content (*handle*) on the platform and the content will be automatically included.

The technologies developed within this project were tested by different groups of teachers/trainers from various Higher Education Institutions, namely the *University of Porto*, the *Open University (Universidade Aberta)*, the *Polytechnic Institute of Porto* and the *University of Minho*.

### 3. The course “*Design of e-Content for e-learning*”

The specialized course on e-content design was developed within this project and will allow, on the one hand, to profile the e-trainer/e-author of content in both academia and professional training and, on the other hand, to foster the development of high quality learning and training material. The implementation of the course will be based on two components, one will be in class training and the other will be distance learning (online learning).

The face-to-face environment will make use of the relevant technologies involved in the preparation of content for e-learning (namely, *MOODLE*, the e-learning platform that supports the course, *MindManager* for e-course and e-content planning, the *Learning Authoring Tool* and the *Open Educational Resources Tool*). In the distance learning part the students will use these tools autonomously and will use and experiment with different strategies supported by pedagogical choices inherent to specific e-learning situations.

The course is structured around the following modules:

1. Learning processes and context
2. Management of e-content production (project)
3. Design of e-courses and e-content
4. Learning objects
5. Content creation tools
6. Online learning evaluation

A face-to-face session for the course opening is set to present the course methodology, its objectives, activities schedule, and the e-learning platform. The learning design of the course follows a *Project Based Learning* model, where the students must develop their own e-content project.

The students will have an area on the e-learning platform where they will be able to upload their project and carryout various learning activities, this will allow them to develop their own content throughout the course. At the end of the course the students will present online the resulting projects.

The learning methodologies to be adopted by this course are based on proven constructivist approaches with special emphasis on active pedagogical models. In particular, emphasis on the use of *Project Based Learning* techniques throughout the training project, allowing students to develop their own e-course project and respective e-learning content from the beginning, so that the results can be transferred immediately to their current professional context.

Typically the learning content designer is a trainer/teacher capable of creating and designing a training e-course and of deploying the respective learning content. At the end of the training program the students (trainer/teacher) will have valuable competencies, not only to design the course for a specific learning context, but also to produce the adequate learning content, using the tools supplied and following the international standards. Thus, the content produced by students will follow widely accepted criteria of re-use, interoperability and portability that allow them to be used in different platforms and learning contexts.

Emphasis is given to the use of the *Authoring Tool* and the *Repository of Educational Content*, as well as, planning tools and communication tools, namely web tools aimed to facilitate distance training. In this context, the learning content designer should be capable of:

- Designing and creating e-courses for a certain learning context;
- Planning the learning content to be developed;
- Producing learning content according to international standards;
- Creating, integrating and exploring the learning content in the LMS;
- Building/selecting instruments to evaluate the learning content produced.

#### **4. Conclusions**

Preliminary results show that the tools developed were a success in terms of acceptance and ease of use. The software, namely the *Authoring Tool* and the *Repository of Educational Content*, on the one hand, permit the trouble-free creation of learning objects and, on the other, allow the organization and management of learning objects that make up the portable e-content for various e-courses.

The production of e-learning content according to the international norms and standards guaranteed 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.

The publication of a technical book on e-content design is also an added value given the fact that many of these themes were never before explored and published in the Portuguese language. The book will focus on the production of multimedia learning objects and the design of modules in e-courses that, in turn, can be exported to standard environments (SCORM and IMS), which will allow the objects to be imported by the LMS.

The resources we propose herewith are a set of innovative educational products in the Portuguese language that will certainly serve as a basis for the training of authors, teachers and designers of content for e-learning that, in turn, will train other agents in the training process, creating a chain of dissemination and multiplication of the results of this project.

At the moment, when e-learning and Open Educational Resources are of great importance to worldwide organizations such as the Hewlett Foundation or UNESCO, the unquestionable value of accessible and user-friendly tools, together with the application of integrated training methods and processes, seems to support a new and sensible course of action for research and development in education.

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