Evaluation and integration of tools for the development of web based course ware

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Evaluation and integration of tools for the development of web based course ware

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1. GOALS AND OBJECTIVES

In the old days the learning methods were based on the charisma and wisdom of the teachers and hard study sessions of the students. The times now have changed and different and improved techniques have emerged into universities, private schools and also virtual schools.

In this document we will go through all those tools, techniques that have made it possible to develop the new ways of learning. How the old methods can be substituted by a faster, more clear and more efficient way of teaching.

At the beginning of the project the idea about this issue was clear. It was mostly about showing those methods I saw in universities and also in private English schools in Spain. But when we were digging into this theme, I realized how many different branches about this were growing and also the amount of information I had to read to understand the whole.

The eLearning is a form of distance education which has emerged with the development of new information technology and Internet. It consists of taking advantage of the ease of distribution of educational material and communication tools offered by the network to create an environment for learning.

Through this technology students have access to courses and interactive multimedia Web format, supported by media that enable collaboration and online discussion of the subjects studied. This means to that training is tutored by an expert to monitor the progress of students, as well as guidance, resolving doubts, motivation, etc...

Also there is a really important economic impact on how the actual companies train the employees, with a system that creates a shortage of skilled workers, especially in those companies with global teams, highly qualified professionals or telecommunications related.

eLearning solutions facilitate the delivery of the right information and skills to the right people at the right time. That is the main goal.

One of the objectives of this study is to choose tools to create web courses easily for teachers in a practical method without the complexity of building a sophisticated eLearning system; it can cost a lot of resources, money and time. Therefore the included manuals will be helpful information for the readers and also a quick way of showing differences and advantages of each of the tools and also a quick reference related with eLearning.

I have based my selection on trying to find the best tools that allow working with the most used tool to generate presentations that in my opinion is PowerPoint. Also having the possibility to record the screen, to add narration, video and to have the possibility to edit all these features.
The possibility to create FLASH format was also important as it is the most used in the web contents and at the same time to have another conversion possibilities like .AVI, .MPG or just finding the best way to add the eLearning content via CD.

But all these methods (Flash, PowerPoint, sound, video...) can be improved by the tools presented in this document. They are able to combine and optimize the efficiency and effectiveness due to all the elements included inside the eLearning standards, giving as a result the most flexible way of making eLearning courses.

In this document I will speak about the different options to generate eLearning material (tools, systems, standards) and I will present three of the main tools to make eLearning courses easily, three tools to the readers of the manual, specially aimed at teachers so they can try by themselves all of them and choose the one they like most.

These tools are Camtasia Studio, Articulate and TurboDemo, which will be the most interesting parts of this project, filling the practical part of the eLearning study adding a manual instruction for all of them.

As I said some lines above, all these tools and content makers are able to co-operate due to the standards which apply rules to the eLearning tools. Therefore in the document I’m going to talk also about the standards related to the eLearning environment.
2. BACKGROUND

"The development of eLearning is discussed in [9], [12], [13], [19] and [35] and the background information in Chapter 2 is mainly a compilation of the material in these sources."

2.1 What is eLearning?

ELearning has its historical background in about 30 years of development in computer based training and education. With the growth of the internet this kind of training became much more accepted and the creation of multimedia contents and systems to manage learning activities went on faster.

Additional eLearning is based on a long tradition of teaching and learning experience.

The larger worlds Information Technology and Education and Training influenced the new term eLearning and so eLearning became a subset of both of them.

Nowadays, eLearning refers to the learning that is delivered or enabled via electronic technology. It encompasses learning delivered via a range of technologies such as the internet, television, videotape, and computer-based training. In principle, eLearning is a kind of distance learning. Learning materials can be accessed from the web or intranet via a computer and tutors and learners can communicate with each other using e-mail, chat or discussion forums.

Therefore, it can be used as the main method of delivery of training or as a combined approach with classroom-based training. It can be valuable when used as a part of well-planned and properly supported education and training environment, but eLearning is not a magic bullet that replaces existing pedagogical theories and approaches. Nevertheless, it has almost everything that those theories need to get implemented.

Many learning and technology professionals believe that eLearning will have become state of the art when we will stop referring to it by a separate name and begin considering it as an integral part of a complete learning environment. [13]

B-Learning

It is the abbreviation of Blended Learning, "Combined Training" or "Teaching Mixed." This is a semi-modality study which includes both eLearning and traditional classroom teaching.

It is beginning to adopt this model for online courses, as it combines the advantages of on-line teaching (virtual classrooms, computer tools, Internet) with the possibility of having a teacher as a supervisor of the courses. [35]
2.2 What is a Learning Object?

Typically, a course consists in a series of modules, sections, exercises, simulations, etc., designed to train the student in a set of skills and knowledge. As such, the course is a unit and the composed of individual courses, books, and other eLearning products is named curriculum.

However, it is feasible to separate the different skills and knowledge in minimum units and observe the course as a sequence of these units. Each of these units can be designed as a Learning Object.

Based on this definition a Learning Object is a minimum training unit that carries out a single purpose and that can be sequenced along with other Learning Objects to shape courses covering broader learning objectives.

Basic features of the Learning Objects

So, is a chapter of a course a Learning Object? ...Not exactly. To fulfill its function in isolation, irrespective of the way in which it was included, a Learning Object must have some basic characteristics.

To be an Object Learning independent should have an appropriate structure, including presentation and objectives, formative content and finally an evaluation and conclusions system.

- Brief

By its own nature, a Learning Object tends to be brief. Taking in consideration the on-line limitations as well as the average of self-study session of a user, a Learning Object should if it's possible, be designed for an average duration of 15 minutes or less.

- Context independent:

A Learning Object should not require another context that himself. Therefore it can not make reference to other objects or ambiguous references. Thus the Learning Object develops its own context by combination with other Learning Objects.

- Labeling (Metadata):

In order to facilitate their identification and tracing, a Learning Object must be properly defined in their Descriptive tags (metadata). In this way it becomes possible to its management and its automatic contextualization with other Learning Objects with which it shares concepts.
• Interoperable (standard):

Learning Objects should be designed according to a standard allowing its platform independence from LMS or LCMS, to enable it to be charged or released for any platform of any manufacturer. At present, the ADL SCORM and IMS are working on a package system of Learning Objects that guarantee this interoperability.

Advantages of Learning Objects

• Flexibility.

A material designed for use in multiple contexts can be reused more easily than a material that must be redeveloped for each new context. This type of formative material can also be updated, indexed and managed on a simple way.

• Customization.

The design of courseware as Learning objects greatly facilitates the customization of content, allowing the recombination of materials tailored to the training needs of the group in question or even the individual.

• Provides competency-based training.

Since each Learning Object corresponds to a specific learning objective, either knowledge or skill, this approach is more appropriate for the course to complete the training programs based on skills. The identification of each Learning Object with a specific skill, as well as the evaluation of the competency gap of each student would design completely customized training routes.

• Increase the value of the contents.

Reusing content increases its value, both by increasing the potential of its future exploitation by the successive amortization of the cost of development.

As can be seen the effort that goes into the design of courseware in a modular fashion more than offset by its benefits. The Learning Objects are the basis for the development of the objectives of eLearning: maximum customization, fully adapting to the training needs of each student, and training just in time, giving each student the exact precise training content in each time. [19]

2.3 Traditional classroom teaching VS Web based distance learning

There are a number of typical features of distance learning, and clearly differences regarding the traditional classroom teaching:
1. Physical separation between teacher and student.

In distance learning, the teacher is usually physically separated from his students, who usually resort to the teachings of their teachers through printed, audio-visual or computer materials. In general, rarely through physical contact, and mostly we can have students located in different parts of the world.

2. Massive use of resources.

The centers which provide distance learning are the resource centers. If we look at European distance universities, we see how they have always been pioneers in the use of these kinds of resources in their teachings.

The massive use of technical resources in the distance learning, has led to have been overcome difficulties arising from the boundaries of space and time, so students can learn what they want, wherever they want and whenever they want.

3. The student as a centre for independent and flexible training.

While in the classroom the teachers teaching determines the pace of learning because they decide how much of the topics they explain every time, in distance learning the student must know how to manage their time and choose their pace of learning. The distance student is much more independent, and it calls for greater self-discipline on the student attendance. The first thing that a distance learning student has to learn is precisely to learn because their success depends on it.

4. Tutoring.

Unlike between conventional educations, the distance learning, apart from course contents, which are not transmitted by a teacher, generally are distributed in print, audiovisual and telecommunication systems, there is a tutoring work, usually carried out by different people that have developed the course content.

Distance education characterized by a physical separation between teachers and students-not excluding physical encounter points, which prevails two-way asynchronous communication where the Internet is used mainly as a communication way for sharing knowledge, so that the student is the focus of an independent training and flexible, having to manage their own learning, usually with external tutors help.

2.4 Advantages and Drawbacks of using the Web in teaching

2.4.1 Advantages of using the Web in teaching

ELearning is based in a massive use of the Web as a way of communication. Therefore, it is useful to know the advantages and disadvantages of using the Web in distance teaching. These are the main advantages:
• Very easy to use.

Once you have access to the Web, work on it is as simple as clicking the mouse, as it is not aware of any required additional computing.

• Multimedia communication system.

When a student is connected to the Web, he can access all kinds of multimedia documents: not only text also sound and audiovisual information.

• The distance between transmitter and receiver of information is not relevant

When you access a Web page, you don’t have any information about where is located physically the computer we have submitted: it can be located only meters from our own computer, or thousands of kilometers away. This does not happen with ordinary mail or the telephone, where pricing is directly related to the distance: the more distant are the sender and receiver, the higher the price to be paid the geographic barriers has disappeared for information exchange.

• Very low costs for students and for teachers that generate contents.

Internet operates as an international nonprofit cooperative, where each partner takes maintenance costs connecting to the nearest node, costs are reduced for everyone.

• Connection to the Web of the vast majority of research centers and universities.

This is one of the great added values of the Web. Furthermore, we have to think that for distance students, it is precisely one of the most important factors regarding his contents, they can access to the largest library of electronic publications ever dreamed. The Web has become, in the industrialized countries, in a media almost universally as fax or telephone.

2.4.2 Drawbacks of web usage in distance learning

• Disorientation in information access.

The procedure for accessing information on the Web is a hypertext; each Web page can contain numerous links to other sites, which are usually marked with a different color or with an underscore. Hence one of the critical aspects of the Web is that the student can be disoriented, as the only way to surf the Web is going selecting cross-references.

• Potential use for destructive and criminal purposes.

There are still critics on the use of the Internet for not corrects purposes, in some cases, even criminal, like getting users information that can be use for swindle and frauds. Also the teaching can be put down to subjective and wrong information.
• Slow access to the Web.

Due to the excessive growth of the Web, it is clear that in some cases might be inappropriate to talk about information highways because the impression you get sometimes is that these highways are almost always collapsed.

2.5 Advantages of eLearning in the enterprise

The advantages of eLearning in the enterprises can be summarized including the following list:

• Greater flexibility.

ELearning provides greater flexibility in regard to the conventional method of the class in the classroom because it is not necessary to be programmed increasingly logistics involved any other action training in the enterprise.

When a course is offered, employees can receive in any slot, apart from the fact that the employee can set their own pace of learning, according to the time available and the goals it has set.

• Ease to access.

The fact that the employee can follow any course of eLearning, generally he only needs one terminal with an Internet connection and a browser.

• Reduction of learning time.

According to empirical studies carried this purpose, it was found that the times of learning can be reduced between 40% and 60% with eLearning solutions.

• Retention increasing.

In experimental studies, information uptakes of eLearning processes are retained 25% more than if solutions are used in conventional training.

• Compatibility with activities.

ELearning is compatible with many other activities, almost simultaneously, work, recreation, etc... therefore need only access the computer at any time, on the other hand, stop the training when it is desired.

• Convenience.

The eLearning avoids many trips, is a great comfort for employees to avoid frequent trips to far locations from their workplace, even taking an overnight stay away from home.
• Reduced costs.

E Learning can be up to 30% cheaper than conventional training in the classroom, where we can not draw the conclusion that eLearning is completely replace of the conventional training, even if they are very different learning methodologies, usually both are complemented.

• Possibility of immediate course contents updating.

In the eLearning courses is possible to incorporate any change at any time, and the employee can access to the updated information. This is unthinkable in the conventional training.

• Personalized training.

The eLearning courses offer the great advantage of being able to be customized, so every employee who is identified on formation site of the company, he will have displayed any information (course offers, tracking of their progress, etc...) that human resources direction has been scheduled.

• Training process monitoring.

A huge advantage of any eLearning training action is the possibility for the human resources direction tracking of each and every one of the employees, even the smallest detail, in the learning process: number of connection times, date and time, exercises carried out, page views, degree of employee satisfaction with each course.

2.6 ELearning in an economic point of view

E Learning will be critical to the success of individuals, organizations, communities and economies in the dawning knowledge economy.

Much touted are the benefits of the internet for the various functions of organizations ranging from procurement to marketing to customer service. However, the digital age has spawned an overwhelming mass of raw information that is frequently difficult to retrieve and to use.

The critical and distinguishing strength of countries, organizations and individuals lies in their intelligence and knowledge in this new economy. Network technology has enabled a proliferation of customized and timely educational tools that optimize investment in human capital: eLearning solutions facilitate the delivery of the right information and skills to the right people at the right time.

The globalization of the economy, shortage of skilled workers, free agent mentality, new flexible work situations (telecommuting, for example) and numerous other factors have created problems not easily solved by traditional education, spurring the initial growth of the eLearning industry.
Companies are addressing these problems using technology-based learning resources targeting the academic, corporate, and consumer spheres with managed, interactive, just in time, current, and user centric education tools. These factors and others set the stage for what we believe are exceptional investment opportunities in the eLearning space. [9]

2.7 ELearning needs analysis

An eLearning needs analysis is very similar to the assessment process you would use for any other form of training delivery. The basic model includes:

- Determining training objectives
- Analyzing the needs and skills of the audience receiving the training by collecting data
- Reviewing the data for trends and consistencies
- Designing a high level course outline for the eLearning curriculum
- Developing training recommendations based on the data collected
- Compiling a project plan and budget for the eLearning curriculum
- Summarizing the needs analysis results and presenting them to management.

The development of online material market offers many jobs opportunities for web designers because are based in the Web: HTML pages, Flash movies, etc... the same kind of content developed for other on-line projects.

The previous knowledge of the web designer makes it particularly suitable for the development of courses. Although knowledge of the basic principles of usability and accessibility and limitations of the medium are essential to develop on-line material, the development of eLearning courses has peculiarities that make it distinct from other types of online content. [12]
3. METHODS

"The different tools, systems and standards of eLearning are discussed in [5], [8], [11] and [34] and the methods information in Chapter 3 is mainly a compilation of the material in these sources."

3.1 Tools for creating eLearning content

Tools for offering eLearning make sure that the eLearning you create can be accessed by learners conveniently and efficiently. Tools for offering eLearning provide several functions:

- Making eLearning available over a network.

Sometimes this activity is referred to as publishing a course. As its name suggests, publishing makes the course public.

- Administering your eLearning offerings.

Common tasks include enrolling learners in courses, assigning administrators and instructors to courses, collecting fees, and churning out required reports. Even online courses involve a lot of paperwork. Tools in the Offer column of our tools framework help with this paperwork.

- Controlling and tracking access.

To the courses, lessons, and individual objects you offer. Tools may be needed to restrict access to registered learners and log which modules they have taken and completed. Offering may also require recording scores on individual tests and other graded activities.

Creating eLearning refers to the process of authoring and integrating content. It can take place at each level of content. That is, you can create raw media elements; integrate them into pages, displays, and learning objects; link those to create lessons; aggregate the lessons to create courses; and link courses to create a curriculum.

These are the different kinds of eLearning tools that we can find in the market:

- Course authoring tools.

Expressly designed for creating eLearning, such tools simplify the process of implementing instructional strategies, creating menus and navigation schemes, and authoring pages without extensive technical knowledge.

- Web site authoring tools.
For creating HTML pages and linking them to produce entire Web sites, such sites could be courses or material associated with courses. By including scripting, dynamic display effects, and connections to databases, these tools can create highly animated and interactive eLearning content

- Testing and assessment tools

For creating and conducting assessments, these tools create true-false, multiple-choice, short-answer, text-entry, matching-lists, and other kinds of computer-scored tests. Some track performance and generate reports

- Media editing tools

For creating, editing, and "Web-readying" drawings, icons, photographs, animations, sounds, video, and other media included in eLearning

- Conversion tools

For transform documents, presentations, graphics or other contents to formats that can be used in eLearning and on the Web.

![Diagram: How the information is created and accessed](image)

Picture: How the information is created and accessed [11]
3.2 ELearning System Tools

The tools in this section tend to be the most expensive and technically complex of the tools and technologies we cover in this thesis. Even so, it is important to understand what they offer.

- **Web servers.**
  To deliver Web pages and other media requested by a Web browser.

- **Learning management systems.**
  To administer courses and students

  - **Learning content management systems.**
    To assemble and offer courses made up of reusable content modules.

- **Collaboration tools.**
  To enable fluid communication among distributed learners

  - **Virtual-school systems.**
    To conduct instructor-led learning over the network

- **Media servers.**
  To deliver sound, video, and other dynamic media efficiently over the network
3.2.1 Web Servers

Web servers are core technology for eLearning projects. The eLearning courses need some kind of web servers due to their nature internet behaviour.

Those who make eLearning courses will not probably setup the web server, but they cannot escape the limitations of the web servers. LMSs and virtual-school systems may be more sophisticated, but it is the web server that does main work.

![Web Server as core technology for eLearning projects.](image)

3.2.2 LMS

A learning management system (LMS) simplifies the process of administering education and training. It is a complex system used by managers, administrators, instructors, and learners to schedule, register, bill, and track learners through courses and other learning events. It lets learners find and register for courses, launch online courses, monitor their competencies, and measure their progress through a course or program of learning. Finally, it helps administrators manage training programs and compile statistics and reports.

The LMS integrates courses created in content creation tools (Web-based and course authoring tools). It can also integrate courses delivered by a Learning Content Management System (LCMS). In these cases, the LMS find the course and redirects the learner to the LCMS, which actually launches the course and tracks the learner’s progress. The LCMS then reports completions and grades back to the LMS.

An LMS is a Web-based database application that sees the courses that has been accessed or has been completed by the learners. Through an integrated, Web-based interface, an LMS lets
administrators make common tasks, like adding courses, registering learners into courses, launching courses for learners, recording course completions and grades, and generating reports.

![Diagram of LMS Schema](image)

**Picture: LMS Schema. [11]**

### 3.2.3 LCMS

A learning content management system (LCMS) simplifies the task of creating, managing, and reusing learning content, that are the components of courses.

LCMSs manage learning content by maintaining items of content in a central repository. From this database, designers can organize, assemble, approve, publish, and deliver courses and other learning events.

An LCMS lets authors create, store, and refine learning objects or other units of content. It helps learners locate and take just the learning they need at the moment.

![Diagram of LCMS Schema](image)

**Picture: LCMS Schema. [11]**
3.2.4 Collaboration tools

Collaboration tools help people work and learn together at a distance. They let participants share their ideas, opinions and doubts. They are essential for collaborative eLearning, e-mentoring, and knowledge management initiatives.

This category covers a wide range of tools, from simple text-based e-mail clients to complex online meeting tools. Supplying a complete collaborative environment may require you to combine several separate tools and technologies.

- Synchronous vs. asynchronous collaboration

Collaboration tools can connect participants synchronously or asynchronously.

Synchronous communications, also called conferencing, occur in real time. That is, all participants have to be online at the same time. Synchronous communication media include chat, application sharing, whiteboards, audio conferencing, and video conferencing.

Asynchronous by the other hand make no necessity for the learners to be together at the same time. Then they don’t need to wait the response, expecting that the other participant will read the message at some point.

With asynchronous communication, the participants can send the message when is more convenient for them, and also can reply more relaxed, having time to think about the received message. Anyway, between online forums and e-mails, the forums are less synchronous due to there is less expectation of a quick reply.

These collaboration tools make possible for participants to have free discussion about all those issues they are learning.

The simplest tool is the email. It makes a simple way to communicate not only between the instructor and the student, but also send multiple messages to many participants about issues like changes.

Talking about a special issue, the forums give the best tool, because all the opinions and information about an issue can be tracked.

![Collaboration tool Schema](Picture: Collaboration tool Schema. [11])

### 3.2.5 Virtual Schools

Virtual-school systems enable the delivery of instructor-led and facilitated eLearning.

They combine capabilities from learning management, content management and collaboration systems.

Virtual-school systems are different from online meeting tools in several ways. Online meeting tools tend to be a collection of collaboration tools increased for eLearning. They tend to be session oriented.

Virtual school systems are more course and curriculum oriented, even though they can share the capacity to conduct online meetings.

Virtual-school system supplies a package of features needed to assemble administer and conduct eLearning courses.
Virtual-school systems usually combine an extensive database that tracks all aspects of learning with a collection of collaboration tools.

The database lists and tracks connections among classes which are defined in the system as learners enroll in particular courses. Curricula are defined as sequences and dependencies among courses.

Courses are defined in terms of lower-level objects, which may include specific media. Courses may also involve tests and meeting events, which may include media, such as presentation slides, and may also involve a mix of collaboration tools such as e-mail, discussion forums, chat sessions, audio conferencing, application sharing, whiteboard sessions, and video conferencing.

3.2.6 Media Servers

Conventional Web servers deliver HTML Web pages on request. Because most Web pages consist of text and simple graphics, this is not too difficult a chore. A moderately powerful Web server can handle hundreds of requests per second. But when the media requested are large audio and video files, a conventional Web server may begin to cough, wheeze, and collapse from the exertion required.

The chores of handling many requests for large media files are best handled by a media server, which specializes in high-bandwidth audio and video.

3.3 Standards in ELearning

To enable student monitor activities on the contents, beyond what the statistics it has been developed several standards or specifications in the field of eLearning: ADL, AICC and IMS are the most extended.
All these standards promote content and platforms interoperability from the different manufacturers. Platform or LMS and content are separated by these two basic ways:

* Packaging specifications.
* Test specifications.

The "packaging" is to label the content so that it can be recognized as such by the LMS and enable its to load on the system. In the case of ADL SCORM and IMS specifications (the most widely used at present) this is done by describing the content in an XML file, where are referenced the resources in this content.

Test specifications relate the way that the content must register the user activity in the auto evaluation test and other activities that the course includes. These specifications are the implementation of an API that connects the content with the LMS. However, there are tools to facilitate the creation of evaluation systems, for example, extensions for the most used applications like Flash.

An even easier alternative is the use of specific authorized tools for eLearning, which provide a complete environment to design the contents and do not require programming; automatically packaging contents created and all the code is generated for the student monitoring activity on the content in any LMS compatible. [34]

These tools facilitate greatly the work for content design and online courses and allow the web designer adapt their skills to this new market without excessive complications.

Producers create individual modules or learning objects which must be integrated into a unified course. Standards that allow the assembly of courses authored in different tools by different producers into packaging standards. These same standards enable a management system to import and organize all the components of the course.

![Diagram: How the standards work in eLearning.](image)

3.3.1 Interoperability and compatibility

The standards allow interoperability and compatibility between eLearning components.

| Interoperability and Compatibility | - The eLearning platform  
- Materials and contents to be incorporate  
- Support and monitoring services  
- Creation and development content tools  
- Human resource management systems  
- Evaluation tools |

This compatibility allows the freedom to choose providers content and tools, as well as the acquisition of content and assures us a good investment for the future because it allows integrate different tools and even a complete migration to another platform or system.

The advantages of standardization is that it allows the reuse of courses to other platforms, for example, the migration of all the learning data activity to another system (platform, human resources systems or knowledge management), develop of internal courses for their own platform or extract student activity learning data (assessments, learning routes, profiles, etc...).

Independently of the technology and content providers, the chosen system must allow interaction and integration among the multiple and diverse components that form to facilitate such things as:

- The automatic transfer of data between our learning platform and management system.
- The platform (LMS or LCMS) must be able to manage and endure courses from different backgrounds.
- The platform should enable the storage and data management of the learning activity (learning pathways, activities, evaluations, etc...) for their interpretation.
- The platform will allow the import / export of all management and monitoring data.

3.3.2 Institutions of specifications and standards

The model of the initiative ADL SCORM (Advanced Distributed Learning), which several organizations cooperate involving in standardization (IEEE, AICC, IMS, ADL), offers open specifications, tested and stable, which to base the development of tools (eLearning platforms, creation and analysis) and content, compatible with each other.
The internal specifications are the base on which accredited standardization agencies work to achieve an open specification accepted by all: the standard.

A specification is a technical document that describes the components (part static) and behavior (dynamic part) of a particular system.

These specifications derived, in the coming years, an ISO standard (International Organization for Standardization) to govern the open model of "eLearning" so it’s strategic importance and the compliance of tools and content are part of the advantages and capabilities offered by the open architecture.

In those formative technologies the success depends on its interconnection and integration ability with the adoption of open standards.

### 3.3.2.1 W3C World Wide Web Consortium

The W3C is an association that provides specifications for the Web. Although it is not an accredited organization, its specifications are considered standard done for the industry, such as the specifications HTML, XML or RDF.

The W3C specifications are the basic level of standardization in web technology. For example, specifications emitting in IEEE / ADL / IMS are formalised using XML of the W3C as the language to represent the metadata, content structure or the participant profiles.

### 3.3.2.2 IEEE / LTCS Working and Study Groups

IEEE (Institute of Electrical and Electronic Engineers) is one of the most important government agencies for the establishment of international standards. Through his committee LTSC (Learning Technology Standards Committee), performs development of standardization in new learning technologies.
The objective of the various working groups IEEE LTSC is to develop technical standards, practical recommendations and guidelines for software components, tools and design methods to facilitate the development, dissemination, maintenance and interoperability of computer systems implementations and components for education and learning.

The committee IEEE / LTSC consists of a series of working groups under the following standardization lines of virtual learning systems:

- General.

To normalize the architecture, reference model and general terminology

- Oriented to student.

Student model, tasks model and student identification

- Oriented Content:

Exchange of data courses, sequence and modulated courses, packaged content, metadata in educational objects

- Restrictions and Protocols:

Semantic and exchange restrictions, data exchange protocols, restrictions HTTP.

- communication between systems:

CMI proposals, platforms and media profiles, communication agents and company interfaces.

3.3.2.3 AICC Aviation Industry CBT Committee

This consortium emerged at the end of the 80 'as a result of the problem that materials and learning courses for digital aviation industry become obsolete with each new generation of computers. Since then, they work developing technical specifications for learning through digital technologies.

The objectives of AICC are:

- Assist aviation companies and the rest, to the development and introduction of virtual learning.

- Develop recommendations to support interoperability.

- Promote a forum about the authorship of digital content
AICC has developed standards (AGR, AICC Guide Recommendations) specialized in different domains of virtual learning. The most important is the CMI model (Computer Managed Instruction), which offers a broad proposal for the exchange of learning content, management and monitoring of learning outcomes.

It defines how the learning objects should interact with the platform and which information can manage the course and the platform.

Both ADL as IEEE / LTSC have used this CMI standard, which have added various improvements, as a base for their work patterns.

3.3.2.4 ADL Advanced Distributed Learning Initiative

The ADL initiative (Advanced Distributed Learning), is a program of The United States Department of Defense and the Science and Technology office of the White House to develop, through the ADL Co-Lab, the principles and guidelines of work necessary for the development and implementation efficient, effective and large-scale learning on new Web technologies.

ADL does not develop specifications themselves but integrates and complement the already existing ones (consortia and organizations such as AICC, IMS, IEEE / LTSC). Through his ADL Co-Lab, is a true open forum for cooperative research, development and evaluation of prototype digital learning and creating design and specifications guides.

With the model SCORM (Sharable Content Object Reference Model), ADL is positioned as:

- A reference regarding the definition of educational content on-line.
- A set of technical specifications, to be met by Defense Department suppliers of the USA.
- A bridge between new emerging technologies and commercial applications.
- A document for the future development of the technical aspects of digital eLearning content.

3.3.2.5 The initiative ADL SCORM

ADL SCORM model is a complete selection of the most urgent, critical and advance specifications, in IEEE/LTSC (for example, the interface CMI, which regulates the interaction between courses and platform a native of AICC and in standardization process in IEEE / LTSC or the IMS metadata in standardization process IEEE / LTSC).

ADL SCORM is considered the first operating model and real standardization, applicable in learning platforms and content development. ADL SCORM marks a milestone toward standards, should serve as a base for the utilities and compatible content development, opening in practice the industrial implementation phase and commercial use.
3.3.2.6 IMS

The IMS is an open organization, which involved industry and education, government agencies and development societies, who are working on various proposals and specifications for Web technologies learning, such as the definition of metadata for educational resources, definition of evaluation material, etc...

To promote growth and viability of the virtual learning, IMS has two different objectives:

- Help defining the technical specifications to allow interoperability of applications and on-line learning services.
- Promote the implementation of these specifications in products and services, to ensure the broadcasting of digital learning content. [5]
4. THE ALTERNATIVES

"The different alternatives in eLearning are discussed in [8], [11], [16], [17], [18] and [34] and the alternatives information in Chapter 4 is mainly a compilation of the material in these sources."

4.1 Technology

More and more technology is being purchased and used by people with little technical training or knowledge, the people who are tasked with buying technology and getting it all working are not just information technologists but instructional designers, training department managers, school administrators, teachers, instructors, and trainers.

At the same time the complexity has increased. Those wishing to deploy eLearning Must choose from hundreds of tools in many separate categories, including learning management systems, learning content management systems, authoring tools, and collaboration environments, all of which are evolving at a bewildering rate.

The developers first must understand the technologies that underlie such efforts. They have to be able to combine separate tools to create, offer, and deliver content. Such knowledge can be complex and highly technical. And few projects can be done with just a single tool or technology. To complicate matters, tools and technologies change at a frightening rate. Technologies evolve and mature and new tools are continually being developed. Companies form, merge, and go out of business in the span of a few years.

Technology doesn't make eLearning. People do. The right starting points for any exploration of technology are the people for whom the technology is needed. [8]

4.2 Choosing a LMS

ELearning = Contents (electronic material) + communication (forums, chat, IM, etc.) + monitoring (registration of the student activity).

To facilitate compliance with this "equation" from the mid-90 were developed eLearning platforms or LMS (Learning Management Systems). There is a tremendous amount of LMS in the market offering management features and distributing courses content, communication tools and utilities for monitoring in a more or less closed environment.

The selection of an LMS is not an easy decision. Although the LMS share many features, his philosophy of use and integration possibilities are varied.

In many cases, open source systems are an attractive option because of its cost and potential. Its basic functions are essentially the same as those of large systems and if it is not needed an advanced functionality for corporate environments; these systems can cover the requirements desired.
The first basic difference regarding the "conventional" content development for the web is obviously the didactic orientation, that is, the contents must adapt to some pedagogical principles or solid instructional design.

Usually the instructional design is not entirely in the hands of the web designer, the author / expert in content is in charge of this function, but the web designer should have a minimum knowledge in instructional design.

And secondly we have basically a technical factor in relation with the third element in the eLearning equation: monitoring. [34]

4.3 Choosing a tool to create ELearning content easily

One of the most important parts of this Thesis is to find an easy solution to allow the teachers the creation of eLearning material in an easy way using the most common tools and formats in internet.

A lot of tools are offered in the market to create eLearning content, so it is difficult to choose one of those. I have based my criteria selecting the tools to work with the most used web format that in my criterion is Flash, and the most used methods to create learning courses that, in my opinion, are Powerpoint and screen-recorders, offering the possibility to add narration, video, image and audio, with the possibility to edit all these components to create a professional eLearning content.

Another important criteria in my selection is that the tool selected can combine the characteristics explained in the chapter 3.1 (tools for creating eLearning object) and the tools have also to support the ELearning standard to have the possibility to be added in a more complex system like an LMS if it is desired.

- ARTICULATE

Articulate is a very complete tool to work with PowerPoint slides with the possibility to add all kinds of multimedia and to convert in different formats. Articulate is ideal to create ordinary learning content.

- TURBODEMO

Turbodemo is a tool thought to record the screen with a lot of recording possibilities adding multimedia and converting in different formats, Turbodemo is perfect to create demos or computer learning content where is important to record the screen for example to teach how to use a program.
• CAMTASIA STUDIO

Camtasia Studio for me is the star tool because it is a complete tool that offers the possibilities of Articulate and Turbodemo, it is possible to work with Powerpoints and to record the screen adding multiple multimedia options and to converting in a multiple formats.

As one of my objectives is to create Flash format and to work with Powerpoint, I think it is a good idea to know more about that.

4.3.1 What is Flash?

One of the most important advances in design terms in the Web has been the vectoring technology developed by denominated Macromedia Flash.

Flash is the commonly technology used in the Web that allows the creation of vectoring animations. The interest in the use of vectoring graphs that they allow you to carry out animations of little weight and that take just a short time in being loaded by the navigator.

Exits two different kinds of graph:

• The vectoring graphs

An image is represented from lines (or vectors) that have certain properties (color, thickness...). The quality of this type of graphs not depends on the zoom or the type of resolutions with which are watching the graph. No matter how much we approach, the graph not to pixel because the computer draws up automatically the lines for that level of approach.

• Images in bit map.

This type of graphs is similar to a square matrix in which each one of the squares (pixels) shows a certain colour. The Information of these graphs is individually kept for each pixel and is defined by the coordinates and colour of the pixel. This type of graphs is depends on variation of size and resolution, being able successively to lose quality when modifying their dimension.

Flash uses the possibilities that working with vectoring graphs offers, easily redimensionables and changeable by means of functions, intelligent storage of the images and sounds is used in its animations by means of libraries, to optimize the size of the archives that contain the animations.

This optimization of the space that the animations occupy, combined with the possibility at the same time of loading the animation that this one is in the navigator (technical denominated streaming), allows to contribute visual elements that give life to a Web without for it the time of load of the page extends until you limit unbearable by the visitor.

In addition to this aesthetic aspect, Flash introduces the possibility of interacting with the user. For it, Flash invokes a programming language called Action Script. Object-oriented, this language knows clearly influences of the Javascript and allows, among other many things, to manage the filling of forms, to execute different parts from an animation based on events produced by the user, to jump to other pages, etc.
In this way, Macromedia makes our available a thought technology to contribute better design at the same time to our Web that allows us to interact with our visitor. By all means, this is not the only alternative of vectoring design applied to the Web but, without a doubt, one is most popular and more complete about them. [34]

4.3.2 What is Powerpoint?

Powerpoint is a powerful program to create presentations with slides to use them when it must expose in public or for its use in any oral or written type of presentation. With Powerpoint is easy to obtain a results and effects that would be impossible with another type of supports or that cost an enormous work.

4.3.3 What is a Powerpoint presentation?

A presentation is a set of slides and documents that appear to an audience, notes for the orator and a scheme that serves like summary. All is stored in a file. Each page that is created in the space of work on the screen constitutes a slide of the presentation. Each presentation can have a single page or hundreds of them. In each slide we can include texts, tables, graphs, sounds, drawings and predefined images made with PowerPoint or with other applications to create a design with a certain format and appearance.

4.3.4 Main reasons to convert a PowerPoint file into a Flash file

This is a detailed list of the main advantages if we convert a PowerPoint presentation into a Flash file. It does not matter what is the final mission, a presentation based in Flash contributes so much to its success because it makes its content easy to access and distribute.

- Greater Accessibility.

Once converted into Flash, a Powerpoint presentation can be easily seen in any Internet navigator like Internet Explorer, Mozilla, Netscape, Firefox and many others. Since more of a
98% of the navigators have installed a plug-in of Flash, it is not necessary to install any special software.

- Compatibility.

Everyone who has a computer, including Macs, Linux, Solaris, HP, SGI workstations, PDAs (PocketPCs and PalmS), and handheld devices (with an integrated Flash reproducer) can see their Powerpoint presentation in Flash format. There are no limits in terms of devices or computer operating systems.

- Reduced size of File.

A Powerpoint presentation converted to Flash can drastically reduce the size of the file up to a 1/10 of the original size.

- Integration of Sound.

A Flash file can also integrate tracks of audio, including music and voice recordings.

- Screen resolution

Flash files can be reproduced to almost any resolution and/or screen size, what makes this file an ideal vehicle to distribute presentations through a great number of different devices.

- Distribution in Internet

To distribute Powerpoint files through Internet so they can be viewed for other users can be easy to do, but not always the final user has Powerpoint installed in their PC. But if we upload a Flash file in any server, forum or discussion group everybody can see it.

- Streaming

Flash files use technology of continuous flow (streaming), which allows the spectators online to start watching the presentation, without the need to wait until the presentation is completely downloaded before to start running it.

- Basic controls of Interaction

Flash files contain inlaid optional controls that allow the end user to start the reproduction, to stop and to rewind the presentation.

- More Options of Distribution

Flash for many of the previously listed reasons is also the ideal format to distribute Powerpoint presentations in CD-ROMs. It allows multi-platform compatibility and at the same time it provides a light and functional file that can integrate audio and video and can be exhibited in different screens and resolutions.
• Ready For Electronic mail

Still if anyone wants to send a Power point file to somebody by electronic mail, to convert it into a Flash file can be a better option. The file is smaller and does not clog your recipient's inbox. In addition to this, the flash file allows you to maintain all its transitions, animations and effects, and at the same time one makes sure that the person who receives it will be able to open the file without having to download another program.

• Security

Others can publish Power point files if they have Power point installed in their machine. This is not the case for the Flash files. Nevertheless, they allow you to maintain a greater control of their content if it is necessary.

• Friendly with the Firewall

The contents based on Flash do not have problems to cross firewalls because they are like a standard Web content.

4.4 Manual Instructions