An eLearning Environment for SMEs in the Food and Beverages Industry Sector

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Abstract: In this paper, we present the eLearning Environment that was developed within the scope of a research project. Our objective was to create a system for distance learning on the topics of quality and certification procedures for industries and industry personnel of the Food and Beverages Sector. In this paper, system architecture and functionalities are described.

Keywords: Distance Learning, Cooperative Education.

1   Introduction

Nowadays, personal computers and generally the new Information Technologies are widely used for educational purposes. The term *"interactive software"* is used to declare the specific software that gives the ability to the trainee to participate in determining the pace and sequence of a course.

Open Distance Learning (ODL) or eLearning includes the use of new methods and tools in order to increase the flexibility of educational procedures in terms of space, time and educational tools. The basic features of distance learning are:
❑   the time and space division between trainer and trainee,
❑   the adaptation of the lesson, with regard to the requirements and the constraints of the trainer, and
❑   the non direct communication between trainer and trainee.

The first form of distance learning was the courses through mail in Europe in the middle of the century. The use of technology for educational purposes began 40 years ago in Latin America, through radio for the training of residents in agricultural and isolated regions. The use of TV in education takes place in the 60s when public and private stations, in cooperation with schools and universities, offered courses to people and schools. The main disadvantage in educational TV is the lack of interaction between trainers and students. In the last 10 years NASA provides education via technology application satellites, an effort that began 30 years ago [1].

The rapid growth of information and communication technologies and mostly the wide spread of Internet offer solutions in a wide range of subjects comprising informing, cooperating, communicating, advertising and more. Internet technologies were commonly used for the diffusion of great amount of information in educational institutes and enterprises. Soon, the opportunities of Internet for new educational applications became clear, like *"distance learning"* and *"autonomous learning"*. The World Wide Web technology more particularly, can be used for accessing a great volume of information, available in various forms (text, image, sound, movie) and can be updated and expanded quickly and easily [3].

Internet is the most suitable platform for the implementation of distance learning applications. The ability to provide all available information from the same system in combination with the low cost of acquiring such systems is the primary reason for this choice. The main advantages that arise from the

use of Internet as a learning tool are the use of multimedia for the presentation of the courses, the use of hypertext and hypermedia, the interactive learning capabilities and the availability of tools for building educational applications.

The increasing use of Internet and the ability to access remote places, make it very attractive for the implementation and delivery of training programs. The training through the WWW is a method that, even though cannot achieve immediacy in the relationship between trainer and trainee nor can it substitute the traditional form of learning, has in fact a lot of advantages, especially when it comes to training adults [2], [4]:

- can be used for trainees located at geographically remote places that do not have the ability or the time to be present in the training centers;
- offers the ability of personalized training, in which the trainee selects the timing and the pace, as well as the depth of the acquired knowledge, in accordance with his personal needs and potentials;
- provides speed and flexibility in the update and the expansion of the learning material;
- does not require special equipment on the part of the trainees; just a personal computer with multimedia capabilities, a modem and access to the Internet;
- ensures savings in resources regarding the development of additional learning material, especially when the required equipment and knowledge is available.

In parallel, Internet learning has the ability to maintain part of the most positive learning features of traditional learning processes, such as communication and cooperation between the trainer and the trainee, assignment of exercises and tasks, as well as interaction. Part 2 presents the learning features of the system and the learning programs. System architecture and functionality are described in part 3.

2 Learning Features

The operation of the eLearning system does not require the presence of a trainer during the learning process (*"asynchronous"* education), in order to offer trainees the possibility to choose the time sequence and the pace of the course they attend, as personalization imposes. More specifically, trainees are able to:

- attend the courses whenever they want,
- attend the courses step by step, in proportion with their time availability,
- bypass the units they are not interested in,
- repeat specific units,
- choose the learning pace and the depth of the acquired knowledge, in accordance with his personal background and interests.

Issues that might rise (questions, queries addressing the scientific coordinator, discussions between trainees, group cooperative tasks etc.), are coped with during the learning process or right after its completion. For this reason, the Internet e-mail service is deployed in the form of a private mailing list that includes the trainees and the scientific coordinator. Trainees have the ability to communicate with each other and with the scientific coordinator, express their opinion on various learning topics, submit questions and receive answers.

Learning material is designed and structured in advance in the form of a tree and it is available to the trainees during the learning process. That tree includes at the first level the lesson chapters, at the second level the chapter units and at the third bottommost level unit subunits, if any. Each trainee is given the ability to attend any unit and in any order without restrictions.

Despite the existence of a suggested sequence for every lesson, trainees can choose any chapter of the lesson, in any order. This ability not only provides flexibility and freedom of choice to the trainees, but also makes study easier for them, as they can choose different parts of the lesson, in proportion with their time availability, as the principles of (especially adult) learning command.

The main feature of the eLearning system is the ability of continuous update and improvement of the course, if there is a need based on the feedback and interaction on the part of the trainees.

3   Learning Programs

Quality is a significant factor for the increase of the competitiveness of SMEs in the Food and Beverages Industry Sector so the choice for installation of systems for control and certification of quality and for observance of the European Union's health rules, works efficiently in the direction of sector industries development.

The *"ISO 9000 Series"* and *"HACCP"* address basically staff of SMEs in the Food and Beverages Industry Sector, who have no special technological skills, in order to be informed about Certification Quality Systems and the sensitization on food quality issues. The objectives of the learning programs are obtained through the analysis of the advantages of such control and quality assurance systems.

The thematic objects of the two implemented courses comprise:
- ISO 9000 Series.
  - ✓ Basic principles of Quality and Quality Systems.
  - ✓ ISO 9001: Quality Systems.
  - ✓ The Certification Process.
- HACCP.
  - ✓ Introduction to the HACCP System.
  - ✓ Integration of the HACCP and the ISO 9000.
 - ✓ Development and Application of the HACCP System.

4   Architecture and System Functionality

The eLearning system architecture is depicted in Picture 1.
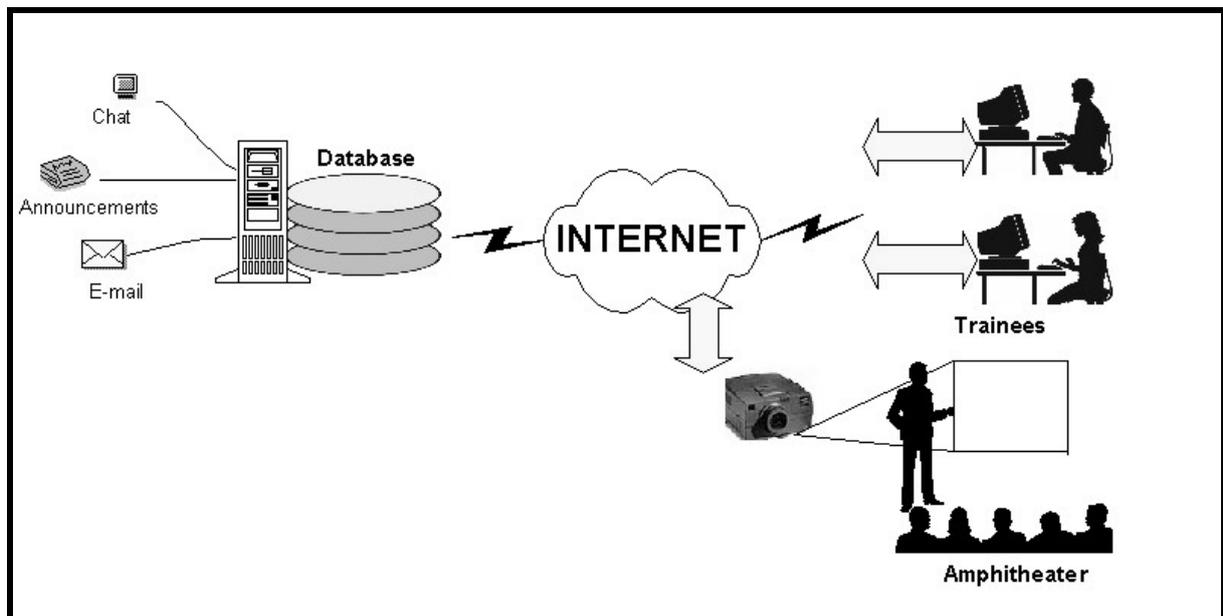
Picture 1: Distance Learning System architecture.

The eLearning system is designed so as to provide trainees with a set of tools and options available at all times. During the learning process, in the left part of the user monitor there is a bar with assistive tools providing integrated distance learning services. Such tools are: Library, Announcements, Cooperation, Personal Info, Amphitheater and Exit (Picture 2).
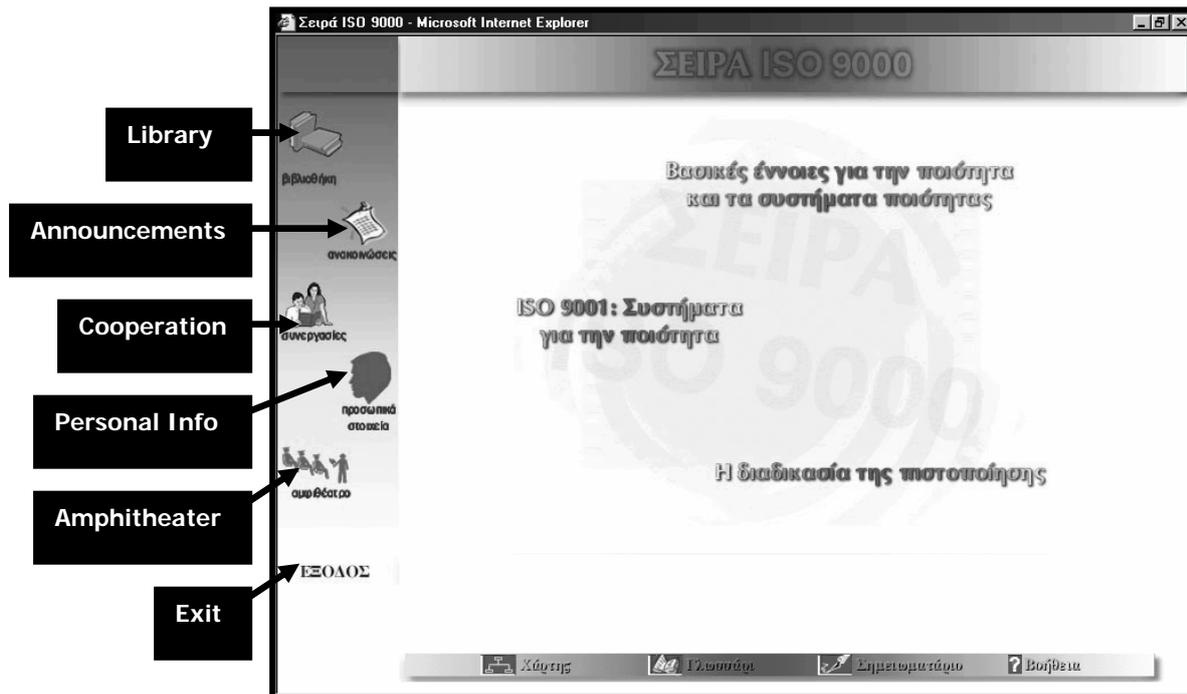
Picture 2: System introductory instance.

❑ *Library:* available bibliography referring to the subject of each lesson and access to additional relevant sources on the Internet through hyperlinks.

❑ *Announcements*: information on activities regarding lessons, like the time and the subject of open discussions and cooperative exercises. Trainees have also the ability to send a message to the scientific coordinator through electronic mail (e-mail) at any given point of the learning process, for submitting remarks or enquiries regarding the lesson or for requesting additional information about the taught topics.

❑ *Cooperation:* trainees have the following capabilities:
  ✎ Information for the trainees attending the lesson at any moment this service is requested.
  ✎ Participation in shared activities on the Internet, like live discussions between trainees and the scientific coordinator about the content of the lesson or execution of cooperative exercises.
  ✎ Dispatch messages through e-mail at the mailing list of the course.

❑ *Personal Info:* every trainee has access for modifying the personal information filled in the registration form. Information referring to lesson attendance by the trainee is also provided (number of course attendance sessions, session duration, etc.).

❑ *Amphitheater:* trainees have the option to attend at real time a lecture given by the scientific coordinator through their computer speakers, at a fixed, preset time (as determined at the Announcements).

❑ *Exit:* used for ending the current learning session accompanied with a notification of the event to the rest of the connected trainees.

During the attendance of the lesson, apart from the learning material, a set of tools that help, support and direct the learning process appear on the screen. These tools are placed in the navigation bar at the bottom of the screen and include a Lesson Map, a Glossary, a Notepad and a Help utility. The former tools corresponding to specific functions, give trainees the ability to participate in an integrated learning process. The navigation bar is presented in Picture 3.

Picture 3: Navigation bar.

Lesson Map

This tool shows trainees the tree structure of the lesson and the currently selected unit. Thus trainees can have a general aspect of the organization of the course in Chapters and Units. In this way they know at any time their exact position in the learning process but also they can jump to another part of the course by choosing the respective unit title (Picture 4).
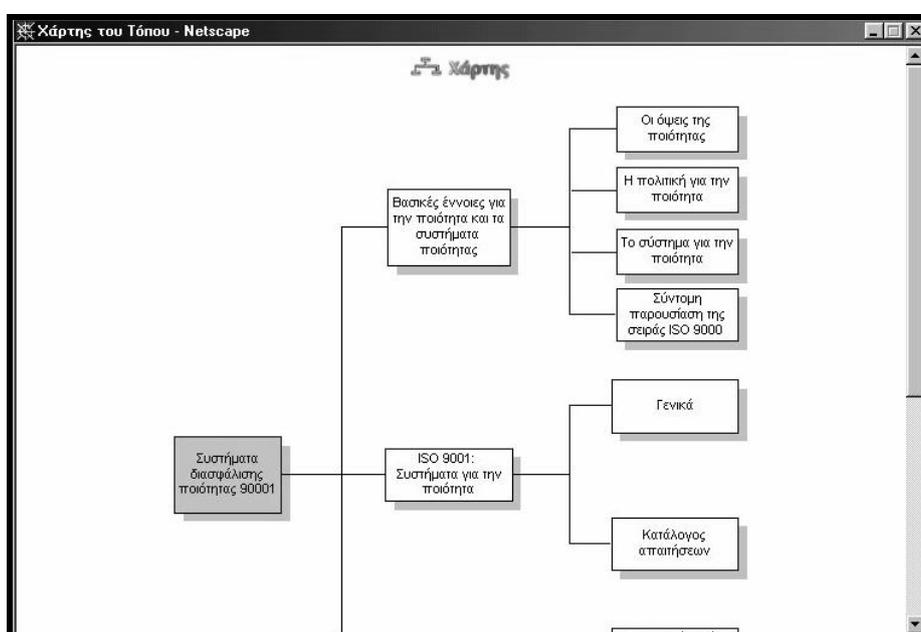
Picture 4. Lesson Map.

Glossary

The Glossary is a table of terms and definitions that offers trainees the ability to study the complete set of terminology used. The definition of terms included in the Glossary of each lesson, is also available in the learning material of the course, when the user points the cursor over the term appearing in a certain format (hypertext). Thus, trainees can acquire the definition of a term much easier and faster during the learning session, without interrupting the process.

Notepad

The notepad offers trainees the ability to take down notes such as comments, observations, questions or remarks just as they do when reading a book, at any stage of the learning process. The contents of each trainee notepad are recorded in a database, so that old notes are also accessible. Notes can also be sent to the scientific coordinator, who may in turn reply with e-mail to the questions and observations of the trainees.

Help

The Help utility refers to a set of assistive guidelines about the navigation bar and navigation in the eLearning system.

Self-assessment Process

During the course and at the end of some units or chapters, self-assessment exercises are suggested to the trainees in order to evaluate their progress in the course and the knowledge they acquired.

The exercises presented to the trainees are in the form of closed questions where trainees are asked to choose the correct answer (multiple choice and combinational exercises). After the completion of each exercise, trainees receive a report on whether their answer was correct or wrong and the correct answer is returned. Finally, at the end of a series of specific exercises, trainees are notified about their total score for the given set of exercises and are provided with suggestion about their subsequent course in the lesson (for example, they are prompted to repeat the unit in the case of a score below a given threshold).

Picture 5 shows the feedback returned to the trainee of the eLearning system as a system response to a given self-assessment exercise, in the *"ISO 9000 Series"* course.
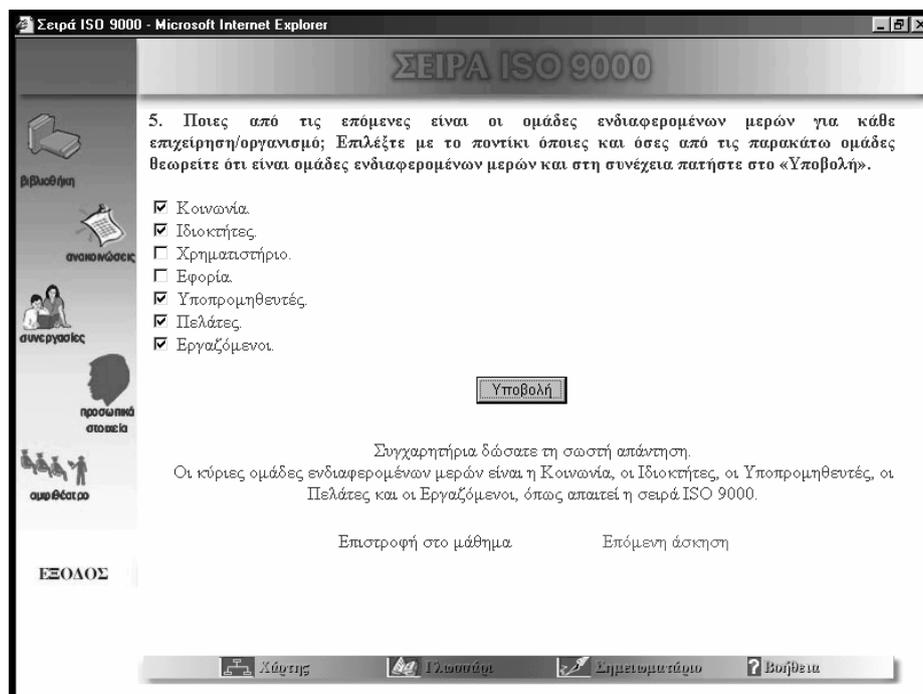
Picture 5. Self-assessment question and system response.

In addition to the self-assessment exercises, *"electronic meetings"* take place online at a time the scientific coordinator determines and then publishes in the Announcements. During such meetings subjects related to the course are discussed and cooperative exercises are executed. In these cooperative exercises, trainees submit their opinions on the solution methodology applied to problems that require cooperation and brainstorming. The scientific coordinator is present at these meetings, directs the cooperation and based on the trainees' participation evaluates their performance.

In parallel, trainees may express questions raised during the learning process to the scientific coordinator via e-mail. The scientific coordinator checks the messages on a daily routine during the course and answers all received questions. Trainees can also send messages to the trainees' directory

expressing questions, suggestions and remarks. Questions and answers circulated via e-mail between trainees are recorded, in order to be used for the improvement of the learning course.

The course material is also available in a CD-ROM in the Greek language. Attending the course from the CD-ROM does not require an Internet connection, but on the other hand does not support communication features.

5   Conclusion

Distance Learning is a sector that has a rapid growth in the recent years, as Internet enters the life of modern Greek. This paper addresses the issues of this sector, in relevance to the eLearning environment that has been designed and implemented within the framework of a research project. The project aimed at providing insight to businesses and especially to SMEs, which want to take advantage of the Internet opportunities, by providing to their employees the opportunity to attend web courses and benefit from lifelong learning. The educational material focuses on the topics of total quality management and certification procedures for SMEs and their personnel on the Food and Beverages Industry Sector. Quality is one of the main factors for the improvement of competitiveness in this sector. In the future, there are thoughts of expanding the eLearning system with additional functionalities and developing new courses for assuring up-to-date and efficient training.

6   Bibliography

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