Implementing a Web-based e-learning Environment for Electrical and Computer Engineers

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Abstract *— In this paper, we study the e-learning process from the learner's point of view. In particular, we have investigated and studied technologies, methods and tools of e-learning applications. Based on this research, we have designed and implemented a system that gives users the opportunity to be educated from distance -with channel of communication the Internet- in various academic subjects. The specific case study concerns the lesson "CMOS VLSI Design" of the Postgraduate Program "Integrated Software and Hardware Systems – ISHS" of the University of Patras in Greece. It is an integrated e-learning system that provides users with a wide range of advanced services and accomplishes to offer a distributed learning environment that simulates the operation of traditional class teaching electronically. The paper presents in detail the e-learning model in which the system development was based on, the offered functionalities, as well as the evaluation methodology adopted for testing the system. The last section comprises conclusions and future plans.*

Index Terms *— e-learning, web-based environment.*

INTRODUCTION

The growth of the Internet has offered more opportunities than ever before for people to communicate and access information and opened up new possibilities that influenced all sectors of public life and particularly the learning process. The conventional seminars, with instructor and trainee in the formal classroom, have now to compete with the advanced distance learning systems or e-learning systems [17]. Besides, according to valid forecasts, e-learning industry is expected to be doubled up to the end of 2003 and enterprises will spend for their employees' training billions of dollars [16]. These indicate that distance learning has the potential for rapid growth and acceptance [15]. However, the challenge is to improve the quality of learners' education experience.

Many people have touted the ability of e-learning to provide information to "*anyone, anytime, anywhere"*, and although we believe that this is the phrase that best describes it now, this description is also appropriate for traditional distance learning methods or even the Internet in general. We believe that the true power of e-learning stands in its ability to bring the *right* information to the *right* people at the *right* time. This is the yet-to-be fulfilment promise of e-learning. Web-based integrated learning systems will revolutionise e-learning by enabling personalised, interactive, just-in-time, current and user-centric learning tools. These systems will allow all facets of a course, including lessons, practice, self-assessment, collaboration activities, etc. to be tracked in order to make the necessary adjustments for improving the course quality and the learners to be able to monitor their progress [3].

Major technological Institutes, Universities and schools have already integrated and are using e-learning systems adapted to their personal requirements and needs [1]. The basic feature of all these efforts is the presentation of various lessons using multimedia material (text, animation, graphics, video and sound).

As the e-learning industry begins to mature, we are seeing products that are far beyond the simple "click-and-read" courses that have characterised the industry up to date [13]. Future manifestations of e-learning will allow the learner to have more control over his own learning experience, thus making it more efficient and reducing time and costs [14].

In this paper, we study the e-learning process from the learner's point of view. In particular, we have investigated and studied technologies, methods and tools of e-learning applications. Based on this research, we have designed and implemented a system that gives the opportunity to the users to be educated from distance in various academic subjects (the implemented case study concerns the lesson "CMOS VLSI Design"). It is an integrated e-learning system that provides users with a wide range of advanced services and accomplishes to offer a distributed learning environment that simulates the operation of traditional class teaching electronically.

The system has been designed and developed in the framework of the Postgraduate Program "Integrated Software and Hardware Systems – ISHS" (http://poros.vlsi.ee.upatras.gr/EPEAEK/general.htm) of the University of Patras in Greece. The program aims to the specialisation of scientists on theory issues, implementations, and applications of integrated software and hardware systems. So, they will be able to contribute in the progress of industry and in the growth of research in that particular area, in national and international level.

For the definition of the application functional requirements and the implementation, a market survey was conducted in order to be studied which e-learning products are available world-wide and which their basic characteristics are. There were also identified the various models and technologies that are used for the development of such systems. The previous analysis was followed by the design and the implementation of the proposed system. The next step was the evaluation of the implemented system from real users (postgraduate students), in order to be examined how much functional, usable and effective the system was. There were also recorded their reactions with regard to the use of the system as an educational tool. The delivery of the system can be followed by further expansion in other lessons of the postgraduate course or even in other courses of the University.

The system is based on distributed multi-tier architecture and consists of a web server, a server side scripting language and a database. Its aim is to enable the administrator-teacher through easy-to-use procedures to create and manipulate the educational content, which can be studied by the learners from distance. Using a variety of new technologies our system characterised for its expandability, openness, and functionality.

The paper presents briefly the current technologies and tools while focuses on the e-learning model that our system adopts. Then, its architecture, supported functionalities and the evaluation methodology and results are given. The last section comprises conclusions and future plans.

CURRENT TECHNOLOGIES AND TOOLS

For the creation of distance learning courses, web-based learning environments usually are used. These are integrated software packages that offer all the appropriate characteristics and functionalities for "building" integrated e-learning applications [12]. Specifically, there are available in the market a wide variety of learning environments like those of the following list: Lotus Learning Space, Librarian, Blackboard, webCT, TopClass, Embanet, Intralearn, Ecollege, Eduprise, etc. [5]. Indeed, there has been a convergence in the available services and characteristics of e-learning environments [6], [11]. In a higher level most designers have agreed in the following specifications:

- User administration and authentication, user with specific roles like instructor, learner, author, reviewer, inspector, etc.
- Reusable content administration.
- Dynamic configuration of the courses.
- Ability for collaborative learning and co-operation among users.
- Finding and modification of users' profiles.

This set of basic functions supposes that every user has an environment in which he can play his own role. Furthermore, every category of users has its own subset of functions. For example, learners and authors may have searching and navigation abilities, administrators may have full privileges on the system services, etc. In other words, the progress of learning environments shows a convergence on their available features. Therefore, it is of high importance the way these tools are adapted in the learning process and moreover their efficiency. For the first, it is required their use in a variety of cases. Each case is a success story or not for each package and are available from the companies that support these tools.

E-LEARNING MODEL

This section describes the e-learning model in which our system is based on. Specifically, the system addresses the following characteristics:

- **Learner-centric education.** Until now, traditional learning was teacher-centric focused on teacher needs in which the learners had to be adapted. However, this relationship had to be inverse meaning learner-centric. Our system accomplishes to put the learner to the centre.
- **Personalised learning.** By analysing the learner's objectives and existing skill level, courses are assembled on the fly that address exactly what the learner needs to know without wasting time working on areas in which the learner is already proficient or uninterested. This level of personalisation is achieved by using small chunks of information, or learning objects, to assemble a course from the ground up using pre-existing templates. The reusability of these learning objects makes this level of customisation feasible in terms of both time and expense.
- **Easy of use.** Many people meet difficulties using computers in the learning process. For this reason our system aims at minimising the learning of new ways of use.
- **Interactive.** Much of today's technology-based learning is simply an extension of traditional textbook-based learning, where the user reads content from a screen instead of from a page. Today's interaction generally consists of the learner being able to click on an unknown word for the definition on a linked page or the ability to play a short video clip. The proposed system truly engages the learner in a give-and-take type of learning that involves simulations of real-world events and sophisticated collaborations with other learners and the instructor.
- **Geographic ant time independence.** Learners are able to join in the class from anywhere, anytime [4]. This has as a result that there are no building restrictions for the learning process and we have not problems of overcrowding inside the classes. Geographic independence means also that the stored data in the web-based lesson can be changed whenever we want, without any delays in the distribution of the material. When information is in the web all users have access in them. In that way, it is not necessary for both the instructors and the learners to be present in the same class at the same time. The freedom of choosing the time increases the sense of controlling the learning experience and thus increases the motivation for learning.
- **Rich informative material (national universities, libraries, etc.).** Furthermore, teacher is able to enrich learning material, by using new technologies (e.g. multimedia) that make lesson more interesting. In parallel, the material that is produced can be re-used, giving to teachers more freedom to work on the update and enhancement of the material and not with its creation from the scratch anytime that the lesson is tutored. Finally, from the moment the learning material is available on the Internet, a shared database is created serving as a distributed source of information.

The focus of the system is placed on providing teachers-learners with the necessary IT tools for creating-accessing the educational material and communicating with each other. The system defines the following three discrete profiles:

- **Learner:** uses the e-learning system for educational and communicational purposes.
- **Teacher:** defines the structure of the lessons and creates the content.
- **Administrator:** manages user accounts and other configuration and maintenance tasks.

Figure 1 shows the adopted e-learning model of the system. The content of the system addresses electrical and computer engineers of the Postgraduate Program "Integrated Software and Hardware Systems – ISHS" and provides them with educational material (text, graphics, animation) for the lesson "CMOS VLSI Design".

SYSTEM ARCHITECTURE AND SUPPORTED FUNCTIONALITIES

The learning procedure is based on client-server architecture. The system consists of a number of different components: the server that stores the data and control the communication (basic system functionalities), the client that is used by teachers-learners in order to access data from the server (web interface accessible via web browsers), and the network though which they connect with the server. The protocol that defines the communication between client and server is the HTTP/HTTPS. The system database collects directly data from the interaction with the client via ADO. A first reference in the nature of data stored in system database focuses in the following qualitative discernible categories: lessons' data, teachers' data, learners' data, supported services data, evaluation data, and statistical data. So, the main system supported functionalities are (figure 2 and 3 are snapshots from the system):

- **Developing features.** These tools have an open architecture and allow the communication with other existing databases, support the HTML language for content creation and are compatible with all types of browsers 4.X and above. Moreover, they support the Windows O/S (95, 98, N_, 2000).
- **Learning tools.** The available capabilities include: course administration and monitoring, online testing, online revising, student administration and monitoring, multiple choice questions, fill in-the-blank questions, multiple image choice questions, true-false questions, timed test submission, completion and results recovery, grades that are stored on the server, test creation with combination of all types of questions, randomised questions, reports on statistical results, control in the designing of the appearance of the course (templates), customisation and personalisation tools, etc.

- **Teachers' tools.** The teachers have the following privileges: asynchronous/synchronous communication with student and other teachers, creating/importing content, creating assignments, course structuring, creating groups of students (learning communities with similar profile), tracking of students activities, add/remove students, e-mail communication, e-mail management from students, e-mail management from teachers, support of more teachers for one lesson, etc.
- **Students' tools.** The students have the following capabilities: authentication with password, student can change his password, web browsing, multimedia support, creating/importing content, student home-page tool, home-page authoring, calendar/scheduling tool, glossary, search tool for course material, store bookmarks, personal e-mail, variety of file types (Word, Excel, etc.), file exchange and file upload, forums, chat-rooms, self-testing tools, student access and progress data available, bulletin board, white-board, etc.
- **Management tools.** Efficient and secure system management is supported with the following capabilities: scalable security levels for secure access, remote access tools, use of server, file management, home-page presence also accessible from site visitors, multi-language support, online manual and help for instructors and students, newsgroup facility, course cataloguing, related links, support from system administrator to instructors, support from system administrator to students, etc.

EVALUATION RESULTS

The system has been tested in practice by real users and their feedback was very useful for its best tuning up. In the first phase of our evaluation methodology, the goals of system's evaluation were specified via questionnaires and usage scenarios [2], [10], [18]. The users that took part in the evaluation were mainly postgraduate students. Specifically, from the beginning of the evaluation process, some constraints were defined in order the conclusions to be more reliable: a) existence of satisfactory number of users, b) presence of a range of ages, and c) users had to demonstrate some (at least basic) experience in the use of computers and web browsers. During the evaluation, two questionnaires were given to users for filling in:

- **Questionnaire for user's profile.** This form included questions about user's personal data (e.g. age, educational level, computer knowledge and experience, etc.)
- **Questionnaire for system's evaluation.** This form was filled in after the completion of usage scenarios. Its questions concerned the general system evaluation from the users' point of view, the points which were difficult for them and the changes/improvements that they wanted to happen. Specifically, application's usability, effectiveness and functionality were examined, as well as the quality of the educational content and self-assessment exercises and tests.

Moreover, a special form had been prepared, the **survellant's form**, which was completed from the surveillant and contained his notes on the general behaviour of the users, their errors and the help that was given to them during the use of the system, as well as the observations that users made by speaking loudly (think aloud technique).

For monitoring all users actions related to the use and functionality of the system log files were also kept. More analytically, every action made from the users e.g. the selection of a service with a mouse click, was recorded into the log file in order to be analysed later for the detection of possible errors and problems they faced. Thus it was made able the statistical analysis of the false users' actions.

The process, which was followed for the evaluation of the e-learning system, was specific and no declinations from the predefined plan happened. The plan concerned the informing of the users regarding the evaluation process, the control of the system based on existing scenarios, the completion of the questionnaires in specific time instances, the existence of cameras for recording the process and finally the creation and analysis of log files. Generally, during the evaluation process, special care was given in the opinion of the users and their observations/proposals were taken into account, since this was a good opportunity for approaching the real final users of the system (the chosen sample offered useful information for representative and reliable conclusions).

Conclusively, the users who took place in the evaluation process faced the system very positively, provided comments that prove its efficiency and effectiveness. The presentation of the theory was characterised as satisfactory by all users. The user interface was considered usable and was stamped satisfactory in their memory. The systems on-help also satisfied. From aesthetic point of view the system took very positive comments, with quality graphics, correct background selection, clear and concise texts and successful selection of fonts and colour combination. The organisation of the theory was scrutable, the navigation was very satisfactory, the presentation interesting and quite analytical, while the provided services of the theory contributed in a totally good presence. The examples and self-assessment questions help users to better understand the lesson theory but more items should be added. Consequently, the addition of more educational material (theory and exercises) can transform the system to a dynamic help tool for the learners in parallel with the traditional learning process. Furthermore, it can be used as a communication channel for the learners not only between them but also with the teachers.

CONCLUSIONS AND FUTURE PLANS

The swift growth of networks and especially the Internet the last years have provided the Institutions and Universities with high access speeds and advanced telematic services. In this way, the ideal conditions for the development of synchronous/ asynchronous e-learning systems have been created. Therefore, it constitutes necessity to undertake actions for their dissemination and spread in Secondary Education (this moment above 5.000 schools in Greece have access in the Web), as well as in Universities.

In order to be such a movement successful and evokes positive results it should become comprehensible from all that distance education does not come to substitute the traditional way of teaching neither to be used for lessons with the same possibilities but via the computers. On the contrary, it comes to complement the present educational process, to help teacher offering more complete and global knowledge to his students. New technologies can be used for enriching the lesson making more interesting. The aim of e-learning is to resolve problems and to offer new possibilities that with the conventional education do not exist offering in that way new prospects.

The international trends and evolutions show that the technology has invaded everywhere and the familiarisation with it is essential for all and specifically for the tomorrow's citizens and employees. So, it is necessary for the learners to come in contact with new technologies, to learn how to use it and to exploit the possibilities that they give. Through e-learning systems the contact and familiarisation become with natural and pleasant way for learners.

In order to be positive these experiences for learners, it is necessary the proper training of teachers in the used technologies, as well as in the new philosophy that imports in the area the distance learning. Knowledge is henceforth open and accessible from all and the instructor should see technology as a tool that will help him to make more easily and better his work and no as enemy that comes to burden him with more responsibilities. So, it will be supposed to give teacher with tools usable and functional that they require from him the less possible work and knowledge on them.

Various comparative studies have shown that the distance learning can be as efficient as the "face-to-face" teaching, despite the fact that the learners do not feel the same satisfaction from their on-line learning experience [8], [9]. The same analyses mention that the use and the growth of distance learning programs will continue. Of course more research is needed in order to be improved the total communication between teachers and learners, to be found why the on-line learners present lower levels of convenience and to be followed specialised strategies for the increase of learners confidence in such programs. It should be noted that the quality and the plenitude of the applications play catalytic role in the creation of positive on-line educational experiences. The experts that will deal with the implementation of such programs it should comprehend the restrictions that will meet and take into consideration seriously the personal preferences of learners. Also, it is required significant effort from the programmers until the technology of e-learning systems can assimilate better the interaction in real time so that it maintains the interest of learners active. Finally, the state has to take care and resolve the gaps that exist now and brake the growth of e-learning applications, as well as to find a solution for maintenance/support costs of the implemented infrastructures [7]. So, citizens' better education requires the development of distance learning in Greece which should become with methodically steps but also fast since the evolutions internationally are very rapid.

Conclusively, the fight between distance learning against "face-to-face" learning shows that there is no winner, and it must not have one. The value of distance learning is certified by all the cases it has been successfully applied. There are cases where distance learning seems to be the only choice. On the other hand, traditional education techniques cannot be integrally applied in distance learning. It needs gradual adjustment, so as the trainees to be able to go through the pattern of learning the have grown with and have followed during their basic education. That is why distance learning must function in addition with "face-to-face" learning. In that way the drawbacks of distance learning will be reduced and will gradually increase its degree of penetration into the educational system. This procedure has a fundamental factor: continuous assessment of the available learning system and the involvement of trainers and trainees in all stages. For this assessment there is still much need for work and documented scientific methodology. This is the one direction of our upcoming research effort.

We started off this paper by discussing the importance of e-learning systems and then we saw our system's e-learning model, its architecture and the supported functionalities, as well as the results of the evaluation process. There remains lot of work for adding new educational material, including other lessons of the postgraduate course and providing more services especially personalised one to each learner. These are the other directions of our future work.

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FIGURES AND TABLES

FIGURE. 1
E-LEARNING MODEL.

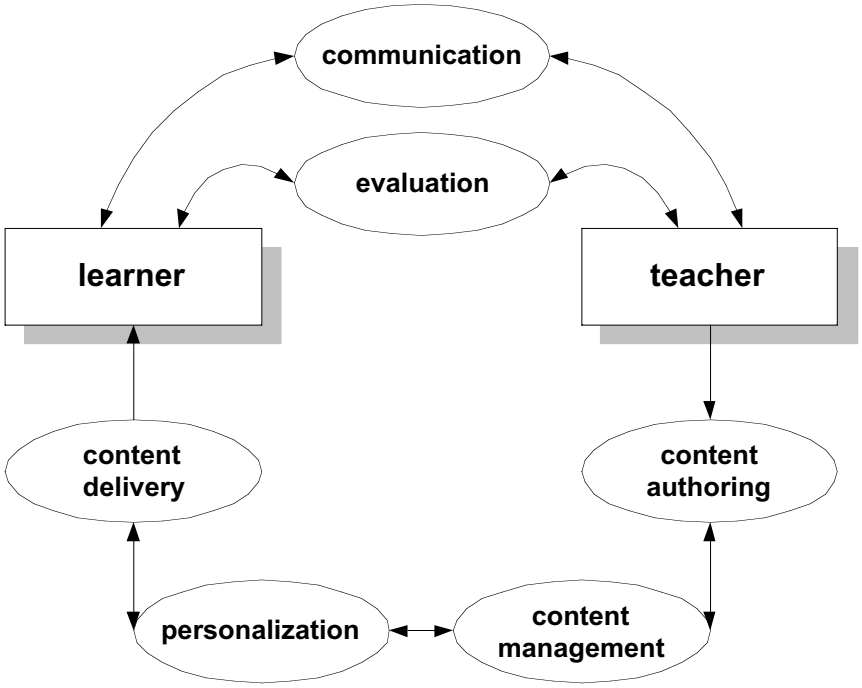
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FIGURE. 2
CONTENT WEB-PAGE.

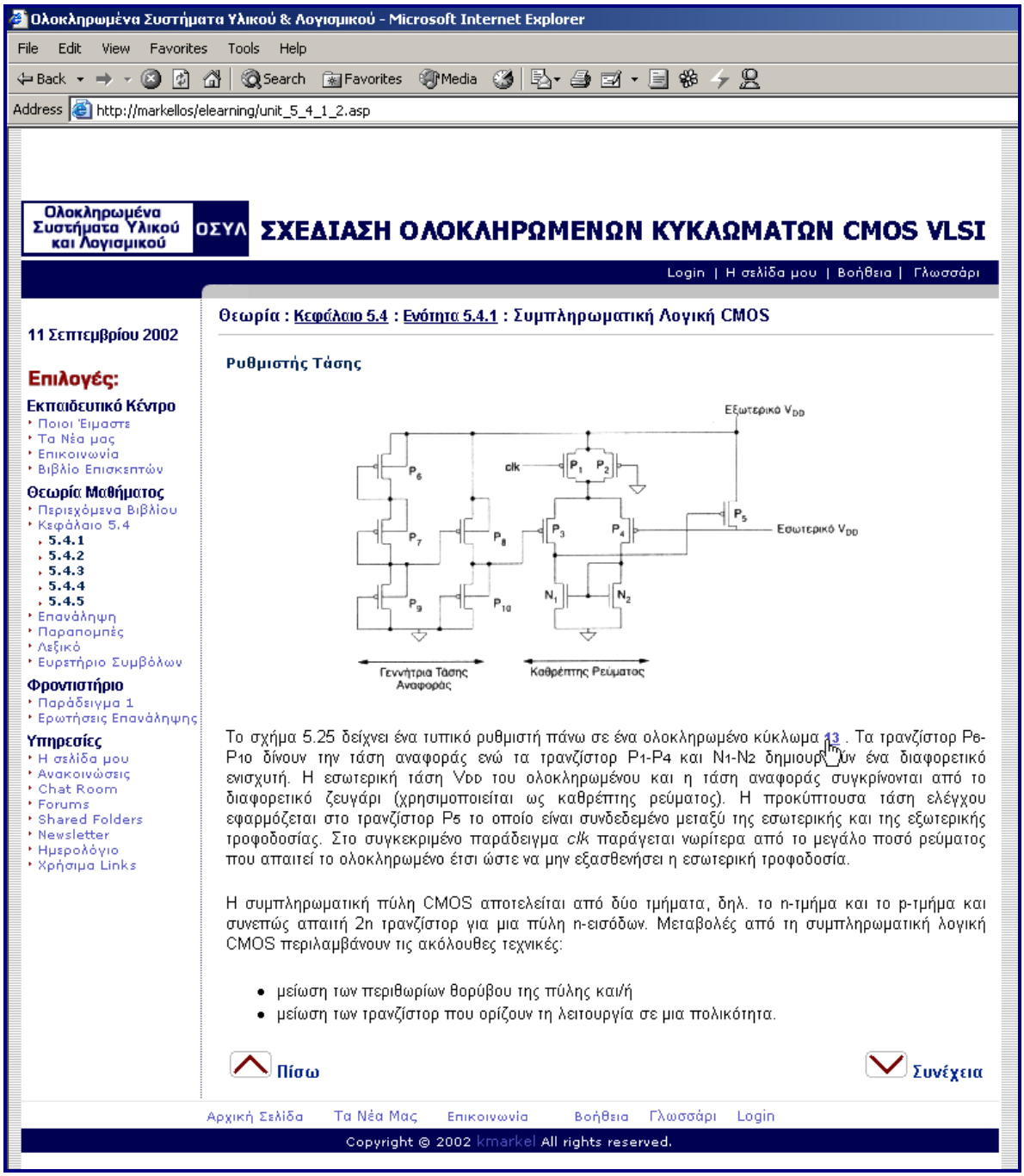
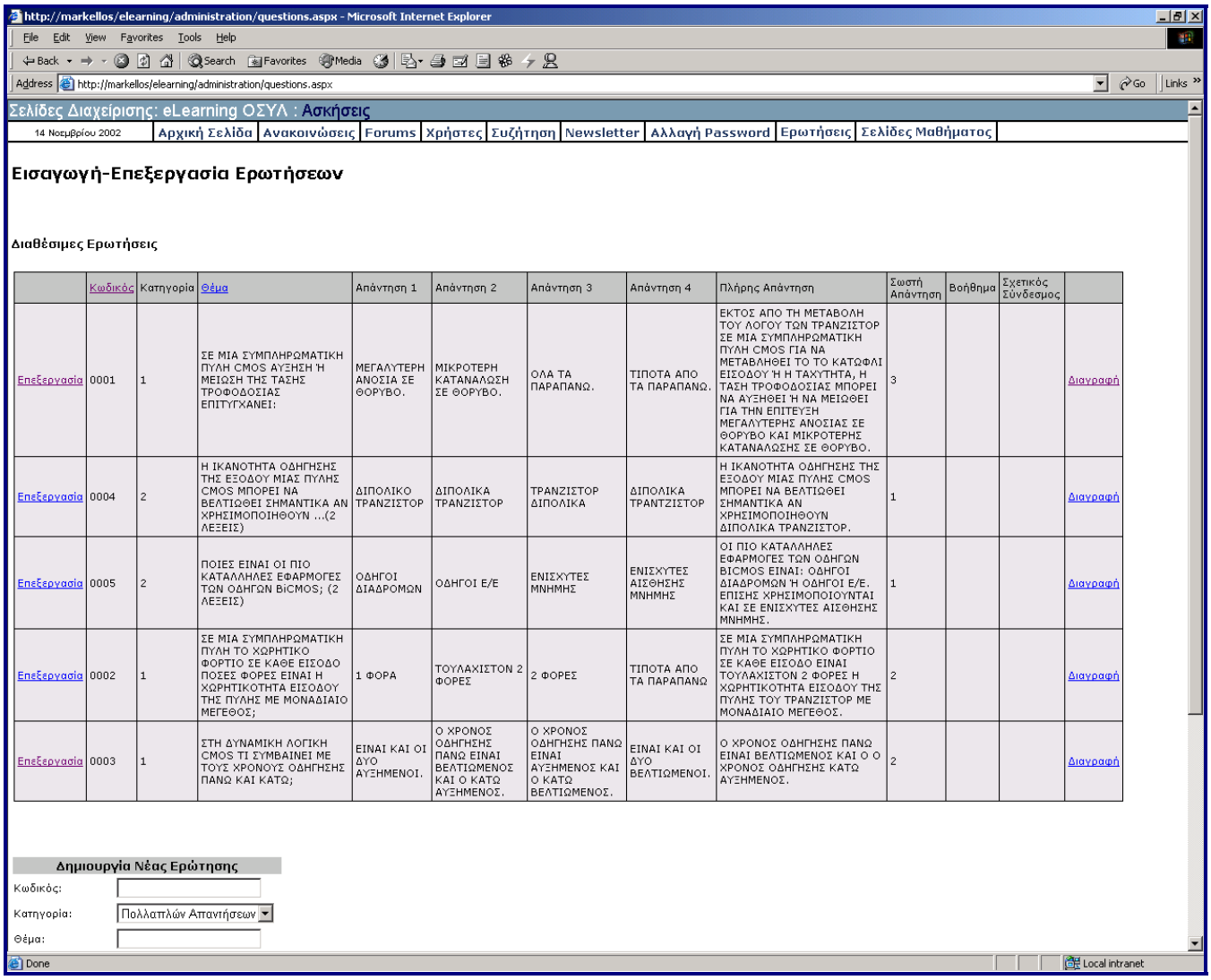


FIGURE. 2
ADMINISTRATION WEB-PAGES.



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Επεξεργασία	0001	1	ΣΕ ΜΙΑ ΣΥΜΠΛΗΡΩΜΑΤΙΚΗ ΠΥΛΗ CMOS ΑΥΞΗΣΗ Ή ΜΕΙΩΣΗ ΤΗΣ ΤΑΣΗΣ ΤΡΟΦΟΔΟΣΙΑΣ ΕΠΙΤΥΓΧΑΝΕΙ:	ΜΕΓΑΛΥΤΕΡΗ ΑΝΟΣΙΑ ΣΕ ΘΟΡΥΒΟ.	ΜΙΚΡΟΤΕΡΗ ΚΑΤΑΝΑΛΩΣΗ ΣΕ ΘΟΡΥΒΟ.	ΟΛΑ ΤΑ ΠΑΡΑΠΑΝΩ.	ΤΙΠΟΤΑ ΑΠΟ ΤΑ ΠΑΡΑΠΑΝΩ.	ΕΚΤΟΣ ΑΠΟ ΤΗ ΜΕΤΑΒΟΛΗ ΤΟΥ ΛΟΓΟΥ ΤΩΝ ΤΡΑΝΖΙΣΤΟΡ ΣΕ ΜΙΑ ΣΥΜΠΛΗΡΩΜΑΤΙΚΗ ΠΥΛΗ CMOS ΓΙΑ ΝΑ ΜΕΤΑΒΛΗΘΕΙ ΤΟ ΤΟ ΚΑΤΩΦΛΙ ΕΙΣΟΔΟΥ Ή Η ΤΑΧΥΤΗΤΑ, Η ΤΑΣΗ ΤΡΟΦΟΔΟΣΙΑΣ ΜΠΟΡΕΙ ΝΑ ΑΥΞΗΘΕΙ Ή ΝΑ ΜΕΙΩΘΕΙ ΓΙΑ ΤΗΝ ΕΠΙΤΕΥΞΗ ΜΕΓΑΛΥΤΕΡΗΣ ΑΝΟΣΙΑΣ ΣΕ ΘΟΡΥΒΟ ΚΑΙ ΜΙΚΡΟΤΕΡΗΣ ΚΑΤΑΝΑΛΩΣΗΣ ΣΕ ΘΟΡΥΒΟ.	3			Διαγραφή
Επεξεργασία	0004	2	Η ΙΚΑΝΟΤΗΤΑ ΟΔΗΓΗΣΗΣ ΤΗΣ ΕΞΟΔΟΥ ΜΙΑΣ ΠΥΛΗΣ CMOS ΜΠΟΡΕΙ ΝΑ ΒΕΛΤΙΩΘΕΙ ΣΗΜΑΝΤΙΚΑ ΑΝ ΧΡΗΣΙΜΟΠΟΙΗΘΟΥΝ ...(2 ΛΕΞΕΙΣ)	ΔΙΠΟΛΙΚΟ ΤΡΑΝΖΙΣΤΟΡ	ΔΙΠΟΛΙΚΑ ΤΡΑΝΖΙΣΤΟΡ	ΤΡΑΝΖΙΣΤΟΡ ΔΙΠΟΛΙΚΑ	ΔΙΠΟΛΙΚΑ ΤΡΑΝΤΖΙΣΤΟΡ	Η ΙΚΑΝΟΤΗΤΑ ΟΔΗΓΗΣΗΣ ΤΗΣ ΕΞΟΔΟΥ ΜΙΑΣ ΠΥΛΗΣ CMOS ΜΠΟΡΕΙ ΝΑ ΒΕΛΤΙΩΘΕΙ ΣΗΜΑΝΤΙΚΑ ΑΝ ΧΡΗΣΙΜΟΠΟΙΗΘΟΥΝ ΔΙΠΟΛΙΚΑ ΤΡΑΝΖΙΣΤΟΡ.	1			Διαγραφή
Επεξεργασία	0005	2	ΠΟΙΕΣ ΕΙΝΑΙ ΟΙ ΠΙΟ ΚΑΤΑΛΛΗΛΕΣ ΕΦΑΡΜΟΓΕΣ ΤΩΝ ΟΔΗΓΩΝ BiCMOS; (2 ΛΕΞΕΙΣ)	ΟΔΗΓΟΙ ΔΙΑΔΡΟΜΩΝ	ΟΔΗΓΟΙ Ε/Ε	ΕΝΙΣΧΥΤΕΣ ΜΝΗΜΗΣ	ΕΝΙΣΧΥΤΕΣ ΑΙΣΘΗΣΗΣ ΜΝΗΜΗΣ	ΟΙ ΠΙΟ ΚΑΤΑΛΛΗΛΕΣ ΕΦΑΡΜΟΓΕΣ ΤΩΝ ΟΔΗΓΩΝ BICMOS ΕΙΝΑΙ: ΟΔΗΓΟΙ ΔΙΑΔΡΟΜΩΝ Ή ΟΔΗΓΟΙ Ε/Ε. ΕΠΙΣΗΣ ΧΡΗΣΙΜΟΠΟΙΟΥΝΤΑΙ ΚΑΙ ΣΕ ΕΝΙΣΧΥΤΕΣ ΑΙΣΘΗΣΗΣ ΜΝΗΜΗΣ.	1			Διαγραφή
Επεξεργασία	0002	1	ΣΕ ΜΙΑ ΣΥΜΠΛΗΡΩΜΑΤΙΚΗ ΠΥΛΗ ΤΟ ΧΩΡΗΤΙΚΟ ΦΟΡΤΙΟ ΣΕ ΚΑΘΕ ΕΙΣΟΔΟ ΠΟΣΕΣ ΦΟΡΕΣ ΕΙΝΑΙ Η ΧΩΡΗΤΙΚΟΤΗΤΑ ΕΙΣΟΔΟΥ ΤΗΣ ΠΥΛΗΣ ΜΕ ΜΟΝΑΔΙΑΙΟ ΜΕΓΕΘΟΣ;	1 ΦΟΡΑ	ΤΟΥΛΑΧΙΣΤΟΝ 2 ΦΟΡΕΣ	2 ΦΟΡΕΣ	ΤΙΠΟΤΑ ΑΠΟ ΤΑ ΠΑΡΑΠΑΝΩ	ΣΕ ΜΙΑ ΣΥΜΠΛΗΡΩΜΑΤΙΚΗ ΠΥΛΗ ΤΟ ΧΩΡΗΤΙΚΟ ΦΟΡΤΙΟ ΣΕ ΚΑΘΕ ΕΙΣΟΔΟ ΕΙΝΑΙ ΤΟΥΛΑΧΙΣΤΟΝ 2 ΦΟΡΕΣ Η ΧΩΡΗΤΙΚΟΤΗΤΑ ΕΙΣΟΔΟΥ ΤΗΣ ΠΥΛΗΣ ΤΟΥ ΤΡΑΝΖΙΣΤΟΡ ΜΕ ΜΟΝΑΔΙΑΙΟ ΜΕΓΕΘΟΣ.	2			Διαγραφή
Επεξεργασία	0003	1	ΣΤΗ ΔΥΝΑΜΙΚΗ ΛΟΓΙΚΗ CMOS ΤΙ ΣΥΜΒΑΙΝΕΙ ΜΕ ΤΟΥΣ ΧΡΟΝΟΥΣ ΟΔΗΓΗΣΗΣ ΠΑΝΩ ΚΑΙ ΚΑΤΩ;	ΕΙΝΑΙ ΚΑΙ ΟΙ ΔΥΟ ΑΥΞΗΜΕΝΟΙ.	Ο ΧΡΟΝΟΣ ΟΔΗΓΗΣΗΣ ΠΑΝΩ ΕΙΝΑΙ ΒΕΛΤΙΩΜΕΝΟΣ ΚΑΙ Ο ΚΑΤΩ ΑΥΞΗΜΕΝΟΣ.	Ο ΧΡΟΝΟΣ ΟΔΗΓΗΣΗΣ ΠΑΝΩ ΕΙΝΑΙ ΑΥΞΗΜΕΝΟΣ ΚΑΙ Ο ΚΑΤΩ ΒΕΛΤΙΩΜΕΝΟΣ.	ΕΙΝΑΙ ΚΑΙ ΟΙ ΔΥΟ ΒΕΛΤΙΩΜΕΝΟΙ.	Ο ΧΡΟΝΟΣ ΟΔΗΓΗΣΗΣ ΠΑΝΩ ΕΙΝΑΙ ΒΕΛΤΙΩΜΕΝΟΣ ΚΑΙ Ο Ο ΧΡΟΝΟΣ ΟΔΗΓΗΣΗΣ ΚΑΤΩ ΑΥΞΗΜΕΝΟΣ.	2			Διαγραφή