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# SSGRR 2002s










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International Conference on Advances in Infrastructure for  
e-Electronic, e-Business, e-Education, e-Science, e-Medicine  
on the Internet

Main

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# E-Book, an e-learning tool for Engineering Undergraduates

E. Gómez-Ramírez, *Member, IEEE*, M. Ponce-Meza & M. Farías-Elinos, *Member, IEEE*

**Abstract**—An e-book for Dynamical Systems (DS) was designed and developed by an interdisciplinary group (Education, and Computer Sciences experts) with the purpose of model development of a tool that can be used in other subjects. This e-book was developed with an intelligent system, called Master System (MS), which integrates the uses of the multimedia and the Internet, performing individualized students exercises, exams, quizzes, and offering the option of students and teachers feedback of their performance. The intelligent assistant for these functions is described. The educational methodology followed is the deep understanding of concepts and development of thinking and professionals skills. The e-book is updated with teachers and students self-developed cases transformed in web pages for the e-book. In this paper are discussed the functions and possibilities of the Master System design and performance, intelligent assistant and the educational methodology followed.

**Index Terms**—e-book, understanding, and e learning.

## I. INTRODUCTION

The use of the Internet has been polemic, some people defend its pedagogical possibilities and others its informative potential. Reality shows that students with high point average spend more time in the Internet, with academic purposes, and it improves their academic performance [1] [2].

The web pages can help teachers in the functions of:

- a) *Increasing the communication, giving more hours to the counseling, to the email for receiving and sending homework assignments and feedback.*
- b) *Actualizing of the relevant information of the course, like deadline for homework assignments, projects and relation with other topics.*

- c) *Promoting the debates and the academic discussion on complex topics, records of the discussions and the generated conclusions by group.*
- d) *Establishing of relations and links with other web pages in the Internet that can help complementary information for advanced students, who required more information, more complexity and deeper thinking on the topics.*

Summarizing, some of the problems faced in the design and development of e-books are:

- There is not a unified pedagogical justification in the use of the technology for teaching undergraduates, and there is not a methodology that evaluates the impact of the use of the technological tools, besides the quantitative aspect, that is for example, the number of participations.
- There are not valid criteria to evaluate the quality of the comprehension and learning.
- There is a lack of relation between the knowledge and skills developed in the classroom and the ones required in the professional environment.
- The use of the technology by itself is still waiting to prove that helps in increasing the intrinsic motivation, the understanding and the intellectual challenge and in the promotion of the autonomous learning.

The e-book design can be one of the most important tools for learning; it integrates the multidisciplinary knowledge, and involves the development of edition skills, besides the expert management of information and specific content.

The paper is organized as follows. The paper introduces the goals of the project. The following section introduces the major concepts of the teaching for Understanding perspective. Next section shows the intelligent assistants in the e-book. Finally it presents the Master System structure.

## II. GOALS OF THE PROJECT

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This proposal has the general objective of design and elaboration of an e-book for the Dynamical System course, with the integration of multimedia elements and the Web. The main goal is to promote the deep understanding of the topics, the development of flexible knowledge and the development of autonomous learners under the perspective of knowledge building. This model promotes the active participation of the student and the professor; both are considered agents in the building knowledge process. The base of this perspective is the discovery, now the information needs to be found in different places, students then need to put together integrate and understand the concepts.

The specific goals are:

1. Establish the transition from the use of the text tool in a traditional classroom to a virtual classroom environment. The challenge is to integrate different electronic tools to make an evaluation of their impact in the academic performance and in the understanding of the relevant concepts.
2. Design and elaboration of the specific content of the book for the course of Dynamical Systems. Find links with real projects developed under the Dynamical Systems perspective that can enriched the materials in class, developing links with companies and institutions working in the area of interest of the subject.
3. Development of the support material for the professor in the web, and in the Internet, besides power point presentations.
4. Design and evaluate the functions and help given to the students by the Master System, specially the functions to guide the learning, and the feedback to students and professors done by the intelligent assistant.(statistics, comments, etc.)
5. Design and evaluate the criteria that impact the understanding of the subject. The Master System helps professor in the teaching management functions, and the professor can dedicate that time to the students, giving feedback to their performance and explaining their doubts. The Master System evaluates the homework, and will keep the students' records on performance and grades.

#### A. Benefits

For the students:

1. Homogenization of knowledge, with the use of the Master System. The MS has an exercise generator, which will help students to study the topics they do not know well and practice the times they require to the level of comprehension required for the subject. The students will be able to choose the exercises in accordance with the learning complexity they can answer and practice with other cases, before the professor evaluates the final answer to the cases assigned.

2. The learner will develop research skills and independent proposals of uses of the technology. The student will generate his/her own proposals of web pages that can be included in the e-book. The best pages will be included in the e-book. This will be considered as the intrinsic motivation of students to develop their own complex cases.

For the professor:

1. Actualization of the professor in the technology management. The professor will integrate the technology use and the content of his/her subject.
2. Utilization of the information given in the Internet
3. Control over the performance of each student
4. Less time dedicated to the evaluation of homework, projects, and in other administrative works.

For the Institution:

1. Share the resources (virtual laboratories) with other institutions conforming other virtual laboratories and motivating the academic exchange of materials, giving as a result an efficient use of the laboratories. Each institution can invest in specific laboratories and connect them in a network, what will improve the quality of investment getting access to different virtual laboratories.
2. The possibility of distance learning programs based on e-books design and development.
3. Improvement of the academic performance with the possibility of connection with companies interested in developing and investing in training to their human resources using e-books.

As it was mentioned before this proposal is the first step in the reproduction of this model that can be applied in other subjects in other levels.

### III. TEACHING FOR UNDERSTANDING

In recent years, the theories of learning have focused on the development of learning strategies and deeper understanding in learning.

This project of e-book was designed based on the Teaching for Understanding Methodology developed in Harvard University,. [3] This is an effort to apply it to the undergraduate level.

This methodology is focused on the generative topics that are the big topics that help students to understand the context of the main concepts. The development of context for understanding is basic in the goals of understanding development, which cover the relevant comprehension of the topics. For example, students will be able to apply concepts of mathematical models to real situations and problems. Once, the goals have been defined the students will work on

specific understanding activities, which will help the professor to evaluate what the students have learned.

The ongoing assessment is the criteria developed by the professor to evaluate the understanding reached by the students.

The ways the professor will evaluate the understanding of the students will be based on the quality of projects designed and implemented by the students during the course.

#### *A. Theoretical Aspects of the Teaching for Understanding used in the E-book*

From the students perspective the information presented is relevant only if it is conceptualized in real phenomena, under which they can understand the real connection with the concepts learned.

The student in this course faces the need to develop their own ways of applications of the models reviewed in class, what is development of their own cases and their own examples.

### IV. INTELLIGENT ASSISTANTS IN THE E-BOOK

The assistants today are important because give us the opportunity to access to relevant helping information, for example, the balloon in MacOS, or the Clip in Office Microsoft.

The assistants offer help no only in the menu, but in the text helping us in the meaning of key words, or giving the meaning for them, or suggesting the references or the links where further information can be found.

One of the problems in the development of assistants in Web pages is that the information can not be reached in only one sever, but it is distributed in many servers, what makes difficult the information management.

The e-book considers the assistant in its possibilities of helping in the development of patterns of learning of each student, what will help the professor in the feedback on the students' performance.

The assistant in the e-book will help in the reinforcement of the knowledge learned by the e-book, especially in the hardest topics of the subject.

The importance of including an assistant in the e-book has the possibility of offering help on line to each student, plus the application of data mining [4] and collaborative forms of work [5], especially useful for the team work evaluation.

Another advantage of using intelligent agents in the e-book, will be the possibility of accessibility of video, audio and image files.

In this e-book the assistant will work in two levels: one in the answer and response pattern, and the second in the help for searching information in the Web.

### V. STRUCTURE OF THE MASTER SYSTEM

The Master System is developed to have the following parts:

- a) Students records: Name, number, key access number.
- b) Exercises generator: Automated generator of exercises with different level of complexity. This includes questionnaire of students needs in the course, exercise generated that the student will study, in accordance with the results of the questionnaire, homework generator and exams generator.
- c) Control of academic criteria. This features performance evaluating the homework by complex level, absences records and participation. Statistical information about students and the group.
- d) Feedback to the students and to the professor. This feature will keep a record by student, on his performance, level of complexity and suggestions of further study done by the teacher. The professor will receive the critical cases that needs more attention for a specific student.

To introduce teachers and students in this new option of learning is necessary to have special guides that help to understand the way that the Ebook must follow to get the maximum benefits. Two guides were developed: the professor and students guide. The content are the following:

#### *A. Professors Guide:*

Theoretical frame of electronic learning:

Guide of the electronic book:

- Professors' Manual
- How to use the Master System. Management of Academic Criteria
- Management of Professors' Performance Criteria

Plan of Classes

- Calendar of Activities: Classes, Homework, Practical Sessions, Exams.

Glossary

#### *B. Students Guide:*

Theoretical framework of electronic learning

Guide of the electronic book:

- Students Manual
- How to use the Master System. Development of exercises to help them in the homework assignments (training exercises)
- How to do the homework?

- What does the information of the academic indicator can be understood?

#### Plan of classes

- Calendar of Activities: Classes, Homework, Practical Sessions, and Exams.

#### Glossary

#### REFERENCES

- [1] Ponce M., Fariás-Elinos M. Talent Development in the Internet. Seattle. Association for The Advancement of Computing in Education (AACE) 1999.
- [2] Ponce M., Fariás-Elinos M. Academic uses of the Internet. San Diego. SITE Society for Information Technology and Teacher Education International Conference, 2000.
- [3] Blythe T. et al. The Teaching for Understanding Guide. Jossey-Bass Publishers. San Francisco, 1998.
- [4] Fayyad U. et al., Advanced in Knowledge Discovery and Data Mining. AAAI Press/MIT Press, Cambridge, Mass, 1996.
- [5] Balabanovic M, Shoham, Y.. Content-based, Collaborative Recommendation, Comm. ACM, Vol.40, No.3, Mar 1997, pp. 66-70G. O. Young, "Synthetic structure of industrial plastics (Book style with paper title and editor)," in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, pp. 15-64, 1964.

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