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Preface

For more than a decade the rapid growth of ICT and its use in education have
generated a lot of changes in traditional educational structures as well as interest in
defining new models for designing advanced learning solutions.

This book provides an overview of international perspectives regarding the
latest innovations and results in different fields of education. In particular, it is
addressed to all those who are interested in exploring methodologies and extending
their knowledge of current research in education and training technologies.

The wide variety of contributions provides an interesting and useful account of
some of the major issues and controversies facing researchers, academicians,
professors, educational scientists and technologists in most of the educational
contexts in which ICT is applied.

We are particularly pleased to acknowledge the invaluable assistance of the
International Scientific Committee in reviewing the contributions.

The Editors, 2005

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Tutor-Sky: a web environment for multimedia on-line education

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Abstract

Computer Science and Telecommunication technologies are being more and more integrated in teaching and learning systems. The subsequent modification of the educational world becomes a natural event towards a student who is immersed in a multimedia technological society and expects to find a similar learning environment. At present, multimedia is widely used in education to improve and integrate the learning processes and is ever more used in on-line education where the different media help in re-creating the "natural" interaction between teachers and students. There are many tools that allow teachers to publish on the web of learning contents, but none of them allow teachers to easily and flexibly create a complete learning environment and add all the needed multimedia contents (e.g., audio and video) whereas students are provided with full flexibility in choosing what, when and how to learn.

This work presents the conceptual and implementation details of a web environment, Tutor-Sky, which tries to answer to all the requirements for efficient, flexible and integrated multimedia on-line education. Tutor-Sky on the one hand allows the teacher to easily insert and structure multimedia content in order to create an on-line course (or just an on-line lecture) and on the other hand allows the student to flexibly organize and customize learning paths through the choice of content, media and learning environments. Tutor-Sky will be discussed here in terms of its objectives, architecture and main implementation characteristics. Moreover, some examples of usage will be shown both from the teacher's and the student's points of view.

Keywords: multimedia web environment, on line education, e-learning.



1 Introduction

Today students live in environments surrounded by images, sounds, videos, etc. As a consequence, books, as sole education tools, result inadequate and new means, such as multimedia are used in education in conjunction with traditional means. The use of different media improves the learning process by easing the understanding and memorization of the received information and concepts as a result of stimulation of different senses and usage of the intuitive part of our brain (together with the rational part).

Another big revolution which has recently invested the education world is represented by on-line education where, rather than having an instructor transmitting pre-constituted information to the students, we have students who build their learning paths by searching and selecting the most appropriate information in the network [1, 2]. Moreover, students can interact with other students and the instructor (through forums, chats and mailing lists) to share their learning experiences, ask questions and explore specific topics. Finally, students can test their knowledge and skills through self-evaluation phases. The new kind of education that arises is cooperative and distributed. It poses the student at the very centre of the learning process and considers him/her active part in this process. The instructor/teacher is better seen as a knowledge facilitator rather than the subject who only transfers knowledge (even though he/she usually keeps the role to create and organize the online contents and possibly provide the main course guidelines).

In order to make an on-line lesson as much similar as the frontal one, multimedia information can be added to the on-line contents. The different media on one hand help in re-creating the "natural" interaction between teachers and students and on the other hand contribute to increase the interest and attention levels of the student when taking the lesson. Thus, a multimedia on-line education seems to be the most promising framework for future education.

It should be noted that on-line education (as well as multimedia on-line education) should not be necessarily seen an opponent to "classic" education (e.g., frontal lessons). On the contrary, it is very efficient also as a support to a frontal course where frontal classes and on-line contents create a mixed course that provides the students with the advantages of both approaches. In this case, in fact, students have an instructor who provides frontal classes and integrates them with an on-line environment which usually contains the class's contents, additional information, labs, practical exercises and self-evaluation tests. The lesson contents can be browsed by the students before the class so to better exploit the lesson itself or can be explored after the class so to review the different topics with a rhythm that is more suitable to the student. Moreover, he/she can use the additional information and practical labs to improve his/her knowledge and skills and can take the tests to self-evaluate his/her learning progress.

There are many Internet examples of on-line environments that constitute either self-contained courses or support to frontal courses [3, 4, 5]. Moreover, there are many tools that allow creation and publication on web of learning

contents. Some tools allow on-line creation of contents (most of those tools belong to the *LCMS - Learning Content Management System* category and follow the *SCORM - Sharable Content Object Reference Model*) whereas other tools allow off-line creation of courses that, after creation, must be published on proper servers. Table 1 lists the most popular tools and shows the main features, advantages and disadvantages of each tool.

Table 1: Tools for creation of e-learning contents.

PRODUCT	MAIN FEATURES	ADVANTAGES	DISADVANTAGES
ATUTOR [6]	- LCMS - On-line - Contents creation and management	- Free - Easy to use - Customizable	- No multimedia integration - No streaming
MOODLE [7]	- LCMS - On-line - Contents creation and management	- Free - Customizable	- No multimedia integration - No streaming
ADA Lesson Generator [8]	- Off-line - Modular contents management - Contents publication	- Easy to use - Easy to export	- No multimedia integration - No streaming - No user customization
PRODUCE R [9]	- Off-line - Video editing	- Slide/audio/video int. - Free for PowerPoint	- No user customization - Small browser support
BREEZE [10]	- Off-line - Video editing	- Cross-browser - Slide/audio/video int. - Course management	- No user customization

The table above clearly shows that none of the of the listed tools allows teachers to easily and flexibly create a complete learning environment and add all the needed multimedia contents (e.g., audio and video) whereas students have full flexibility in customizing the learning environment and contents..

2 Tutor-Sky solution

The purpose of Tutor-Sky, is to create an online e-learning environment which can be used by a teacher to easily insert his/her lessons and integrate them with optional multimedia contents so as to offer students with information in different forms and facilitate/improve their learning process. The main features are:

- an easy-to-use environment for teachers and students;
- the possibility for the teacher to create lessons on-line;
- an automatic integration of multimedia contents;
- the modular management of the lessons and topics of the course.



The course may be organized on multiple learning levels with a main level containing the basic information and further levels containing more and specific details. The course contains a set of media such as the audio and video of the lesson and/or an accompanying music chosen by the teacher so to improve the learning process of the student. Nevertheless, the student can decide if and what media to use during his/her learning phase. The possibility to create modular and structured courses in independent didactic units gives the teacher the opportunity to structure the course according to his/her ideas and gives the student the opportunity to choose how to follow the course considering his/her own interests and needs.

2.1 Architecture

Tutor-Sky is a "three tier web application" (Figure 1). The three application levels are:

- *presentation level* – typically an internet browser. Its task is to send the requests to the intermediate level and show the results to the customer
- *intermediate level* – typically a web server module (like php, asp, perl). Its task is to elaborate the data for the presentation level;
- *data level* – a set of information stored in an independent application (such as a database or e-mail server).

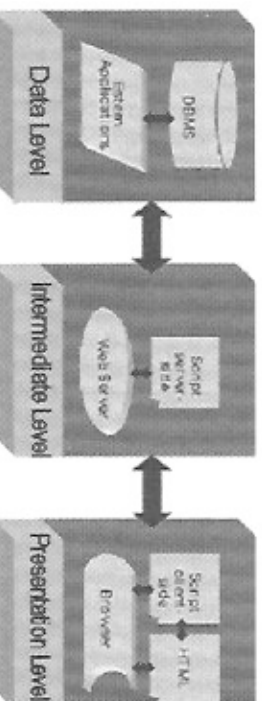


Figure 1: Three tier web application.

2.2 Implementation

The development environment chosen for "TutorSky" is open source. The web server is Apache, the scripting language is Php, the database is MySQL and the streaming server is Icecast2. This gives the possibility to execute the application on Windows, Linux or other operating systems. The implementation follows the architecture described above with data level, intermediate level, and presentation level. The data level application consists of a database whose structure is shown in Figure 2. The structure of the intermediate level, developed in php, can be divided in Customers Management, Course management and Lesson Player. The Customers Management takes care of customer registration (through a web form) and supplies a cryptographed password with MD5 function (message

digest 5) and customer identification. The Course management deals with the structure of server files and directories. For each course there is a directory created when the teacher creates a new course. The Lesson Player is the part of the application that shows the slide synchronized with the other multimedia contents.

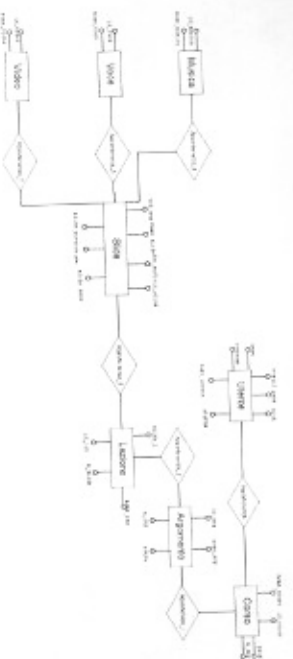


Figure 2: Database structure.



Figure 3: Creation of a new lesson.

3 Example of use of Tutor-Sky

We now describe how teachers and students interact with the application. After login, a teacher can create a new course providing the name and a short description of the objectives (or any additional information). The next step is to add a new topic and a new lesson. Figure 3, for example, shows the creation of a new lesson *Course presentation* in the *Computer Networks and Internet* course.

Now the teacher can insert the new lesson either or through the loading of previously realized slides or through the creation online of the slides. In both cases, it is possible to insert optional contents (e.g., voice, video, music) through the corresponding dialogue windows (Figure 4).

Once the lesson has been inserted, the teacher will have the possibility to choose between three options: a) insert another lesson, b) insert a deepening lesson, c) finish. A student, after login will be presented with a list of available courses. Once chosen a course, the student will be presented with the main page of the course (Figure 5).

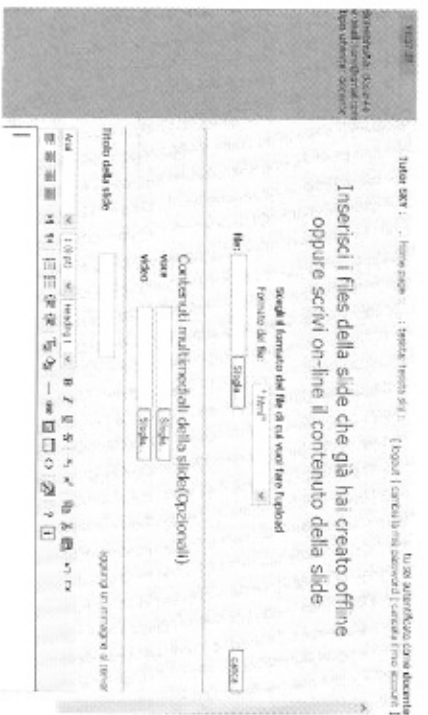


Figure 4: Insert a lesson.



Figure 5: The main page of a course.

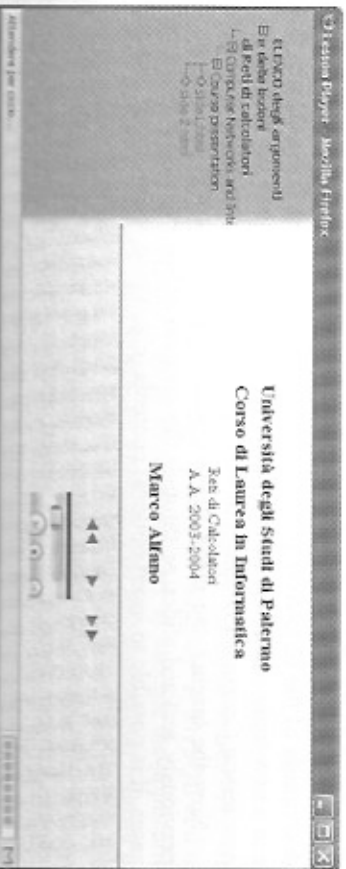


Figure 6: Lesson Player.

Now the student can select a lesson by clicking on it and select the desired media. The lesson player will load and play the lesson and all selected multimedia contents in a web page like the one in Figure 6.

The Lesson Player has the commands for the slides and for the Media Player of the voice and video plugins.

Tutor-Sky can be found at the web address <http://sisiss.unipa.it/tutorsky>.

4 Conclusions and future work

This work has presented the architecture and implementation of a three-tier web application, Tutor-Sky, which allows to create and manage multimedia on-line courses. The design of the application has been based on the following key aspects:

- modularity;
- multimedia;
- efficient use of resources;
- easiness of use (both as course creator and user);
- flexibility;
- environment customization.

There are of course many open points both conceptual and implementative that need to be explored. Examples are:

- addition of further multimedia contents (e.g., animations);
- increase in flexibility and customization;
- improved file management by the teacher.

These and other aspects will be carefully evaluated during the experiments which are currently taking place with university instructors and high school teachers. The results of the experiments will allow to evaluate the performance of the application in terms of learning progress and use of resources and to improve the architecture and overall design of Tutor-Sky. In particular, ways to improve the interaction between teachers and students (even through an on-line course) and the transfer of information to the student (which should follow as much as possible the learning rhythm of the student) will be studied in the future and the practical results implemented in Tutor-Sky.

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A case study on the use of Virtual Graffiti Portal (VGP) as an agent for e-learning

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Abstract

This paper presents a case study on the application of Virtual Graffiti Portal (VGP) as an e-learning agent for open, flexible, and distance education in the Faculty of Creative Multimedia, Multimedia University, Malaysia. VGP is a method of having a virtual discussion in a real time situation. This learning agent is designed mainly to solve some problems in mastering/learning a subjective subject such as visual art. One of the novel contributions is that it allows a virtual discussion in any place at any time. This solves a geographical factor for distance learning and the time constraint issue. Various possibilities can be obtained from this method, such as online chat and real time art discussion, which are made possible by using a virtual drawing board for sketching and drawing. The advantages and disadvantages of this system are discussed together with some proposals for future improvement.

Keywords: *Virtual Graffiti Portal, e-learning, virtual learning, visual art, online learning.*

1 Introduction

Web based learning has been practiced for decades. According to Vat [1], the technology of the World Wide Web (WWW) is rapidly developing into a powerful, platform independent networked infrastructure of providing integrated solutions in numerous sectors of our society. The Web-based environment [2] creates new possibilities to support and enhance this communication within the teacher-student community, while retaining the familiar face-to-face classroom interaction, as one of the essential aspects of a learning process [3]. Even though web based learning has a great advantages over the conventional one, it should