CmL-plus: A new vision for the first m-learning platform in the Romanian DE system

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Abstract: - The main advantage of mobile computing is portable computation: rich interactivity, total connectivity and powerful processing. M-Learning is, consequently, the intersection of mobile computing and e-learning: accessible resources wherever you are, strong search capabilities, interaction and support for learning, performance-based assessment, independence of location in time or space. Introducing an m-Learning platform into ODL education involves, for the Romanian Distance Education (DE) system, far more than simply providing tools and organizational changes, new duties, synchronous/asynchronous communications and on-line educational support for PDA users.

The aim of re-building this m-learning platform – CmL (Communications in mobile Learning) – was to look for a profound and revolutionary way to accomplish these needs by improving the non-traditional learning. The result of this re-shaping process is "CmL-plus" platform, providing a central access point for students to access on-line tutorials, complete self-assessment tests, participation in discussion groups and off-line communicationwith teachers or peers using e-mail. A system applicationwas used and the control of tutorials was transferred to the administrator.

Key-Words: m-learning platform, mobile communications, PDA, e-learning, interactivity.

1 Introduction

The Internet is extensively used today, not only for transfer of information, but also for applications in scientific learning. Therefore, many networked learning platforms have been developed for this purpose. The m-learning platforms enable development and deployment of compelling interactive and enhanced video services [1]. If these platforms are correctly implemented, the results are significant. The availability of advanced mobile technologies provides several benefits to m-learning and testing by creating an additional channel of access with mobile devices such as PDAs and mobile phones. One of the most important task for universities in Romania is to contribute to the knowledge society, thus giving an opportunity to all adult society members to study all life long.

One of the main lifelong learning tools in DE system is represented by m-Learning platforms [2]. This means that an advanced DE system supported by information communication technologies (ICT) and accessible for all virtual students must be created [3]. At the beginning, several design guides for the learning environment were followed, such as:
- modular architecture, for superior scalability and performance;
- enabling single-site implementations, in order to support tens of thousands of users and thousands of tutorials or courses;
- open architecture supporting third-party learning applications interfaces;
- easiness of use by all users, through a familiar and consistent graphical user interface.

The chosen technical solution [4] was to use a Pocket PC/Personal Digital Assistant (PDA) in combination with a mobile phone, for the distribution of learning content and for the communication between tutor and students, between peers and for students' access to the learning materials (Fig. 1).

Quality assurance and enhancement of any educational provisions take many forms and are

secured by a variety of means: educational development is one of them. In many situations DE has been developed in a tradition of system thinking and educational technology. In this tradition systematic feedback, evaluation and revision and/or further development play an important role. An important aspect for the use of the m-learning platform is its evidence-based reflective practice [5].
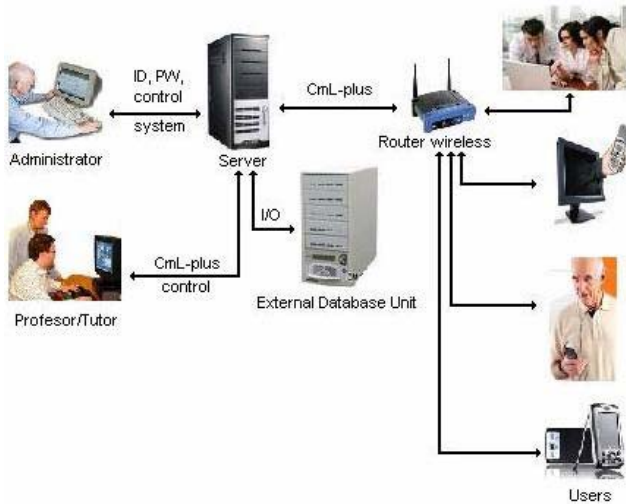

Fig.1. The infrastructure used for "CmL-plus"

The successful completion of m-Learning is expected to create the first online tutorials and evaluation tests in the DE Department of the university.

2 Architecture description

The use of computers in education has mostly been focused on enhancing learning in *formal settings*, typically in the traditional classroom or computer lab. The use of mobile devices could expand learning possibilities and solve the problem of being tied to a particular location [6].

Active problem-solving is central for constructivist learning [7]. Within cognitive science, problem-solving is synonymous with learning and viewed as the manipulation of problematic situations, comprising the appraisal of the problem, creation of a problem space, the selection of goals, and the deployment and monitoring of cognitive structures to reach those goals.

The "1 Decembrie 1918" University has to provide its personnel with adequate experience in the implementation of advanced m-Learning platforms and online tutorials. We are currently testing "CmL-plus" platform and all results are quite satisfactory [4]. The application is structured into four modules: *administrator system* (Fig.2), *off-line*

communication by e-mail, database for *tutorials* and *on-line communication (chat) module* (Fig. 3).
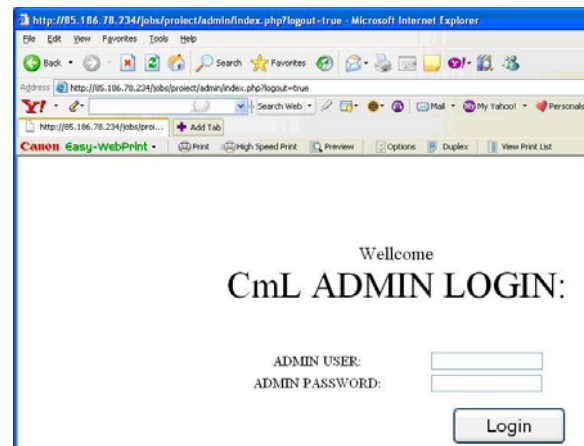

Fig. 2 The administrator graphic interface

These four modules represent two layers of the same application and the architecture used to develop it was created in HTML (for the graphic interface and sending the data from one page to another), PHP (for receiving, modifying and displaying data, as well as for working with databases – read/write/delete/replace) and sajax (for creating the chat module).
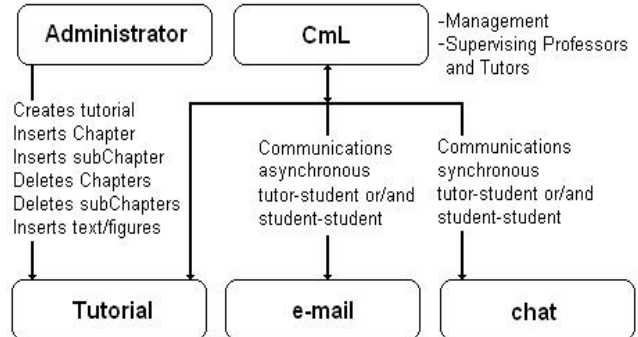

Fig.3 The "CmL-plus" Block Diagram

The best option to ensure a non-disturbing automatic refresh was the use of java scripts. Each module was created using a specific programming language: the tutorial is 100% and automatically written in HTML using *administrator system application*, the chat module is based on java scripts (sajax platform) dealing with reading data and especially with refreshing and displaying data, while the e-mail module uses PHP scripts for reading the database, deleting, modifying and displaying.

2.1 Architecture of the application
The project is based on a client/server configuration. It is absolutely necessary to create a MySQL

database with adequate tables and values. The client uses the internet connection and a web browser (having the last version of Java installed), in order to connect to the application. The main login interface (Fig. 4) verifies the input data for validation in the database, and either displays an error message if the user doesn't exist, or sends the data to the next page and displays the links on which this project is based, i.e. MAIL, TUTORIAL and CHAT .

Every page reads and sends further the user data and password sent by the main login page. If the data doesn't exist on a page, a message is displayed, denying access to that page (Fig. 5). Thus, data is sent from one page to another. Because the TUTORIAL module is 100% created in HTML, it cannot receive data to send it to another module, and therefore exiting this part of the application is similar to logging-out. An error message is displayed, and the user is redirected to the login page.

Fig.4 The structure of user login on PDA display

The graphic interface of the project is very simple, this decision being justified not by the incapacity of the mobile devices to cope with such a project, but by the fact that the user is interested first of all by the facilities of the m-learning platform and not by a complex, very elaborated aspect of the menus on the PDA display.

The database is divided into several functional blocks: *the user section*, which stores the information about user's accounts (tutor, student), the *tutorial section*, containing information about the tutorials structure and about the links with other physical educational resource locations and the *chat section*, containing all the received messages (e.g.,
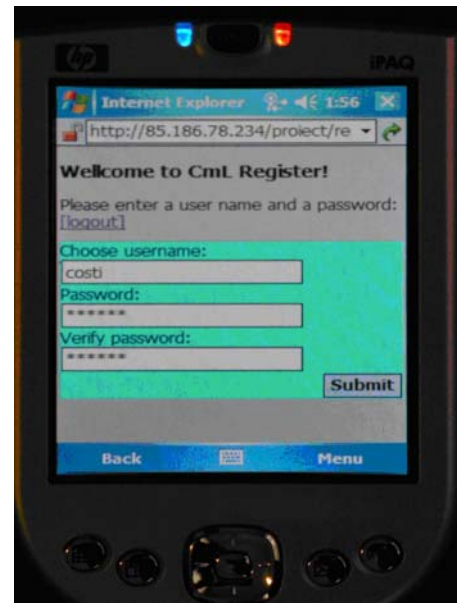
online messages).

Fig. 5 The user registration structure on PDA

3 "CmL-plus" functionalities

The tutorial module is composed by a succesion of links, referring to different pages for each chapter, subchapter, title or figure (Fig. 6). Figures may appear in two configurantions:

1) in text (small configuration), as a link to the enlarged figure that can be visualized;
2) as a single object on page, where the size and details allow understanding the content.

Most often, figures represent tables, reffered by the tutorial content. In the graphic interface menu of the module there are three essential links, that facilitate organized navigation within the application: **HOME** (sending to the start page), **Back** (sending to the previous page) and **Next** (sending to the next page). Every title, chapter or subchapter is a link that sends to the specific page. If the content of a subchapter is too large, in order to avoid creating a too long page, the choice of continuing the article by placing a *Continue* button at the end of each part was offered. The administrator can select from the menu several options regarding the number of tutorials, how many chapters a tutorial may have, how many sub-chapters a chapter may include and whether the sub-chapter contains only text or both text and image (Figs. 7 and 8).

The mail module is a script utilized by the user to send mail-type messages (Fig. 9). The script reads/writes/deletes/modifies the information in the database, such as informations regarding sent messages, message content and whether the

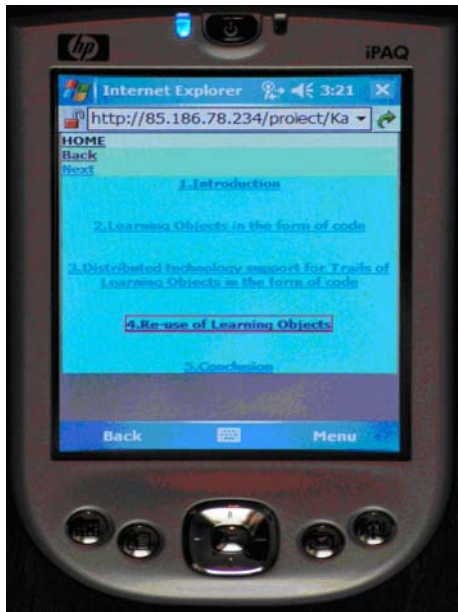messages have been read or not.

Fig. 6 The structure of tutorial on PDA display

A MySQL database is used to store the information. Information is placed/searched/modified/deteled using PHP commands that use further SQL commands.

Fig. 7 Administrator's menu regarding the tutorials

The off-line communication module offers a simple graphic user interface (similar to the e-mail interface offered, for example, by Yahoo), created only to send and receive messages and not to support any other functions.

The on-line communication module (chat) is a modified application of a sajax script that using free libraries offered by this platform.
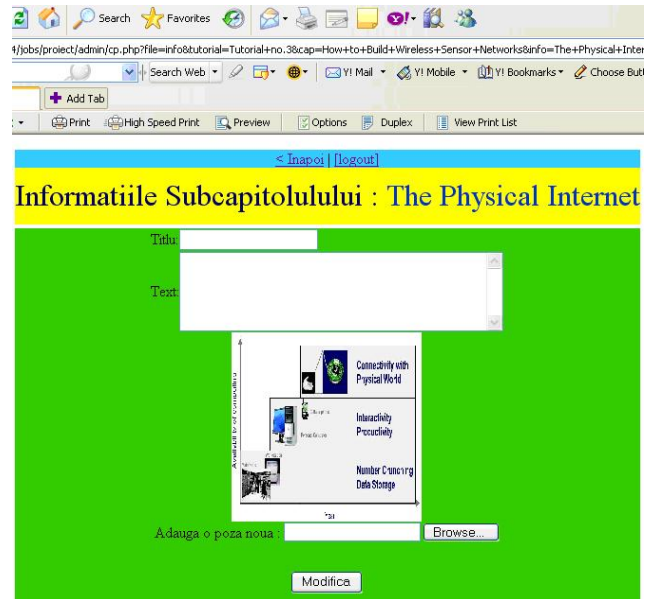

Fig. 8 Details of the sub-chapter menu

The module writes the content of the conversation in a file. An unlimited number of users can log in for discussions in this module, and their names appear next to each message sent.

Fig. 9 The structure of e-mail on PDA display

The "CmL-plus" m-Learning platform provides the essential needs of the students with respect to communication and studying the tutorial content. Both tutors and students can access this platform on their PDA as well as on their PC, because in this

version the "CmL-plus" platform uses the same scale for the display mode disregarding the display type (PDA display, monitor for PC, notebook with regular display or widescreen).

4 Conclusion

"CmL-plus" comes to compensate the lack of face-to face contact between students and tutor, or between professor, tutor and supervisor, being a very useful tool for Distance Learning. The architecture of „CmL-plus" is very flexible and the students can ask questions and send comments to the tutor or to the professor and can receive the feedback via e-mail or chat, in synchronous or/and asynchronous mode.

The benefits and disadvantages for „CmL-plus" users are similar to the benefits and disadvantages for m-learning devices [8]:

Benefits:
- Increase mobile educational traffic and student's opinions.
- PDAs are lighter than books and enable the student to take notes or input data directly into the device regardless of location either typed, handwritten or using voice.
- Optimize valuable teaching resources and enables several students work together on assignments even while at distant locations.
- Bi-directional real-time text interaction.
- Access to personalized stored content.
- Easy access to classes with mobile device from anywhere: increases work/ learning performance and relevance to the learner.
- Connecting everyone independent of bearer, with simultaneous support for any type of voice or video device in the same classroom and may assist learners with some disabilities.
- Students can really communicate between their home or office PCs and mobile devices.
- Receive a high level of service with the ability to view necessary information for a more effective contact session.

Disadvantages:
- Small screens of mobile phones and PDAs.
- Limited storage capacities in PDAs.
- Battery life/charge.
- Lack of common operating system (essential differences between WM3 and WM5).

- Still difficult to use moving graphics.
- Limited potential for expansion with some devices.
- Wireless bandwidth is limited and may degrade for large number of users.

References:
[1] http://www.radvision.com/Products/3Gproducts Applications
[2] A. Vlaicu, B. Orza, V. Mesaros, V. Dobrota – „A Modern Multimedia Communication Environment for Distance Learning Applications", Proc. of the 3rd International Conference on Multimedia Technology and Tecommunication Services (ICOMT '98), Budapest, Hungary, 28-30 October, 1998
[3] C. Hutanu., A. Vlaicu, B. Orza, M. Achim, N. Ludusan, and Catalina Hutanu – „Applying Modern Educational Technologies in Romania: the Impact of e-Learning Platforms", *EDEN 2004 Annual Conference „NEW CHALLENGES AND PARTNERSHIPS IN AN ENLARGED EUROPEAN UNION"*, 15-18 June, 2004, Budapest, Hungary, pp. 176-182.
[4] C. Hutanu., A. Vlaicu, B. Orza – „IeL - The Romanian e-Learning application for Open Distance Educational System", *International Carpathian Control Conference – ICCC'2004*, Zakopane, Poland, May 24-28, 2004, pp.249-254.
[5] C. Hutanu, A. Vlaicu, - „Ten Years in Romanian ODL System: the Role of e-Learning Platforms in the Digital Age", *ICTAMI Conference*, Thessalonica, Greece, 22-26 [th] October 2004, pp. 245-249.
[6] Mifsud, L., - Alternative Learning Arenas - Pedagogical Challenges to Mobile Learning Technology in Education. Proc. of: IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'02), Växjö, Sweden, 2002, pp. 112-117.
[7] Newell, A. & Simon, H. A., *Human Problem Solving*, Englewood Cliffs (NJ), Prentice-Hall, 1972.
[8] http://www.grayharriman.com/mlearning.htm