

A Modular environment for e-learning and e-psychology applications

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Abstract: - This paper presents a modular electronic environment for e-learning and e-psychology applications. Our work is based on the modularity and adaptability achieved via the ICT and Internet tools that provide authoring services of e-content (i.e. examples, exercises, multiple choices, glossary, references, e-library, announcements, web links) and asynchronous communication (i.e. discussion forums, message box). The distributed, interoperable and user-friendly architecture implemented allows the existence of different user levels depending on their role. Moreover, the environment supports different education scenarios, in a virtual classroom, as well as collaborative learning-consulting via e-psychology applications both for small groups and for individuals.

Key-words: e-learning, e-psychology, modular environment, psychology

1. Introduction

E-learning is the sector of internet which has a continuously increasing growth rate. Business is the community that has mostly took into advantage the services of e-learning, mainly for staff training reducing sensibly the training cost [1,2]. Moreover, e-learning via its application in the social sensitive communities, i.e. the people with disabilities - through their education in new technologies - has highly contributed to the fight for equal rights in the education and in the work market [3]. The last five years, ICT has been widely used in the sector of psychology as a service of education and consulting of small groups [4,5,6]. Due to the above context, the subject of e-learning and its specifications and management have been widely studied in literature: authoring standards [7,8], e-content [10,11], e-content development and management [9], virtual classroom educational methods [3], methodologies of improvement of interoperability of educational content [12], classification-evaluation of the e-student educational level and learning difficulties.

The above context constitutes a basic body of knowledge for the design and development of e-learning applications. On this basis, and towards a modular design of the electronic content, we designed, analytically specified and developed a generic e-learning environment that is based on a highly

interactive use-case model (student, instructor, and administrator) and a flexible-interoperable scheme of assistive asynchronous tools. The environment described in the sections to follow can be easily implemented to support e-psychology, as well as e-learning applications.

2. System Architecture

2.1 3-tier Architecture

The environment's modularity and flexibility are based on the widely adopted 3-tier model (Fig.1).

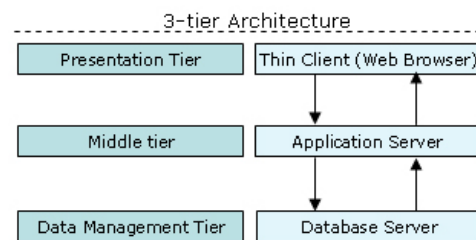


Figure 1. The 3-tier architectural model

The architecture depicted in figure 1 assures the effective management of resources, the best data range, and security. The architecture includes the following tiers: presentation, application and data management. The middle or application tier is

responsible for the presentation of data to the users while the third or data management tier deals with the management of the database transactions. Moreover, the middle tier limits the user access in secure data, enforcing the system security.

2.2 Environment Tools

The environment includes tools that offer flexibility and adaptability depending on their use. The design of these tools was based on the existing web services, as discussion forums [13], chat, message box, e-libraries [14], which are widespread in the public web community. These tools are distinguished in two groups: "informative" and "communication". On one hand, the "informative" tools include services related to the educational material and its presentation. On the other, the "communication" tools include services that allow the communication of different user groups (users belonging to a different session level). The environment offers the possibility of management of these tools according to the user groups' permission. More explicitly, the "informative" tools are the following: list of courses, list of educational material, examples, exercises, multiple choices, glossary, references, web Links, e-library, announcements. Respectively, the "communication" tools are: discussion forums and message boxes. Finally, it must be noted that the environment relates the tools to the educational material courses according to the specific user level permissions. These levels are analyzed in the sections to follow.

2.3 User Levels

Four user levels are distinguished (Fig. 2) in the environment. In each of them different supporting tools exist. Depending on the corresponding use, these levels have also a different role: administrator, instructor, student and unauthorized user. Each of them interacts with the other through the "informative" and "communication" tools related to each level.

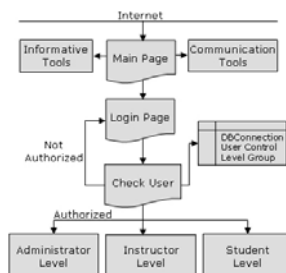


Figure 2. The user-level diagram

2.3.1 Administrator

The administrator coordinates and manages the e-learning application via the administration tools. The administrator determines which user level-group has the permission to use the corresponding "informative" and "communication" tools. Moreover, the administrator can communicate with the instructor in order to be kept informed about the progress of the instructors' courses.

2.3.2 Instructor

In this level, the instructor determines the educational and consulting material. The instructor also determines the development and the way that the material will be presented to the students and in the entire internet community. He/she is able of producing the e-content for his/her course, aiming at the better comprehension and assimilation of his course from the students or the unauthorized visitors. Finally, in this level, the communication between the instructor and the students aims at the resolution of questions at the development of courses.

2.3.3 Student

The student determines the successful development of seminar and courses. Moreover, the student reads the educational material registered by the instructor, communicates and poses questions to the instructor. He/she is the one that tries to resolves exercises or questions of multiple choices. It must be remarked that the student has access in all the information and services independently of the related to him courses' implementation. In this way, continuous access in the knowledge is achieved and consequently the better course comprehension.

2.3.4 Unauthorized user

In this level the visitor can easily browse e-content from corresponding courses taught to the students of the environment. The innovation of this level is due to the fact that the visitor can have access to the consulting material for each course, but also in the discussion forums between the instructors and the students (carried at the development of courses or at the practical application). Finally, this level follows the philosophy-standard "knowledge-access for all" giving the permission to the random visitor to obtain the knowledge of his/her object of interest.

3. User Tools and Services

3.1 Administration Tools

The environment provides administration tools that are separated in three groups as follows: management of general services, management of “informative” services and management of “communication” services (Fig. 3). The transactions executed in each group concern the retrieval, insert and update of the corresponding data. All web requests/responses are carried out through interactive and user-friendly CGI forms. More explicitly, the “general services” group of tools includes management of the data structures of: news, events, announcements and user. The management of the “information” services is of major importance, as it enables the administrator to determine the type and the amount of seminars, classes, syllabus, courses, instructors and students.

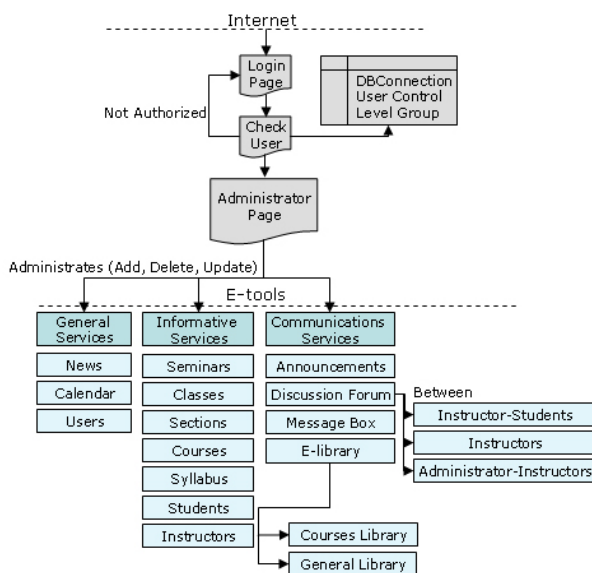


Figure 3 Administrator Level Diagram

The “communication services” group includes services through which the administrator can manage: announcements, electronic library of courses, the discussion forums between instructors and students. Moreover, through the certain services the administrator communicates with each of the instructors separately (via the message box).

3.2 Instructor’s Tools

The tools help the instructor to organize the course in a way that it will help the students in the direct

comprehension of course. The instructor can manage the courses accompanying material (Fig. 4). Finally the tools enable the instructor to conceive the learning weaknesses of his/her students, and to select the education process of each course. More explicitly, the instructor’s tools can be separated in three groups as follows: general services that include management tools of news, events, profile, courses retrieval/search, syllabus and educational material. The second group includes tools that allow the fast access at the already consulting material as: examples, exercises, multiple choices, glossary, references, web links, e-library, announcements, solutions of exercises, discussions between students and instructors. The third and more basic group of administrative services is the one that enable the instructor to build and manage the educational material of his courses: the educational material (chapters, sub-chapters, paragraphs), the accompanying material (examples, exercises, multiple choices, glossary, references, web links, e-library, announcements), the discussions between his students on the answer of questions, the discussions with his students at the practical application of the educational subjects, his message box from personal communication with the administrator.

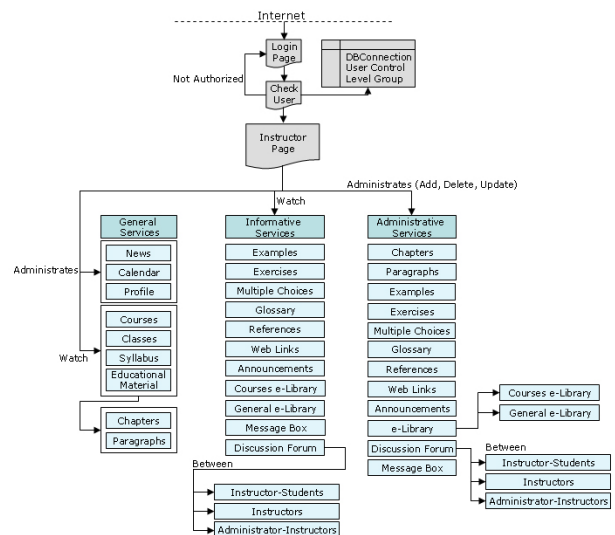


Figure 4 Instructor Level Diagram

3.3 Student Tools

Through a friendly and direct way the environment enables the student-user to have access in the total amount of the educational material with final aim the acquisition of knowledge (Fig. 5). The student’s tool can be separated in two groups as follows: general

services that allow the fast access at: news, events, courses, syllabus and educational material. The second group includes tools that allow the fast access at the consulting material: examples, exercises, solutions of exercises, multiple choices, glossary, references, web links, e-library. What is important in this group is the possibility of communication with the instructor via the discussion forums. Moreover, the student has access at the answers of his/her questions but also discusses with the instructor at the practical application of the theoretical subjects. Finally, the environment aims at the biggest possible parallelism of education in the traditional classroom, with the education that in virtual classroom.

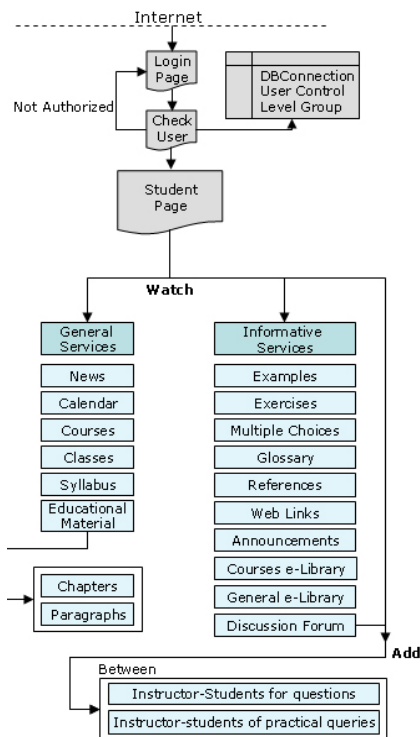


Figure 5 Student Level Diagram

4. Environment and e-psychology

The psychology community focuses on different studying levels referring to the statistical analysis of experiences, diagnosis, treatment and education. The last years, ICT has been widely used in the sector of psychology as a service of diagnosis, analysis of experiences, education and consulting. A variety of e-environments have been developed that support electronically treatment [15,16], diagnosis and

education [17,18,19] on psychology issues. The specifications of e-content and e-tools in an e-psychology platform can be easily implemented through a simple correspondence of the psychology ontologies to the generic e-learning ontologies presented in the previous sections.

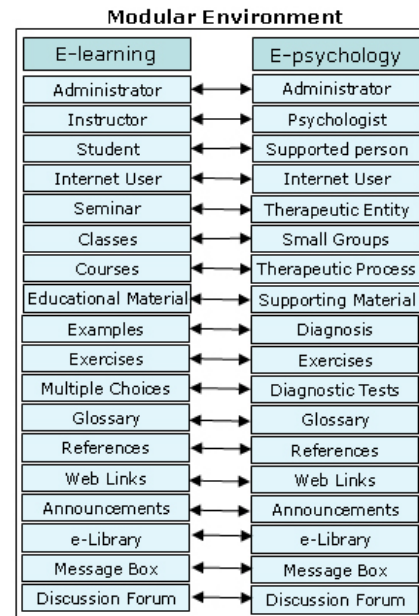


Figure 6 Modular Environment

At this point, we present the way that the e-learning tools are related to the correspondent e-psychology tools (Fig. 6). From the above figure it is obvious that roles of the “instructor” and “student” are transformed to the roles of “psychologist” and “supported person” respectively. The “classes” are turned into “small therapy groups” and the “courses” into “Therapeutic Process”. The “consulting material” (examples, exercises, multiple choices) are corresponded respectively to diagnosis, educational exercise for treatment and diagnostic tests. Finally, all tools (glossary, references, web links, announcements, e-library, message box, discussion forums) can be easily applied in both platforms.

5. Pilot Project

The presented environment was developed under the framework of the Greek research program, namely, “Conditions Improvement of Inclusion to Educational System of Individual with Multiple Handicaps” that was funded by the O.P.E.I.P.T. European community program (Operational Program of Education and

Initial Professional Training) [20]. The project's main objective was the training of teachers on issues of special education of multiple handicaps. The work included two seminar periods: "training" and "specialization". The former included training in physical classrooms while the latter training in physical classrooms and e-learning. Our modular environment was parameterized and configured properly to conform to the project specifications and needs. In this way, it assured the distant training form and also supported the dissemination of new ideas and knowledge in the special education community. Two basic content and services categories were implemented to cover the needs of each seminar period. These were: - for the "training" seminar - tools serving the educational material - and - for the "specialization" seminar - chapters, paragraphs, consulting material (examples, exercises, multiple choices, glossary, references, web links, announcements, e-library) and communication tools (message boxes, discussion forums).

6. Conclusions

This paper presented a modular e-learning environment based on a generic and easily adapted architecture. The e-learning tools implemented were based on e-learning standards in order to be used for e-content authoring and management. The system architecture conforms to the principles of interoperability, user-friendly interactivity and flexibility. The presented environment was adapted to the needs of a certain project of distant training in the sector of special education and the users' comments showed that it was able to cover their educational and authoring needs. Moreover, its generic and parameterized structure enables it to be used in any training sector including psychology training, as well as in e-psychology applications both for small groups and personal support. Future work includes the adaptation and configuration of the environment in a pilot application of e-psychology.

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