

## An Open Distance Learning e-system to support SMEs e-enterprising

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*Abstract:* - SMEs have gradually recognised the positive impact that ICTs and their applications can have on their business. Most SMEs according to EURO watch, particularly those which have fewer than ten employees, today have computer infrastructures and access to Internet. Many types of business software can improve information and knowledge management within the firm, leading to more efficient business processes and better firm performance. This paper presents an e-application for training SMEs in the usage of new technologies as well as in e-activities such as e-business, e-commerce, e-management, e-advertisement etc, in order that competitiveness and e-enterprising in the area of SMEs, is increased. 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, 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 and operation of different user levels according to their roles.

*Key-words:* ICT, SMEs, e-learning, e-tools

### 1. Introduction

The issues for governments are to foster appropriate business environments for e-business and ICT uptake (e.g. to diffuse broadband, enhance competition), and target program to overcome market failures to the extent that they are needed in particular areas (e.g. skill formation, specialised information) [1].

More and more governments are using information and communication technologies especially the Internet or web-based applications, to provide services among governmental agencies and citizens, businesses, employees and other non-governmental organizations [2,3,17,18].

On the other hand, Information and communication technology (ICT) and e-business applications provide many benefits across a wide range of intra- and inter-firm business processes and transactions. ICT applications improve information and knowledge management inside the firm and can reduce transaction costs and increase the speed and reliability of transactions for both business-to-business (B2B) and business-to-consumer (B2C) transactions. In addition, they are effective tools for improving

external communications and quality of service for established and new customers [1,16].

Furthermore E-learning is the internet sector which has a continuously increasing growth rate. The business community, is the community which has taken advantage of e-learning services the most, mainly for staff training reducing the training cost [4,5].

Fundamental to the success of organisations in the knowledge economy is the way such organisations cultivate learning and how they retain knowledge. E-learning can aid an organisation to develop its knowledge base [6,7]. E-learning is instructional content or learning experience delivered or enabled by electronic technologies. For e-learning to become a core part of the training strategy of organisations, the latter need to be clear of the business benefits it delivers [8,9,10,11].

The IT analyst firm, IDC, forecasts that worldwide spending on e-learning will reach US \$23 billion by 2004, a striking increase from a market of less than US \$2 billion at year-end 1999 [12]. While

consolidation in the e-learning industry and a slow economy may not allow this target to be reached within such a short timeframe, there is no doubt of the field's aggressive growth. Enlightened executives are not considering e-learning an isolated activity, but rather, a piece of the overall business strategy. For example, PricewaterhouseCoopers Consulting successfully implemented a business-to-extended enterprise (B2E) portal. This self-service desktop environment for employees provides critical information, software applications, and infrastructure products to drive efficiency gains, use of best practices, job satisfaction, and team collaboration [13].

Hewlett-Packard's learning portal, @hp, handles HR, administrative and training functions for more than 90,000 employees around the world. Course offerings range from IT courses to leadership development courses. The greatest business benefits to be documented are a significant reduction in paperwork and faster decision-making by employees. In addition, the portal achieved a return of \$50 million within six months of going live [14].

However, research indicates that instructor-led training is still the most popular and most used training method within organisations [8,15].

## 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).

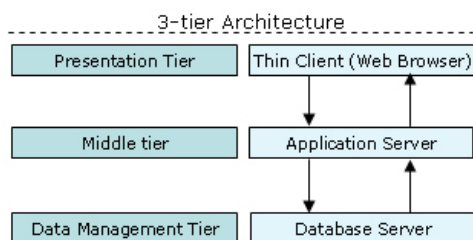


Fig. 1. The 3-tier architectural model

The architecture depicted in figure 1 ensures 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 to 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, such as discussion forums [19], chat, message box, e-libraries [20], which are widespread in the public web community. These tools are distinguished in two groups: "informative" and "communicative". On the one hand, the "informative" tools include services related to the educational material and its presentation. On the other, the "communicative" 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 "communicative" tools are: discussion forums and message boxes, video and audio conferences and chat. 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 "communicative" tools related to each level.

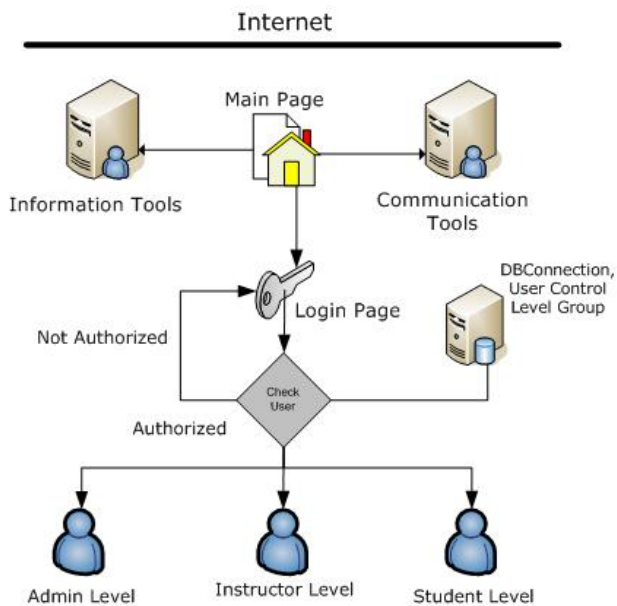


Fig. 2 - The user-level diagram.

### 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 “communicative” services (Fig. 3). The transactions executed in each group concern the retrieval, insertion 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 number of seminars, classes, syllabus, courses, instructors and students.

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).

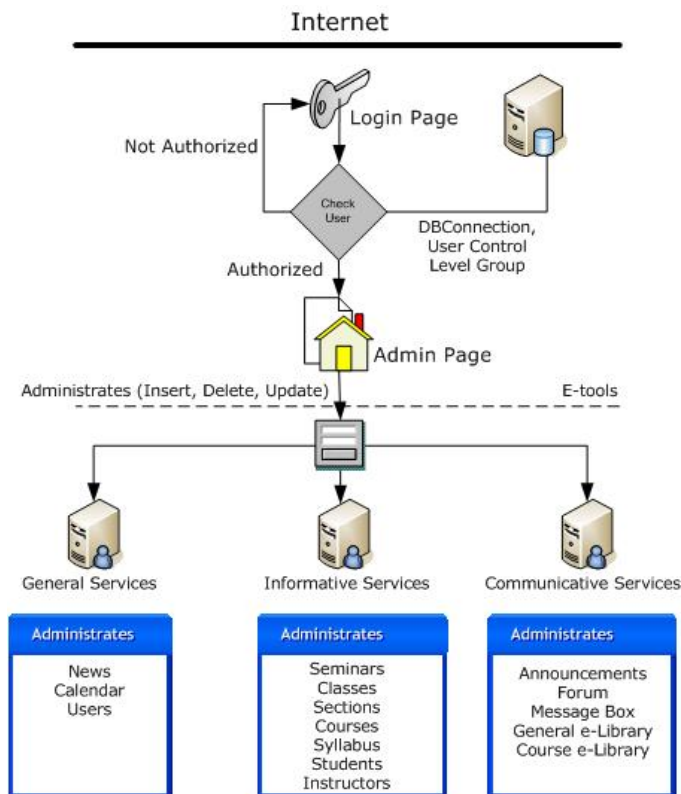


Fig. 3 - Administrator Level Diagram

#### 3.2 Instructor’s Tools

The tools help the instructor to organize the course in a way that will help the students-employees in the direct comprehension of the course. The instructor can manage the courses accompanying material (Fig. 4). Finally the tools enable the instructor to perceive 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 into 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 to 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 the administrative services is the one that enables 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 choice, glossary, references, web

links, e-library, announcements), the discussions between his/her students on the answers of questions, the discussions with his/her students on the practical application of the educational subjects, his/her message box from the personal communication with the administrator.

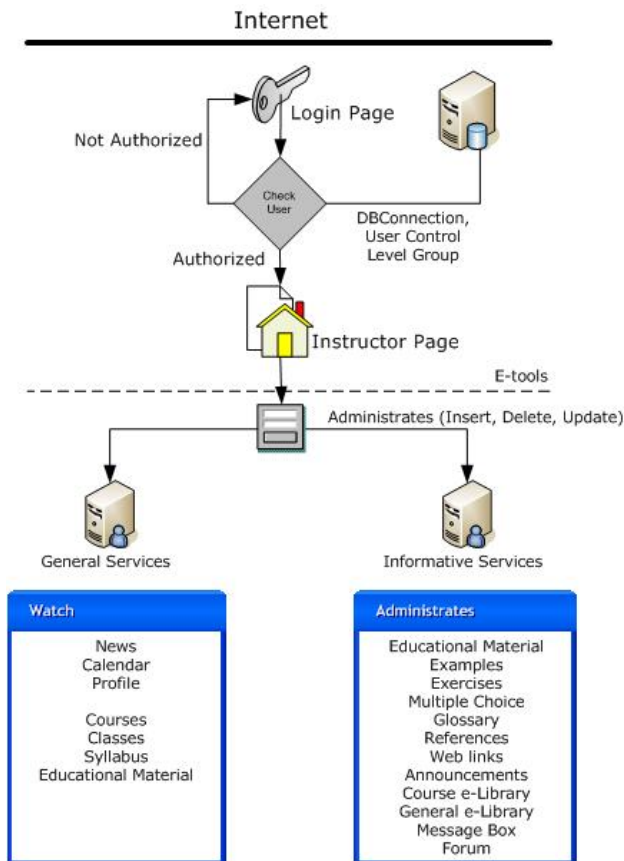


Fig. 4 - Instructor Level Diagram

### 3.3 Student Tools

Through a user friendly and direct way, the environment enables the student-employee to have access to the total amount of the educational material with final aiming at the acquisition of knowledge (Fig. 5).

The student's tool can be separated into two groups as follows: general services that allow the fast access to: news, events, courses, syllabus and educational material. The second group includes tools that allow the fast access to 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.

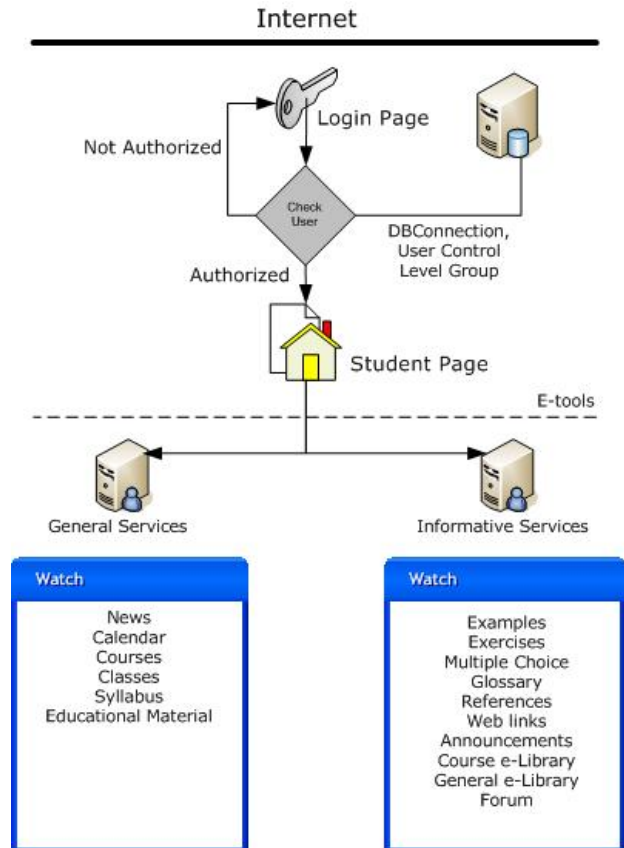


Fig. 5 - Student Level Diagram

Moreover, the student-employee has access to the answers of his/her questions but also discusses with the instructor 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 in a virtual classroom.

### 4. Importance of Training in SMEs

The importance of training to company competitiveness and employee motivation has been highlighted by many researchers [22,23]. Some of the most outstanding advantages are:

To the company:

- Flexibility in responding to contextual changes
- Timeliness of adaptation to normative and contractual purviews

- Labour and organisational quality
- Resource optimisation
- Maximisation of profitability
- Greater competitiveness

To the employees:

- Capitalisation and certification of the worker's own competencies
- Acquisition of new competencies
- Transferability of new competencies
- Increased value of the worker's own role
- Greater personal motivation
- Greater knowledge of the worker's own role

Furthermore, e-learning promises to provide a unique experience that accommodates the three distinct learning styles of auditory learners, visual learners and kinaesthetic learners. E-learning also offers individualized instruction, which print media cannot provide, and which instructor led courses allow clumsily and at great cost.

Some of the most outstanding advantages to the trainer or organization are:

- Reduced overall cost is the single most influential factor in adopting e-learning. The elimination of costs associated with instructor's salaries, meeting room rentals, and student travel, lodging, and meals are directly quantifiable. The reduction of time spent away from the job by employees may be the most positive offshoot.
- Learning times reduced, an average of 40 to 60 percent [24]
- Increased retention and application to the job averages an increase of 25 percent over traditional methods,
- Consistent delivery of content is possible with asynchronous, self-paced e-learning.
- Expert knowledge is communicated, but more importantly captured, with good e-learning and knowledge management systems.
- Proof of completion and certification, which essential elements of training initiatives, can be automated.

Along with the increased retention, reduced learning time, and other aforementioned benefits to students, particular advantages of e-learning include:

- On-demand availability enables students to complete training conveniently at off-hours or from home.
- Self-pacing for slow or quick learners reduces stress and increases satisfaction.
- Interactivity engages users, pushing them rather than pulling them through training.
- Confidence that refresher or quick reference materials are available reduces burden of responsibility of mastery.

## 5. Conclusions

Investment in people is a key differentiator between successful and unsuccessful organisations [9,6]. E-learning is a facilitator for organisations to keep up with changes in the global economy [21]. Traditional training methods alone are no longer able to satisfy the demand for the continual updating of employee's skills and knowledge [9].

This paper presented an 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 SMEs in new technologies issues as well as in e-activities such as e-business, e-commerce, e-management, e-advertisement. By training SMEs in the aforementioned issues, they simultaneously become more competitive in the enterprising area, the enterprising increases and consequently so does the economy.

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