EFFICIENT E-LEARNING SERVICES

František Jakab, Igor Sivý, Ján Genči, Viliam Fedák

ABSTRACT
The contribution deals with the architecture of the eEDUSER portal (eEDUSER - "Efficient E-Learning Network Services Establishment for Education without Borders", project within Leonardo da Vinci Programme). It analyses the concrete aims and functionality of the portal.
The portal offers innovative Internet based asynchronous and synchronous education services incl. videoconferencing sessions. It supports exchange of knowledge, case studies, training, FAQs, troubleshooting, organization of ODL on international level and solves problems of integration, interoperability and internetworking of distributed e-learning resources. The leading idea behind the project eEDUSER is to benefit from the synergic effect caused by integration of various technologies, technical platforms, application domains and services and international distributed educational resources in order to provide an open and interoperable environment. The paper describes the principles of the management of available learning resources, communication possibilities provided by the virtual collaboration rooms, used technologies and standards applied during the development of the portal.

KEYWORDS
e-learning, portal, ODL, virtual room, education resources, www oriented education, virtual learning environment

INRODUCTION

The aim of the eEDUSER project is to propose the concept of a www portal in order to provide educational telecommunication services and access to the distributed educational resources of the partner institutions. Projected outputs include new educational resources (15 multimedia modules to be developed within the project) as well as existing resources provided by the partners' institutions. By educational resources we mean:

- modules accessible via Internet;
- video-records accessible via IP streaming or videoconference transmissions from the specific educational events and
- remote access to the laboratories (virtual laboratories).;

The project particularly deals with:

- design and development of suitable administrative model of the virtual educational infrastructure at international level (based on partner's experience);
- specification of various Internet based services offered in the pilot consortium network that utilizes international distributed educational resources;
- development of methodology of pedagogical, technical and organizational characters that is linked with implementation of the ICT in education and training of modules developers towards effective development of multimedia modules;
- development/production of new modules and adaptation of existing modules - adapted outputs from previous Leonardo da Vinci projects and that will comply the partners' training needs and will prove suitability of utilization in Open Distance Learning (ODL) in different fields and levels of education;

- organizing of training sessions offered by the partners, incl. the video-conferencing communication and IP streaming;

The portal eEDUSER permits to offer innovative Internet based asynchronous and synchronous education services incl. videoconferencing sessions. It will support exchange of knowledge, case studies, training, FAQs, troubleshooting, etc. It will support organization of ODL on international level and will solve problems of integration, interoperability and internetworking of e-learning resources. The project outputs will be utilized for daily training activities organised at the partners' institutions. In framework of dissemination, the network services will be released to other institutions and for self-learners, as well. Thus the project will enable a collaborative use of remote labs and will contribute to a real implementation of a flexible ODL training institution without borders.

The leading idea behind the project is to benefit from the synergic effect caused by integration of various technologies, technical platforms, application domains and services and international distributed educational resources in order to provide an open and interoperable environment (see Figure 1). The proposed environment improves and upgrades current learning and training methods in such a way that they would be more friendly to the users and easy adaptable to their needs.
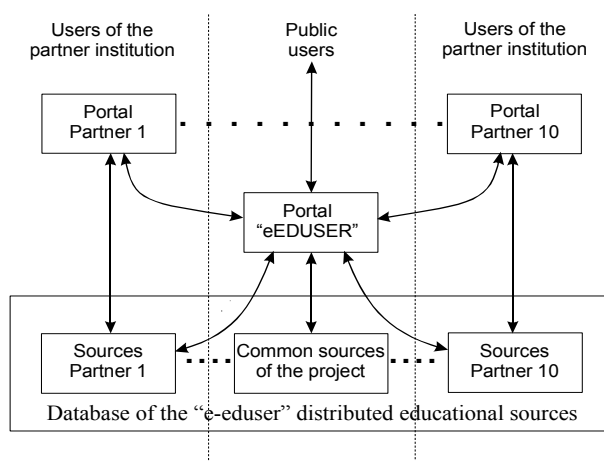

Figure 1. Architecture of the eEDUSER network consisting of educational portals

FUNCTIONALITY OF THE PORTAL OF EDUCATIONAL SERVICES

The most important output of the project is the e-learning www-portal, which has to fulfil the following requirements:

- It should provide advantages of current e-learning systems;
- It should enable customers to study in distance form in virtual classes;
- It should enable to assess the achieved results;
- It should share and enable access to various information resource regardless of their type and locality;
- It should provide various communication tools (chat, audio/videoconference, forum, voice-chat...).

The users of the portal can be divided into two parts:
- unregistered users;
- registered users;

The unregistered users will be able to access to the public parts of the portal only after their registration. These users are our potential partners or clients so we should give them as much information as possible.

Registered users have their account at the portal. As the registered users there can be:
- Lectors: They teach students grouped in the classes and manage the educational process within the classes;
- Students: They acquire the knowledge from available resources and courses via classes;
- Administrators: They are responsible for management of portal resources, courses, classes and access control;
- Course developers: They create the new courses for portal from available resources;

Lector teaches students grouped in the virtual classes and they manage the educational process within the classes.

Student can be anyone who wants to learn via the eEDUSER portal. Firstly, he has to register at the portal and then he may choose some class(es) to attend.

Administrator is responsible for the portal maintenance. They manage accounts for all users registered with the portal, portal resources, courses of portal, virtual classes.

Course developer is responsible for development of courses from the resources of the portal and their maintenance (correction or errors, update, etc.).

Sources of education: One of the main tasks of the portal is management of the educational assets. Further, by the term resource we will mean the educational resource, which can be used in the education process via the portal (i.e. html page, picture, flash module, pdf document, video sequence, etc.).

The resources are divided into two main categories:
- resources of the portal – have to be registered on the portal by administrator;
- additional resources – some free resources added to the class by the lector. The portal does not warrant anything concerning this type of resources;

From the technological point of view the resources can be divided into two main categories:
- static (asynchronous) resources;
- live (synchronous) resources;

Static, or asynchronous resources we divided:
- downloadable resources – html pages, pictures, flash modules, video etc., from which the learning content is composed;
- not downloadable resources – web pages and video, which can be accessed on-line only;

Live, or synchronous resources are divided into:
- interactive lectures - the lectures where the learners can interact with the lecturer by means of chat, net meeting or videoconference;
- non-interactive lectures mean lectures where the students can only listen and watch the lecture. The lecture can be synchronized with the slideshow consisting from slides from this lecture;
- on-line consultations are consultations between students and lectors via videoconference of net meeting;

ARCHITECTURE OF THE PORTAL

From users point of view the architecture of the portal and services is shown on Figure 2 that consists of the following parts:

- public part;
- private part:
    - portal maintenance;
    - study environment (virtul class);

Public part: The public part of the portal will provide information about portal and its possibilities to public, potential partners and clients. This will be also the place where the new users can register. It will include:
- list of services for clients and partners provided by the portal;
- list of learning resources available via the portal;
- forms of education available via the portal (i.e. courses, studies organized by partners' educational institutions such as universities, secondary schools, etc.);
- free learning resources, such as courses, lectures;
- portal usage Tutorial;
- consultations for the potential users;
- registration of new users – students and lectors;
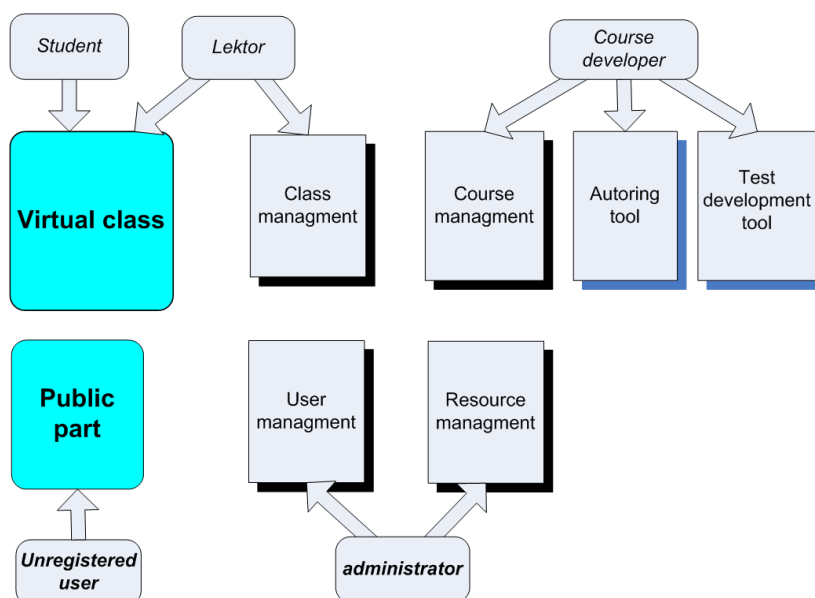
Figure 2. Architecture of the eEDUSER portal

Portal maintenance: This part is accessible only by registered users and has the following sections:
- users management;
- resources management;
- courses management;
- classes management;
- management of other parts (system integrity, categorization, messages...);

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Users management: This environment enables administrator to maintain users' accounts (e.g. creates users).

Resources management: This section serves the upload, inclusion and maintenance of educational and information resource. As it was mentioned previously, eEDUSER differentiates various types of information resource. The source's type specifies the form of its interpretation.

Inclusion of the resource consists of the following steps:
1. Uploading the resource at server *(only in case of static resources);*
2. Inclusion of the resource into the respective category;
3. Fulfilment of the preliminary information sheet;
4. Accepting the resource by the administrator (after checking correctness of the data);

Administrator may modify the classification of resources.

Courses management: Users in roles „Course Developer" may create courses. It consists of:

- creation of the parameters of the course (name, characterization, target group, price, duration, prerequisites, language, assessment characteristics, etc.);
- specification of educational resources, which create the course;
- scheduling of courses (sequencing the modules within the course);

Classes management: Only the administrator and the lector may maintain virtual classes. The virtual class is related to an actual course, i.e. all appropriate educational resources are accessible in virtual class.

Figure 3. Functions for class maintenance

As Figure 3 shows, the following functions are available: inclusion/deletion of students, management of lectors (name, beginning, end of lectures...) and lectors' functions for teaching management (Scheduling, FAQ, Grade book, Announcement,..). The homepage of the virtual class is to be seen in Figure 4.

Figure 4. Homepage of the virtual class

VIRTUAL CLASS CONCEPT

A virtual class is an environment for provision of the following educational activities:
- exploration (access to educational materials, lectures, assignments, simulations, ...);
- evaluation (assessment of tasks, knowledge evaluation);
- collaboration (means of communication for students and lectors: Q/A, forum, chat, audio/video conferencing, ...);
- supplement (to help student learning, some supplementary information or data related to a course are placed in supplement environment – references, Schedule, FAQ, ...);

The virtual class is defined in the eEDUSER system as an entity associating the course with one or more students and one or more lectors for purpose of reaching educational goal(s) (realization of course). The virtual class uses the services of the portal to reach the goal(s).

The virtual class in the eEDUSER system (Figure 5) provides e-learning environment for the realization of the educational activities. This environment is personified and provides the following services:

- educational resources (Resources);
- evaluation (Assignments, tests, grade book);
- supplement environment (Announcement, Document manager, Students, FAQ, References);
- collaboration environment (discussion forum, chat, ipCommunicator. Mailing list videoconference…);
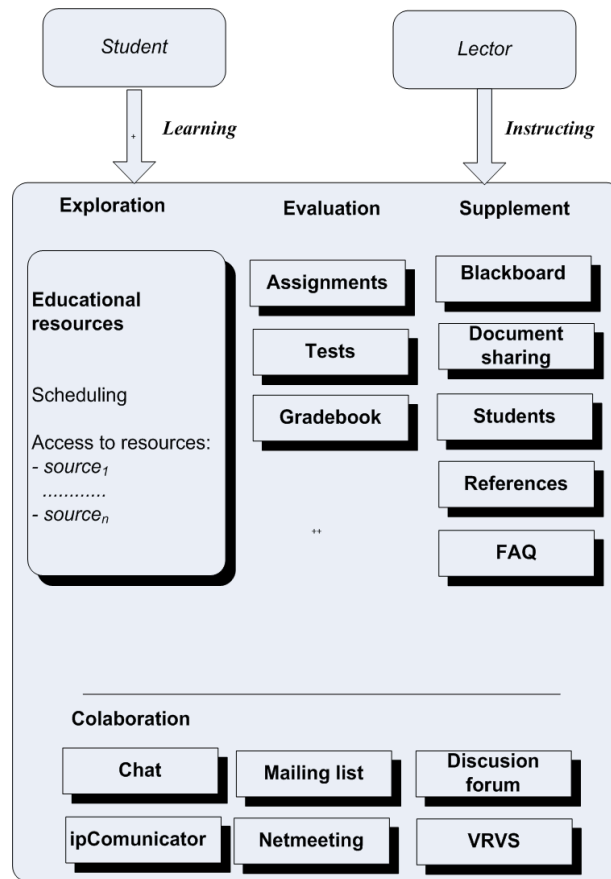
Figure 5. Architecture of the virtual class

Educational resources. This section provides students and lectors with the study materials. The courses are created from these resources and the parameters are set (*sequencing, access time*). The number of educational resource in a course is unlimited.

Obligatory course resources							
Name	Type of res.	Duration	Points/ Weight %	Begin date/time of aviability	End date/time of aviability	View limit	Lock resource in date
Organisation and New Information Technology	HTML site	5 hours					No
Introductory course to the Internet and IP	HTML site	5 hours					No
Organization and Information Policy	HTML site	5 hours					No
Information Projects in Practice	HTML site	5 hours					No
Information Systems Development	HTML site	5 hours					No
Introduction to Information Systems Auditing	HTML site	5 hours					No

Figure 6. Educational resources

Evaluation: Assignment/Tests. This section enables students to pass tests or assignments. The lector may change the tests' parameters.
Gradebook.:The students may to view their results here. The lector assigns marking. The lector may also see the results of his/her students in the class.

Supplement environment: This virtual class provides the following supporting tools:

Document manager. This tool (Figure7) helps to exchange of the documents. Every course has its own directory for uploading documents.

Figure 7. Document manager

This tool maintains the directory structure at the server and it has integrated support for setting access rights to the selected items. Every class contains a „Tests" directory, which serves for test purposes.

Announcement: It places messages for students.
Studenta: This part contains list of students who are in virtual classes. It shows the login of the student, his/her communication activities (chat, ipCommunicator).
FAQ: This part contains frequently asked questions. The students may put questions and get answers.

References: They contain references to interesting resources. The lector may maintain them (*with* short messages), which are available for students.

Collaboration environment: The eEDUSER portal provides the following communication platforms:
Discussion forum: Every course has its own discussion forum with classical structure. The lector moderates this forum, i.e. he creates threads and edits them. The students may also contribute to the forum.

Chat: Every course has its own chat room. It is used also for brainstorming etc.
Mailing list: Mailing list enables e-mal communication between students in the virtual class
IpComunicator: This tool was developed specifically for eEDUSER (Figure 8) and it enables communication through audio and video.

The communicator does not require any special installation. After switching on and clicking on the student's icon, the connection is established. The application consists of two parts: client and server. The clients are connected to the server through TCP/IP protocol, which enables connectivity to private networks (cca 5kb/s – audio and cca 20kb/s audio video). It enables dial-up connection to the Internet too.

Figure 8. ipComunicator

DEVELOPMENT OF EDUCATIONAL MATERIALS

eEduser project supposes to utilize internal and external educational resource. The portal contains also integrated environment for creation of educational materials [1]. Unified forms support creation. These form navigate students during his/her study. The abstract monitor is divided into 3 parts (Fig.10): left, right and bottom part.

Left part: It shows the tree structure of the course with the names of chapters and subchapters.

Right part : It shows the content of the chapter and control buttons: for showing multimedia outputs: - picture, - animation or video, - voice, - document in specific format, - download.
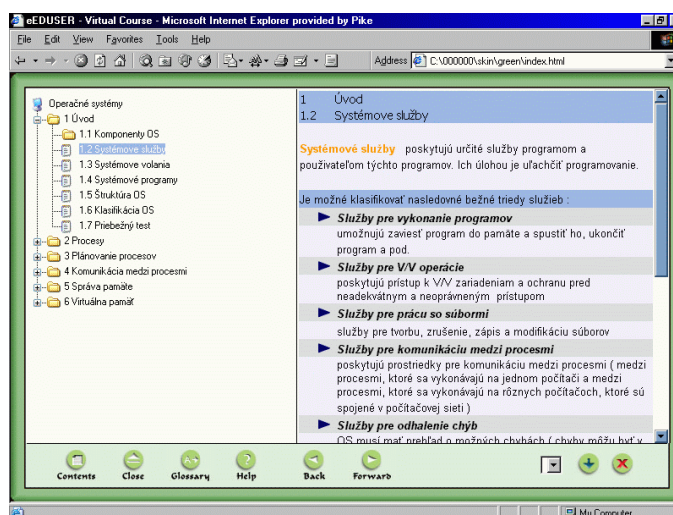

Figure 9. Unified format of pages

In bottom part is the navigation panel for student. It provides also Glossary function (keywords explanation). The authoring environment enables the creation of educational materials and it archiving in database.

Creation of tests: The student has availability to work on tests and to view results. The lector may assign parameters of the tests and to view the study progress of students. There are multiple-choice tests and they are created in the eEDUSER environment. The number of possible attached tests to the courses is unlimited.

Implementation of the portal: The system was implemented on PHP-4, SQL, Apache 2.049 and Linux Debian platform. It is possible to transport it into another operating system. The portal is optimised for MS Explore 5.x and Mozilla 1.4 browsers.

CONCLUSION

Experiences got from utilization of the ICT in education show that e-learning methods and tools cannot be applied for all educational problems. The role of the tutor will increase because he/she has to control efficiently the education. The communication means will enhance the efficiency of remote control.

The eEduser portal presents one attempt to enhance communication between tutors and students and in this way to support the education without borders.

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František Jakab, Igor Sivý, Ján Genči
Department of computers and informatics
Technical University of Košice
042 00 Košice
Slovak Republic
Email: Jakab@elfa.sk, sivy@elfa.sk, jan.genci@tuke.sk

Viliam Fedák
Department of Electrical Drives and Mechatronics
Technical University of Košice
Letná 9
04200 Košice
Slovak Republic
Email: viliam.fedak@tuke.sk