Some Approaches to Implementation of Virtual Learning Environments

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Abstract: *A short analysis of well-known types of virtual learning environments today is presented in the paper. Some examples of world practice are adduced. Four main approaches to implementation of such environments are given. A conception for implementation of uniform virtual learning environment is proposed. As a conclusion the creation of Bulgarian Virtual University as a part of the third stage in national project for implementation of virtual learning environments is announced.*

Key words: *Virtual Learning Environments, Virtual University, e-Learning.*

INTRODUCTION

The control and use of information and communication technologies in the present-day dynamic and global community are important elements for the functional literation of every human, needed circumstance for his personally and professionally growing. In the sphere of education new era of "life long learning" came. People need to get more quickly new knowledge and habits, based on the growing need of permanent learning. In response of this need virtual learning technologies appeared and improved.

Since the mid-1990s the education community has witnessed the appearance of software products labelled Virtual Learning Environments (VLEs) that aim to support learning and teaching activities across the Internet. The definition of a VLE was *'learning management systems that synthesise the functionality of computer-mediated communications and on-line methods of delivering course materials*', [3].

LAYOUT

Many universities today have VLEs embedded within their teaching and learning and most of the remaining institutions are in the process of evaluation and selection.

The following Virtual Learning Environments are well-known:

- virtual educational site;
- virtual center for e-learning(E-learning Shell – http://ecet.ecs.ru.acad.bg/else);
- virtual classroom (HP Virtual Classroom, and others, look at [5]);
- virtual library (Virtual library for PhD Students–http://ecet.ecs.ru.acad.bg/phd-center)
- virtual laboratory (Virtual laboratory on Computer Organization, [6])
- virtual school (Florida Virtual School - http://www.flvs.net/)
- virtual department (Virtual Department in Computing "John Atanasoff", [2])
- virtual faculty (Virtual faculty of information and communication technologies – http://ecet.ecs.ru.acad.bg/ict-vf)
- virtual university or virtual campus (Virtual-U -http://www.vlei.com)

According to [1], virtual learning environments are classified in four generation:

- **virtual learning environments first generation –** These environments appeared in 1992 and allowed the use of first online courses. These are VLEs, which are characterized with data base of learning materials, test system, discussion forums, e-mail and so. A disadvantage of first generation environments is the absence of integration and interaction between separate components. The static virtual educational sites belong to first generation VLEs.

- **virtual learning environments second generation** – They appeared in 1996 and are the most powerful instruments for online courses implementation today. As is well-known, there are over 80 different commercial second generation VLEs, familiar as virtual learning centers. Some of the famous are: Top Class, WebCT, Blackboard, COSE, Learning Space and so. Second generation environments have software platform for e-learning with integrated data base and organized learning process. These environments are characterized with numerous functions as: planning and administrating, function for

creating and supporting learning materials, function for testing student's knowledge and for having statistics of their results. Together with the merits of these environments, a number of disadvantages connected with the insufficient use of modern communication and multimedia technologies can be seen.

- **virtual learning environments third generation** – A distinctive feature of third generation VLEs is the use of newest technologies as: audio-conference through Internet; "one to one" and "one to many" video-conferences; student collaboration over one project or one document. Examples of such environments are: Stanford On-line, InterLabs, Classroom 2000 and others. The system "Virtual university" (VU) is among the VLEs third generation. VU is a model of a real university in the virtual space and offers all its services to the learners in an integrated way through Internet, so it becomes a complete system. These services include online learning materials – different types, specialized virtual centers for educational courses development, library and administrative functions, interactive environment for asynchronous and synchronous communications and online collaboration (work in groups, seminars, forums, practical classes, video and audio conferences).

- **virtual learning environments fourth generation** – These environments are in the initial phase of their planning and developing. The main leitmotif of this generation is its: intellectualization; personalization and adaptation of learning materials to the needs of each user; orientation to new learning paradigms in centre of which the learner and the global educational resources are, instead of the teacher and the local resources. There exist many technologies today, on the base of which fourth generation VLEs can be build. Multi-agent technology is one of them. This technology is presented as one of the most perspective instrument for implementation of such environments.

SOME APPROACHES TO IMPLEMENTATION OF VLEs

We propose four main approaches for VLEs implementation:

1. Every physical department (faculty, university) create own virtual image in Internet – internet site with comparable professional standards, curricula, syllabi, virtual library with disciplines links, virtual laboratories and others, fig.1.

Example of such VLE is: Colorado University Online (http://www.cuonline.edu)

2. Group of universities or all related departments of different universities join their potential in the academic community and create one virtual university or virtual department with national or international significance, fig. 2.

Example of such VLE is: African Virtual University (http://www.avu.org)

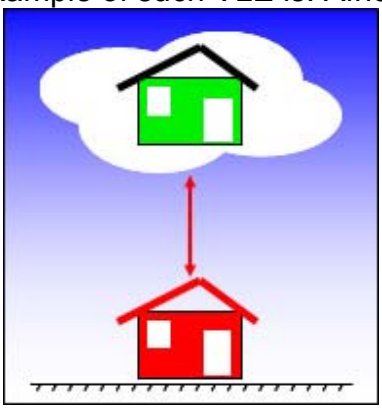

Fig.1

Fig.2

3. Group of people or organization, which does not have statute of real educational institution, create one virtual image. That can be for example virtual university, which do not have real physical building. Such VUs are known as "universities without walls", fig. 3.

Example of such VLE is: Virtual-U (http://www.virtual-u.org/)

4. The fourth approach combines the ideas of the forward three approaches. VLE, which have to be implemented, is represented as virtual portal to a great number of different virtual representations. These virtual representations can be for example virtual universities (virtual faculties, virtual departments, centers for e-learning and others), created using one of the forward three approaches, fig.4.

Examples of such VLEs are: Canadian Virtual University [6], Universitas 21 [7].

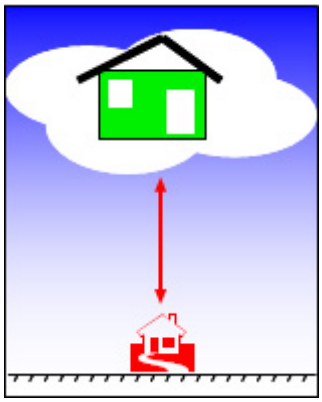

Fig.3

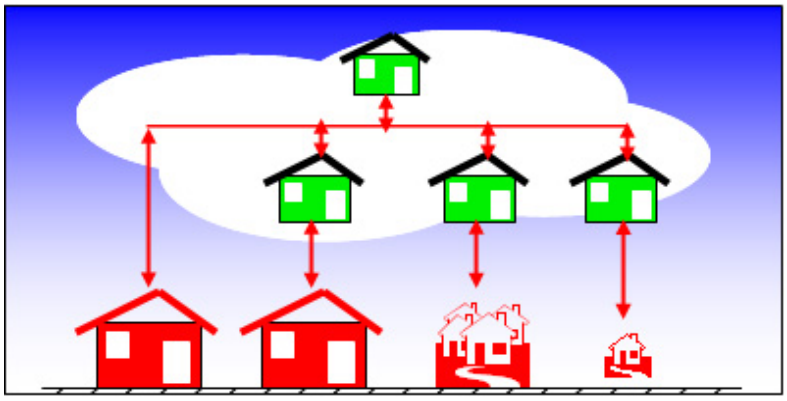

Fig.4

CONCEPTION FOR IMPLEMENTATION OF VLEs

We propose a conception for implementation of uniform VLE by using the fourth approach. The conception aims to integrate researches and developments in different inter-university and inter-institutional programs in Bulgaria (distance learning centers, regional virtual universities, virtual departments, virtual faculties and others) and to use the scientific and productive staff potential, and also to use the information resource and technologies, the telecommunication infrastructure and organizational structure of higher education institutions. Our conception will response to the educational requirements of learners from wide diapason of specialities, professional directions and high schools.

The following principles in the conception are underlined:

- **integration principle** – The integration principle for implementation of VLE will allow: resource cataloguing of all partners at national, regional, inter-branch and branch level; monitoring; having statistical indices for all activities in different levels. It will be possible also to create one data base and virtual library with educational courses, distributed by professional directions. The integration of all environments components (from the organization to the data base format) will provide the possibility of maximum information about the services, which partners offered for users in the VLE;
- **democratization principle** – Equal rights in the VLE for all educational institutions in solving legal and administrative questions, marketing and other activities, which have to provide the quality in leading learning process;
- **independence principle** – Autonomy and self-dependence of every educational institution, which have own virtual representation in the uniform VLE. Independence of each institution in: forming the educational materials, organization and leading learning process, pursuing own economic politics. The institutions own their information resources and have full administrative rights on them;
- **globalization principle** – Joining to the global virtual space, free access to the Web servers for global interaction and possibility for exchanging the most modern technologies and attempts. It is needed the world trends in the field of virtual learning to be attended and the VLE development to be in conformity with these trends;
- **confidential principle** – The information, which is located in every virtual representation, have to be confidential;
- **regional principle** – Joining the virtual representations by regional principle. In the framework of these regional virtual segments, catalogues with regional resources are

formed: catalogue with information recourses, catalogue with educational institutions in the region, catalogue with regional educational institutions' specialities and so. Such an organization will allowed analyzing the regional segments resources and having an access to the specific resource directly from its owner – the corresponding regional educational institution.

It can be pointed some others principles for implementation of VLEs, for example **tolerance principle.**

STRUCTURE AND ORGANIZATION OF VLE

VLE, implemented by using the fourth approach, should have homogenous structure - build on the base of standard program equipment and common data base, which can be accessed from all the partners. It is impossible all VLE resources to be presented within the framework of only one site. The VLE have to be distributed with different virtual representations in it (network of educational sites or other VLEs). Particular virtual sites have to follow determinate requirements and to use the common technological decisions. The VLE should have uniform navigation and have to provide possibility for users for fast and easy access to the information resources (for example fast access to list with educational institutions, which offer courses for specific specialities training).

ADMINISTRATION OF VLE

Each virtual representation is responsible for his administration, but interrelations, organisation and access to common servers in the VLE have to be regulated. The administrative module of VLE will allow collaboration between all virtual representations sub-modules. The administrative roles have to be shared by the following way:

- administrators of regional virtual representations – technical assistants in the corresponding educational institutions, which have administrative obligations for regional information resources (learning materials, student's and teacher's accounts and others);
- administrators of the whole VLE – technical assistants, engaged with installation and actualization of the standard program equipment and also with consultations for regional administrators.

LEGAL AND FINANCIAL MECHANISMS

Legal insurance of the VLE consist of preparing document agreements and contracts, which specify interrelations between partners. These documents concern questions related to the installation, exploitation and modernization of the standard program equipment. Technical aspects are specified and also some financial agreements between institutions are arranged.

It is needed eventually regular financial relations, which will come when the payment of the Internet services start, to be arranged. Learner's taxes will be defined by agreements with the specific educational institution. Each educational institution concludes agreements with authors of the learning materials, which are included in theirs virtual libraries.

The partners in the VLE have to use only licensed software in their virtual representations.

EDUCATIONAL AND INFORMATION RESOURCES

Each VLE aims to give possibilities of teachers, students and technical assistants for distance interactive online and off-line access to all educational resources in the environment at any time and at any place. Educational and information resources of the VLE are different: text materials, computer-educated programs, mathematical models, multimedia products for education purpose, virtual libraries, virtual classrooms, virtual laboratories and others needed for effective organization and learning process with guaranteed quality level.

Organizing and supporting educational courses and all related resources are arranged by the regional representations. The quality control of the courses will be commission's engagement, which will select the VLE learning courses.

PEDAGOGICAL AND DIDACTICAL FUNCTIONS OF VLE

Pedagogical and didactical functions in VLEs are more complicated compared to these in traditional learning. They have to perform organizational, quality control, correctional and predictional operations in the process of virtual learning.

Pedagogical and didactical functions, which are used for organization of students self-learning in the VLE have to provide:

- students interest in the process of learning;
- assimilation of new materials as short as possible;
- the use of the potential possibilities of students logical thinking by training exercises;
- regular consultations between teachers and students, such that the teacher will be organizer and the student – initiator of the learning process.

For effective self-learning student's work, it is needed also the content of learning courses in the VLE to correspond to the requirements and educational standards in Bulgaria.

For that purpose the VLE should have preliminarily prepared documents with regulative information such as: common information for the course (aim and task, incoming and out-coming relations); information about the lectures by themes and parts; learning up-time for each course; forms and time for accounting; timetable of online seminar and practical classes; schedule of synchronous and group consultations; methodical suggestions for students work with different types of learning materials; list with advance help literature and so.

The Internet connection is an important element in VLE implementation. VLE should have high-speed channel for Internet connection, which will provide fast and reliable exchange of information between the partners in the VLE.

The previous tasks are fundamental, but they do not exhaust tasks variety, which have to be decided in realization process of such enormous project – implementation of uniform VLE.

CONCLUSION AND FUTURE WORK

We are choosing the fourth approach for implementation of VLEs, because our main aim is, by using intensively the possibilities of the modern information and communication technologies and the e-learning principles, to join the potential of all departments in computer systems and information technologies and also the potential of corresponding institutions in BAS (Bulgarian Academic of Science). This potential will allowed the quality in bachelor and master training in computers and information technologies to be increased considerably and that to be the first step to Bulgarian virtual university establishment, respectively to virtual educational space in Bulgaria.

Bulgarian virtual university is initiative, a part of national program for implementation of virtual learning environments, which have started two years ago. The main initiators are the Academic Computer Systems and Information Technologies Community and ICT Development Agency, MTC – Republic of Bulgaria. This program has two projects till now. The first project was Virtual Department of Computing "John Atanasoff" [2] and the second one is Virtual Faculty of Information and Communication Technologies.

The first meeting of the initiative committee for establishment of Bulgarian Virtual University was on 16 April 2004. Following stages for creating BVU were proposed:

1. At first, the project foresees BVU to be established as one common national educational portal to Bulgarian high institutions and their virtual learning environments and gradually to increase its functionality and importance, fig. 5.

2. At second stage, the project foresees creation of virtual centers. Virtual INFO Center for PhD Students is already in running order, fig. 6. It is developed in collaboration with High Attestation Commission. It will be used by all PhD Students in Bulgaria and will be the first independently part of BVU.

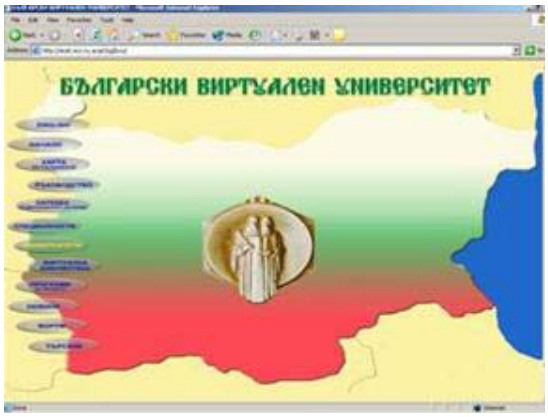

Fig.5. Site of Bulgarian Virtual University

Fig.6. Site of Virtual INFO Center for PHD Students

3. At the following stage Virtual Center for Life-Long Learning will be created. The first web-based courses, which will be integrated in it, will concern the standards, organization and methodology of e-learning. It is expected that the ideas of e-learning for the industry will find realization in subsequent stage.

4. As final stage, the project foresees the accreditation of BVU, so that giving certificates and diplomas for passed virtual education will be possible.

BVU is established in response of European Commission initiative "E-learning" as an integral part of the European and world educational space. BVU is a new initiative, which will help Bulgarian university community to take part in the world processes of consolidation. The mission of BVU is: by intensively and effectively using the possibilities of the modern information and communication technologies to contribute the realization of high-humanely idea for open, adaptive to individual needs, life-long and high quality learning, which will give equal possibilities of every Bulgarian to receive knowledge and abilities, needed in the information era. BVU is dedicated also for members of neighbour and other countries, which wish to receive bulgarian high education diploma.

The establishment of BVU will be probably in December 2004.

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