Virtual Internet Classroom System Modules for distance IT learning and teaching within the shared space of the global network

Professor ŽELJKO MARČIĆEVIĆ, Ph.D, Full Professor BRANKO MILOSAVLJEVIĆ, Ph.D
Department of Computing and Control Engineering
University of Novi Sad, Faculty of Technical Sciences
Trg Dositeja Obradovića 6, Novi Sad
REPUBLIC of SERBIA
marcic@uns.ac.rs   http://www.ftn.uns.ac.rs

Abstract: This paper displays some modular units within the structure of an interactive, online virtual Internet classroom for collaborative strategies in an open educational environment inside the shared work space of the Internet. The Internet resources global search engine will be presented. Weather forecast module, web gallery of images and structures with frequently asked questions and answers in a virtual classroom. It displays the component for multipurpose connection with the virtual professor, as well as the use of the component for cooperative team work. A virtual hypermedia classroom was implemented using ASP development technology with a user interface to distributed databases.

1   Introduction

The scientific technical and technological onship between science and production, scierevolution has fundamentally changed the relatince and education, production and education. The development and progress of science and technology directly influence education, along with its content, methods, techniques and application, as well as the overall organization of teaching [1].

Science and earlier formed disciplines are being connected and merged, and new synergies of two or more scientific fields are starting to form a unique unified whole, leading to new integrated areas of knowledge. We are witnessing the increase in the quality and quantity of knowledge that is expanding in geometric progression. Intellectual activities are evermore emphasized, and in the field of education, the focus is on the solutions for the goal of improving the results of the teaching process.

With the massive use of computers, the conditions for better quality educational technology have been created. Hypermedia educational materials in cyberspace enable the production of electronic hiperver contents with text, images, sound animations and movies so that students can independently advance in comprehending the educational content. It offers the possibility to return to the content that is perhaps not clear, to receive additional information all in accordance with their capabilities and interests.

The possibilities of interactive learning, together with the quality of educational materials and the use of multimedia and hypertext, provide significantly richer content compared to the lessons learned in traditional classrooms. This kind of hypermedia system provides a more comprehensive and quality way of accessing multimedia content, in order to acquire the knowledge. The development of telecommunication technology and the massive use of the Internet enabled interactive distance learning based on a system approach using multimedia electronic sources of information.

2   Disadvantages in traditional teaching

One of the major causes of poor teaching efficiency lies in the fact that active interaction and synergy between more of more individuals in the teaching process is very poor. It is one-way flow of communication-from teacher to student. There is little response and feedback from students to teacher and almost no horizontal communication in which students exchange information among themselves [2].

Because of the one way flow of information, from a teacher to a student, feedback is very rare. The teacher does not have information on the amount of material adopted by the student. Neither students, since they do not send feedback

information to the teacher about the level of adopted content, they are not aware if they know and whether what they know is good enough [3].

Since "learning with real cases" is missing in most cases, evaluation of students is reduced to occasional tests which are not reliable basis for assessing student knowledge and progress, for assessing the validity of the teacher's work and for eliminating weaknesses in the teaching process [8].

3 Learning and teaching in a virtual classroom

Multimedia virtual interactive Internet classroom enables the organization of distance learning using electronic media, computers, video cameras and electronic networks of the Internet.

This kind of approach ensures that all students follow selected lectures held by best of experts and professors, and to upgrade the quality of information through cooperation between related universities and schools. This kind of teaching organization requires maximum interaction between students and teachers, regardless of the location of the student and the educational institution.

A modernly equipped interactive Virtual Hypermedia Classroom at a computer-assisted teaching center is supported by a communication center which can be at the level of either a virtual unit, a school or a larger system. This communication center is a computer supported educational center, viewed from the aspect of implementation. This classroom is virtual and computerized and includes a center for didactic virtual materials and a center for learning and improvement. Pupils and teachers on the Internet inside a hypermedia virtual classroom have access to educational material that enables the understanding of the intellectual essence. Users are able to use moving images, sound, text, illustrations and animation while mastering the content material. Information sources are different, such as digital libraries, virtual didactic materials or information bases. The best organization of the teaching process is the one in which all students work, think, and solve problems interactively [4]. In the traditional concept that we know as Komensky's heritage, this cannot be achieved [3].

The virtual Internet hypermedia classroom is organized in such a way that all users receive tasks, either same tasks or different assignments and master them while being able to control their work using appropriate modules. The teacher is available at all times for support and feedback related to the work of each student. In a hypermedia virtual Internet classroom, it is possible to set up an efficient and rational organization of the teaching process.

4 The Structure of the Virtual Internet Classroom System

A transmedial mega virtual interactive Internet classroom enables the transfer of interactive hypermedial instructions in a shared virtual cyber space [4].

A virtual Internet classroom in the cyber space environment provides conditions for distance education of IT content through the telecommunication infrastructure of the Internet. The implemented and designed model functions to enable realization of the curriculum at any time (full time) and make the teaching content from the domain of information technologies available in any place (shared space) [4].

Basic modular units of the Virtual Internet classrooms are:
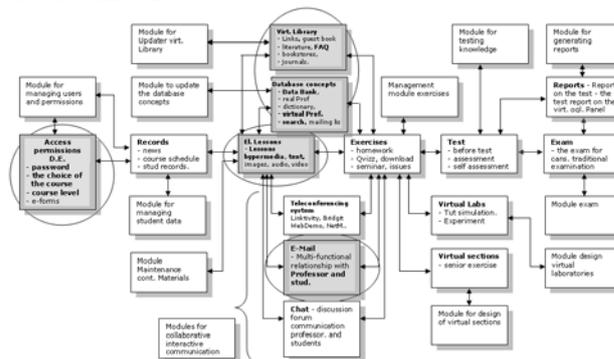
Figure 1. Logical structure of scalable modules in the system Virtual Internet classrooms. [6]

1. Managing user and student data
2. Maintenance of teaching material
3. Virtual library (Internet links, literature in .PDF format, foreign e-books, home country e-books, bookstores, e-journals).
4. Virtuel laboratory (simulation Tutor).
5. A virtual professor in the on-line synchronous mode.
6. Concepts database (FAQ).
7. Guestbook
8. Component for cooperative team work
9. Discussion forum
10. Search for the web site and the entire Internet
11. Collaborative communication modules (email, Web teleconferencing system)
12. Module for exercising with tests, tasks and questions.

13. Gnerating reports , exam applications.
14. Publication of e-contents.
15. Student records in the database.
16. Access permits, course selection and course level.

The basic navigation menu used in the utilization of a virtual Internet classroom is a graphical interface with a hypermedial base to other segments of the ASP client-server technology [7].

5 Educational material on the virtual classroom web portal

Remote Web Learning provides an instructional delivery system that connects learners with educational resources. Its main feature is the separation of instructors and learners in space and time, using educational media and technologies. It fulfills the need to synchronize the instructor and the participant while transferring the course contents and to change the instructor-learner environment from the instructor-centered to the student-centered.
The heterogeneity of the audience with respect to the students' educational needs and background knowledge leads to the idea that one of the challenges of dealing with a distance learning system based on the web is to adapt the educational material to the cognitive goals and abilities of each student with the aim of offering personalized learning [4].

In this case, the content of hypermedia is produced or made up of parts of the educational material in accordance with the level of the student's knowledge. In this paper, we focus on the development, structure and description of the domain of knowledge addapted to suit each learner. Hypermedia interactive virtual trans-medial Internet classroom has available educational units from a link of e-lectures: [6]

✓ Microsoft Word, Microsoft Excel,
✓ Microsoft Power Point, Microsoft Front Page,
✓ Microsoft Windows, Dreamweaver,
✓ Multidiscipline, Corel,
✓ Internet, Outlook Express,
✓ Delphi, C + +, ICQ, Multimedia,
✓ Robotics, Hardware, Memory, Monitors,
✓ Peripherals, Keyboard, Video card.

The educational material supports alternative learning styles by providing different types of information with varying degrees of difficulty, and increases research activities by accepting a hypermedia form of presentation and including stimulating activities. Finally, self-tests, activities and tests on knowledge are included along with

theory in order to ensure the procedure of the learning process.

Figure 2. Educational material in the Virtual Internet Classroom, showing the form for the application and selection of lessons within the Lecture module.

Virtual Classroom is implemented as ASP.NET application to NET. Data is stored in SQL Server 2008 database. User interaction is done via a Web form and web browser. Virtual Classroom is available through the Web-a, and different levels of access are defined [5].

Authentication is a process of generating username and password and their confirmation. If generated username and password are valid, the user who has submitted them will be considered as authorized. When the user is authentic, authorization process will determine whether this user has access to certain web pages at NET Framework and the provider's authentication form for SQL membership is thus selected, since the majority of virtual classroom users have access from the internet [7].
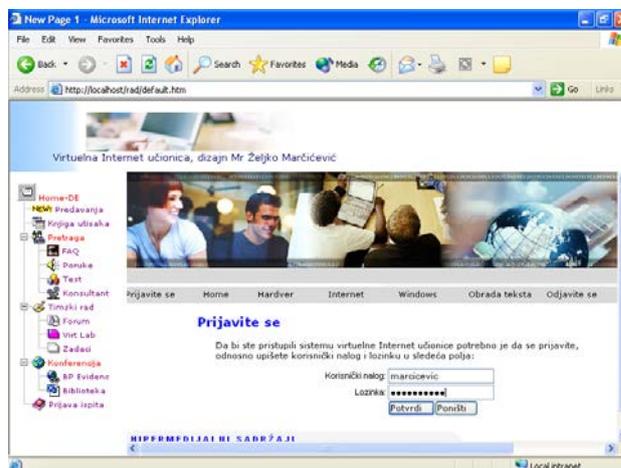

Figure 3. Logging when selecting an application.

6 Subsystems of the Virtual Internet classrooms

Adding a **component for global search** of all internet addresses (URL) through MSN browser – Microsoft Portal, will make the basic component in the structure of virtual internet classroom. Link search provides the following aspects: MSN Components. If the connection to the Internet is active, a redirection to the MSN page is displayed, where the search results will be displayed.

By activating LocalHost, the implementation procedure for MSNBC Components is tested. In an open Internet connection, the weather component establishes a link to the MSNBC website and displays the current weather conditions and tomorrow's forecast on the site [4, pp. 337].
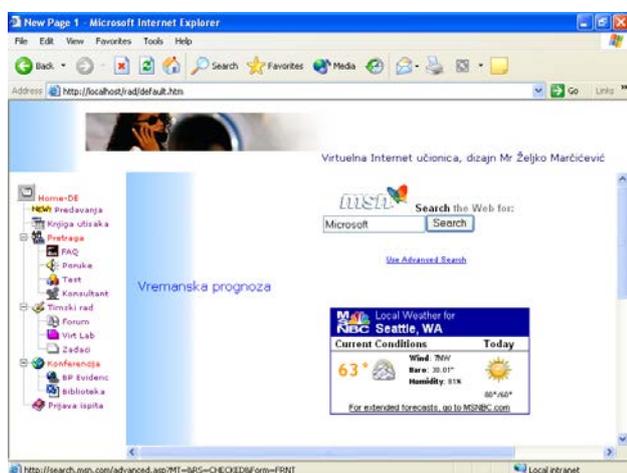
Figure 4. Search and Weather forecast components.

Photo Galery procedure. Photos used in this segment of the site are from the image database. By activating the link through the appropriate image for distant education, the images are enlarged [4, pp.338].
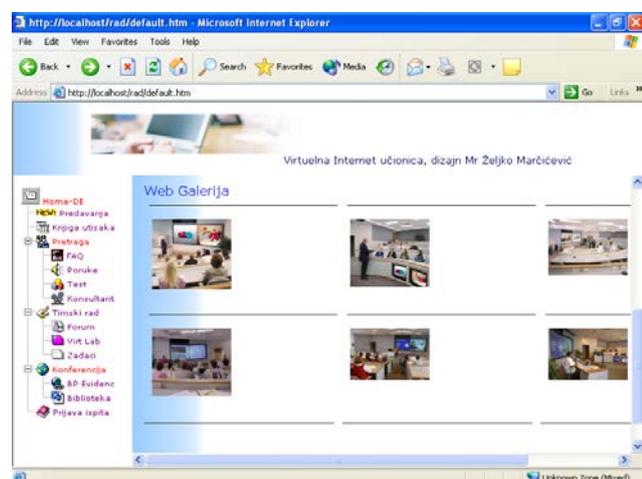
Figure 5. Image Gallery component.

The Gallery can have :

- ✓ A horizontal layout
- ✓ A slide-show layout
- ✓ A collage layout
- ✓ A vertical layout

FAQ Component – frequently asked questions and answers. In this option of FAQ, there is a floating page for Frequently Asked Questions by employing HTML page patterns. Experiments have been made to replace windows for Normal and HTML text templates by personal texts.
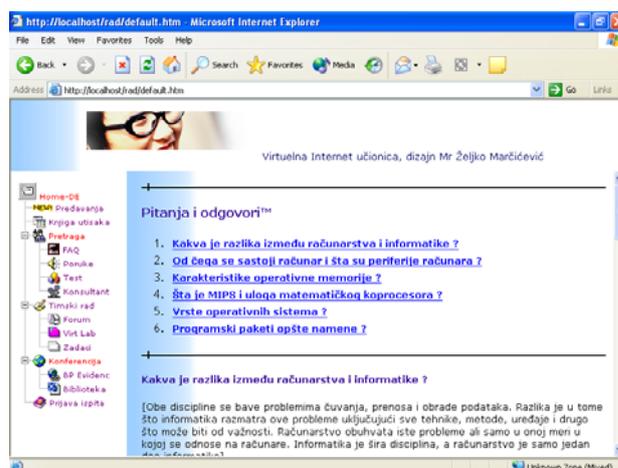
Figure 6. The FAQ page.

Virtual professor consultant component.
One of the basic problems that arises when installing a knowledge transfer system on the Internet is the measure of the presence of sychron subsystems in relation to asynchronous. Synchronous (on-line) approach implies interactivity, direct Internet connection, and simultaneous presence of students and professors on the Internet. Asynchronous (off-line) presents an interferance to student-professor interactivity, but allows the freedom of the presence of students and professors on the Internet at different (nonsychronised) times. Both approaches have advantages and disadvantages.

The mentioned synchronous-asynchronous dilemma, in a virtual Internet classroom, was solved by setting up an intercession, which, in our opinion, is able to balance out the the advantages and disadvantages of both aproaches. We developed this approach and called the Virtual Professor Consultant, and implemented it under the abbreviated name Virtual Consultant. The basic idea behind the Virtual Consultant is a simulation of consultative learning [4 pp. 344].
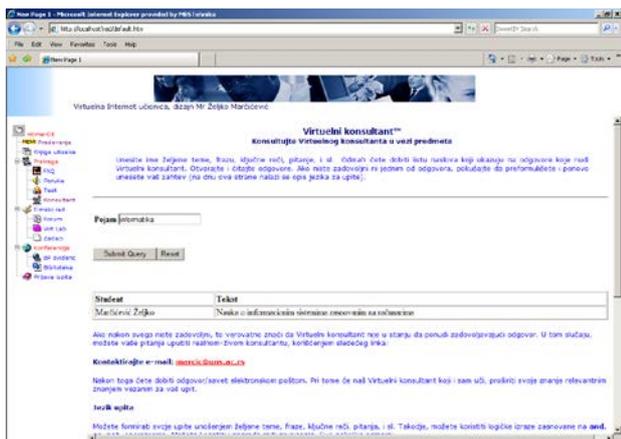
Figure 7. Vrtual professor consultant.

A virtual professor-consultant functions as a subsystem that possesses its own knowledge of a relevant subject and is able to respond to student queries, and can be adjusted, ie. acquires new knowledge in accordance with possible questions to which it does not have the answer. It is placed above a purpose-built knowledge base. Every subject that is implemented comes together with its Virtual Professor containing the appropriate knowledge.

During the consulting process, the student sends out his questions, or consulting requirements, in a relatively free form, or uses phrases, key words and / or logical operators. A virtual professor provides the answer-advice. If the student is satisfied he can finish the consultation. If not, the student has the opportunity to ask the real professor who os appointed to the relative subject. In this case the student receives the answer, the virtual professor adopts this new knowledge, thus, acquiring and keeping up with students' demands.

The student needs to enter the name of the desired topic, phrase, keyword, question, etc. Immediately he gets a list of titles that indicate the answers provided by the Virtual Consultant. It is necessary for the student to read the answers. If the e-student is not satisfied with any of the answers, he/she should try to write the question differently and re-enter the request.

It should be noted that a Virtual Consultant Professor, developed for a particular subject, with ease, immediately, provides simultaneous consultations with a larger number of students. Also, it is important to emphasize that over time, the role of the Real Professor decreases, while simultaneously with the continuous expansion of ots own knowledge, the Virtual Professor becomes increasingly used [4].

A student can always activate the Real Professor appointed to the subject asynchronously. The result appears as an electronic screen where the student types the question. The student receives the answer by e-mail, and at the same time the Virtual Professor adopts this new knowledge .

The use of web location in order to track projects for supporting cooperative team work of students is within the **module for corporative team work**.

Today, there are very few people who perform the duties entirely by themselves. The ability to work teamed together and to manage teams in such a way that all work is done on time and in accordance with the virtual system is a highly appreciated skill. In order to make the cooperation of the teams of students easier, the virtual classroom contains several templates that allow team members to be properly informed, to share information and these templates provide a central storage of all the information that students need for successful collaborative and corporate learning.

Active collaborative instructor-student learning [4, pp. 347]. This form of learning starts from the fundamental fact that students already have significant previous knowledge and skills in the domain in which new knowledge is introduced. With such an assumption learning is no longer the process of transferring knowledge from the one who knows (the instructor) to the one who does not know (e-learner), but rather represents a real pedagogical interaction between teachers and pupils. As we have said, this interaction is typically asymmetrical because the teacher is a cognitively mature person with greater life experience and a significantly higher knowledge in the field he is teaching. However, the student is an active partner in building that knowledge, possessing general life experience as well as the knowledge from the area he is studying.
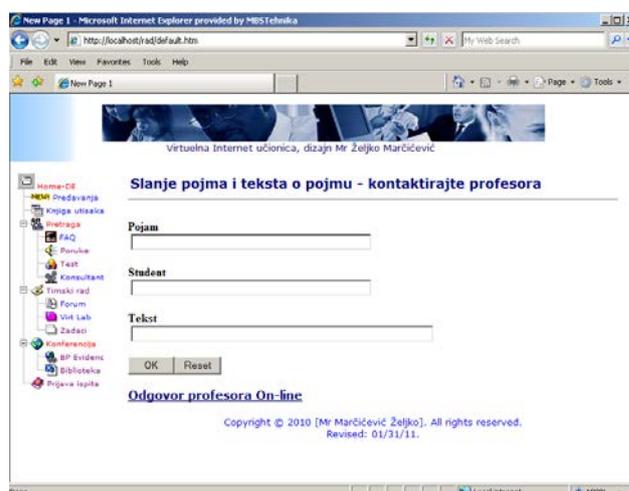

Figure 8. Module for Team Work of Students.

We distinguish the following forms of communication: [4, pp. 349].

On-line synchronous two-way communication (Discussion forum, Chat, Electronic board, Web conference, Audiographic conference).

On-line synchronous one-way communication (Adaptive virtual professor consultant replaces the professor in case of the absence of a real professor, so the e-learner can have a one-way communication with a virtual system - an intelligent system, a knowledge base that evolves).

On-line asynchronous communication (e-mail, when a student is present at e-lessons and a real professor - instructor is not present).

Using the Ok option, the data from the form that is on the student's PC are transferred to the On-line database (knowledge base) that is located on the Server. With the Reset option, the e-student can delete the data entered in the form. If the students use hyperlinks, the answer provided by the Online Professor moves to the Knowledge Base search, ie, in the Search form on the screen (adaptive virtual professor-consultant). In this way, consultative learning is provided by the virtual professor, who is created and designed to enable on-line synchronous communication between the students and the intelligent knowledge base. This option qualitatively develops and improves the intelligent knowledge base, which keeps constantly evolving. In this way the gap between on-line synchronous two-way communication and on-line asynchronous communication is closed.

7 Conclusion

World-wide networks and other Internet-based resources greatly improve electronic training and education. The educational material given in form of hypertext through an interactive hypermedial virtual Internet classroom, provides new functionality of the transfer and exchange of information. When integrated with multimedia tools and range of services, the network can significantly raise the level of and enrich the students' participation in the training process. The network is, in fact, an effective mechanism for integrating many different resources into one interface and is an ideal tool for the use of rapidly changing information.

References:

[1] Stevanović, M., *Škola po meri učenika* [The school that suits students' measures]. Varaždinske Toplice, 2004.

[2] *Nastava i vaspitanje.* Časopis za pedagošku teoriju i praksu [Journal of Education, Journal for pedagogic theory and practice]. Beograd, 2010.

[3] *Inovacije u nastavi* - časopis za savremenu nastavu, Učiteljski fakultet [Innovations in Teaching, Journal for contemporary teaching]. Beograd, 2009.

[4] Marčićević, Ž., *Sistemi za elektronsko učenje* [E based learnig systems]. Visoka poslovna škola strukovnih studija, Novi Sad, 2010. UDK 004.42:37.018.43 (075.8), ISBN 978-86-7203-109-6.

[5] Herceg Đorđe, Željko Marčićević. *Journal of Mathematic*, Novi Sad, 2009., vol. 39, iss.1, pp. 111-121.

[6] Radovan Tomić, Željko Marčićević, Nenad Đokić, *Proceedings of the European Computing Conference*, ECC '11, pp. 36-37, (The previous work of the authors).

[7] The New Dynamic Language Extensibility ModelforASP.NET,MicrosoftASP.NET,http://www.asp.net/DynamicLanguages/whitepaper/

[8] Considerations for Web-based Learning with Real Events. Theo Bastiaens and Rob L. Martens Open University of the Netherlands. Chapter X, pp. 29