One Solution of Web Based Modular System for Distance Learning and Testing

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Abstract: - This paper presents the research which was conducted at the Polytechnical Engineering College in Subotica. The aim of this research was to collect information from students of their level of usage of e-learning and internet services, to train students to use the existing system and to improve and develop the new modular system for the needs of distance learning. This web system is developed by the use of the following techniques: XHTML, CSS, JavaScript, PHP, AJAX, MySQL, XML and Python. XML-RPC web service will be realized to make better communication with the new desktop application and teaching system. The information system will be available at the following web address: www.webprofa.com.

Key-Words: - adaptive, php, xml, distance learning, web, internet, self-testing, web service

1 Introduction

The growth of the Internet has brought on great changes in business and communication between people. With the use of the Internet distances are dimishing and everything is accessible to everyone. E-learning can be defined as instructional content or method of learning by use of electronical technology. It can be realized through storing and distributing education material on CD-ROMs, IBT (Internet Based Training) and CBT (Computer Based Training).

This paper presents the development of a personalized web based modular information system for the needs of distance learning. The first part of the paper describes the reasons why distance learning is so important. The second part gives information about research and research methods and population. The third part describes the existing system and its possibilities. The next part gives the results of research and information of improvement of system. After that the used techniques are described shortly and expected results of future system are listed in the last section.

2 E-learning and distance learning

E-learning can be defined as instructional content or method of learning by use of electronic technology. It can be realized through storing and distributing education material on CD-ROMs, IBT (Internet Based Training) and CBT (Computer Based Training).

Distance learning is an integral part of e-learning, it allows present-day students to acquire an education without having to move out of their

offices or away from their home computers. Communication is achieved by way of an electronic teacher, and in specific cases there is a possibility for real-time communication to take place. The electronic teacher is an application hosted on the web server. It contains a number of questions to which the student sends their answers. Communication happens via the student's web browser.

2.1 When and how was distance learning first applied?

Distance learning was created earlier than many may think. Of course, not in the form in which we now know it and use it today, but it had the same role - to overcome the physical distance for the sake of knowledge transfer. The pioneer of distance learning was Isaac Pitman, a teacher of shorthand. He applied distance learning in working with his students in the 1840s in Great Britain. He told them to transcribe a short messages from the Bible and return it to him for review by mail. He maintained the communication with students across the country and successfully passed on his own knowledge to them. This way of training students, the forerunner of today's distance learning, had immediately showed its quality, cost-effective, pragmatic side as compared to traditional methods and applications.

2.2 What are its historical implementations and who were the first users?

Distance Learning at the beginning of its development primarily functioned through the use of the postal system by providing access to education for people who were unable to attend classes at regular schools. This was the first stage of development of distance learning and it was actually Correspondence Learning. They used it for the inclusion of women in institutional education program that was at that time intended only for men, further, for employed people who were at work during the time of classes, and finally, for those who lived too far away from the educational centers to attend classes.

The discovery of the radio in the year 1920 and the arrival of television in 1940 initiated the development of new opportunities for distance learning. This new media, through which the educational programs were aired expanded education for the audiences to the boundaries of electrical power supply, i.e. the power plants. Distance learning gained completely different

dimensions of time and since then has become an indispensable way of learning. Commercialization of the Internet meant that the whole process of distance learning became more concentrated, enriched with a higher offer specialized programs and degrees of freedom that users have the choice of programs, and ways of attending.

2.3 When and where did distance learning attain recognized institutional status?

In 1859 the University of London was the first university that offered a degree or range of training for distance learning, based on its external program. Another pioneer in institutionalizing this form of education was the University of South Africa, which introduced the Correspondence Education courses before 1946. The greatest Distance Education University in the UK, Open University exists since 1969. In Germany, a similar establishment was opened in 1974, this is the Fern Universität in Hagen.

Worldwide there are now more than 90 institutions, mostly under the name of Open University, in English or translated into local languages and on the model of long-originated Open University in England, which primarily emphasize the importance of distance learning.

2.4 Why is e-learning important?

Everyday people are faced with the inefficiencies of the teaching process. In the region where we live and work there is a need to be competent in information technologies and to be prepared to accept innovations. A number of colleges and schools still use the classic way of teaching. One of the students' problems arising during their studies is that, when they have a question for the teacher, often the teacher is not at hand. In such cases the solution may be to contact the teacher via e-mail, but if the answer is needed immediately, this is not the optimal solution.

Because of the isolation, war and economic crisis of the past decades Serbia has yet to catch up with the developed world from a technological aspect. The country is also lagging behind in informatics literacy and in the sphere of mass usage of information-communication technologies and in education.

Further, there are other problems mentioned which are global or characteristic of our country pinpoint the need for a wider number of steady scientific researches, as this one and similar to them.

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Knowledge becomes the biggest value of a society and also a key resource, whose exploitation brings economic and cultural prosperity. Because of that the aim of this society shall be to create a social environment whose system of values are established on knowledge and innovations.

The need of further researches also highlights other social requirements in our society. The creation of modern universities with current learning media is a precondition for creating experts. The students of this country would be more motivated and stimulated towards further learning if the country invested more in the development of educational techniques. On the other side, the great popularity of web based systems would force telecommunication companies to introduce high bandwidth internet connections on the territory of the whole country. This type of connection will enable the production of better services of e-learning in the way of use different multimedia contents.

For accomplishing these aims attention must be focused on the need of spreading informatics literacy as a supposition for successful development.

The present time poses a demand for new serious scientific researches which will help us meet the requirements of our time. The development of the web service described in this paper is one small step towards achieving that goal.

At the Polytechnical Engineering College a similar problem as described above had occurred. With the subject 'Internet Technologies' the need arose to supply the students with a quality service, accessible at all times for questions, testing and preparation for the exam.

3   Research

The main objective of this research is to present the theoretical and practical research and based on the analysis of results, show a statistically significant impact on the use of e-learning services to increase the efficiency of the teaching process in the subject Internet technologies at the Polytechnical Engineering College. Consequently, on the basis of the obtained results the design of improved systems for distance learning in the mentioned areas would follow, which would eventually be available to the general population and not just school students. The existence of such a system contributed to the increase of computer literacy in our country.

In addition to the main aim of the research, there are secondary objectives to be met:

- to examine to what extent the choice of study program affects to efficiency of web services

- to investigate and determine the level of representation of the computer and the Internet in student population

- to examine the degree of influence possession of a personal computer in usage a web services

- to examine the degree of acceleration of processing test tasks

3.1 Hypothesis of the research

Based on the results of the previous research, what is stated in the subject and then pointed to the research objectives and tasks, two groups of this research project are set.

The general hypothesis of this research project is: "Usage of e-learning services provides a statistically significant impact on increasing the efficiency of the teaching process in the Internet technologies subject".

The general hypothesis will be tested through its sub hypothesis (working or auxiliary hypotheses).

Auxiliary hypothesis:

- IT literacy has a statistically significant impact on a greater volume of usage of e-learning
- Using e-learning service is more time-economical than traditional classes
- Using e-learning service contributes to the automation process of testing tasks
- Traditional learning brings better results in overcoming material
- Selection of the study program affects the efficiency of computer usage

3.2 Method of research

Research for this work was done during the academic year of 2008/2009. The population that participated in this survey is 135 students from the Polytechnical Engineering College in Subotica.

The research took place in the following stages:

1. Survey students and use the existing e-learning system

At this stage the survey of students was performed and training for work with existing web-based system

2. Data collection

In this phase, data were collected, which enabled testing hypotheses

3. Grooming and data processing

At the end of the semester, additional students interviewing was carried out. Students wrote their opinion about their proposals for the improvement of existing service. After that the collected data were processed and statistical analysis and classification of data were performed. With the generalisation of the results, the final considerations are set and the hypothesis were checked.

4. Designing a new information system

Processing information related to the improvement of service, the project of development of new versions of information systems for distance learning was defined.

3.3 Population of research
The survey was conducted of students of Polytechnical Engineering College in Subotica. The sample survey includes 9 groups of 15 students. We used the technique of parallel groups, one control group constituted of the students who do not attend the subject of Internet technologies, while the other groups are experimental and they contain students who attend the subject of Internet technologies. Within each group were used subgroups based on teaching language and study direction. These groups are equal in number. Forming groups is done based on the student records. Students in groups are not the same level of computer literacy.

3.4 Procedures and instruments in the research
For procedures we used testing and interviewing. Educational software 'E-Xpert' was tested. This software was developed at the Polytechnical Engineering College in Subotica.

The testing involved students of the college. The research was purely empirical and is based on the experimental method with two parallel groups to verify the truth of allegations.

Research instruments consist of two tests, two surveys and Internet applications. Both surveys were done in classic form, that is, on paper, and have specific criteria for the analysis and evaluation.

The control group of students had the possibility to choose when they want to access the web service and learn from the lessons and examples that are posted on the Internet. If some segment of learning material was not clear, they could send an e-mail and ask the subject teachers and assistants for a specific problem.

Students who do not belong to the control groups started with lectures and laboratory exercises in the form of classical learning. They also had the possibility to use the web service and thus were able to further test their level of knowledge through testing.

Previous years surveys of students were conducted at the first class of the Internet technologies subject. The subject assistant and professor had insight into the level of usage Internet and computer by freshmens. These data were used only as an indication that the noticeable increase is present in computer literacy.
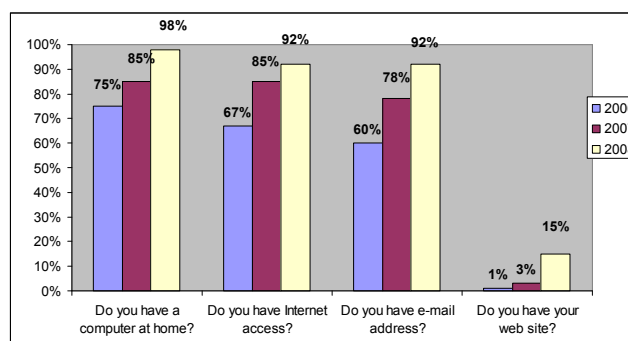

Fig.1 The data of the first group of questions of the first survey

Data presented in the diagram in Fig. 1 shows trend of increased use of computers, Internet and its basic services. This trend increased from year to year. The larger increase is observed in question "Do you have your web site?". In 2006 only 1% of the respondents replied that has its own web site, while in 2008 this percent is 15%. One of the reasons why the number of students who have their own web site increased is that in the end of 2007. and during the 2008. appeared several social networking sites which has enabled registered users to create their own website in an easy way. In 2008. even 98% of students said that they have computers at home and 92% to have Internet access. All 92% percent who responded that they have Internet at home has also responded that they have one or more e-mail address.

On the question "How do you connect to the Internet?" obtained data are shown in the Fig. 2. Telekom's (Serbian National Telecommunication Company) move in 2008 to allow wider use of the Internet population through ADSL connections has resulted in increasing the number of users of ADSL packages with 0% to 25%. Some of the surveyed students said that they are using ADSL, but they retained an alternative solution a wireless connection. It is clear that increasing the speed of the Internet increases the level of use of its services.
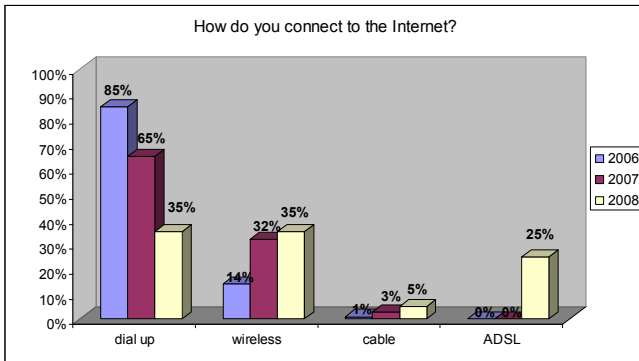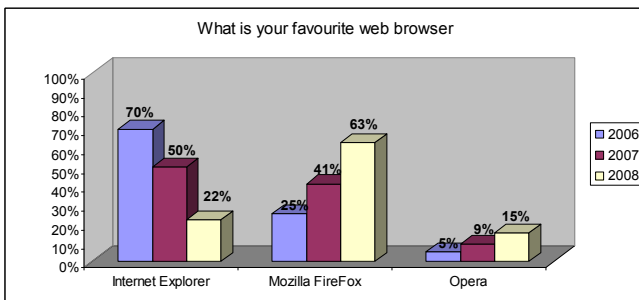

Fig.2 Method of connecting to the internet

Fig.3 The most popular web browsers

The question "What is your favourite web browser?" served just to show us what is the level of usage of some browsers. Since we know that there is eternal "competition" between the user's browser, there are relevant data that supports the fact that despite the imposed Internet explorer using alternative solutions that have a higher level of security. An interesting fact is that every alternative reader captures the growth and Internet explorer a very big drop.

The introduction of broadband Internet connections in 2008 was influenced to a greater number of the spent time on the Internet in a daily average. Data are shown in Fig. 4.
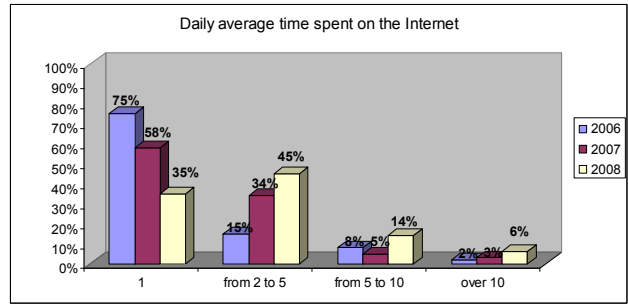

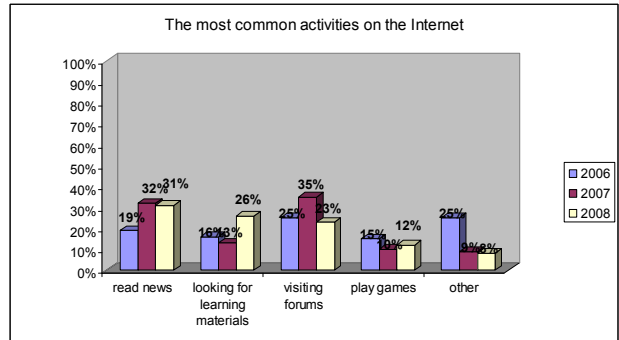Fig.4 Daily average time spent on the Internet

Fig.5 The most common activities on the Internet

Although the increased use of the Internet, based on the data shown in Fig. 5, shows that only a quarter of the respondents used the Internet to find some material for learning. A large percentage of Internet users who use this medium for information and social networking. Forecasts which said that in 2008. the Internet will be the leading medium for information is correct on the basis of the results.
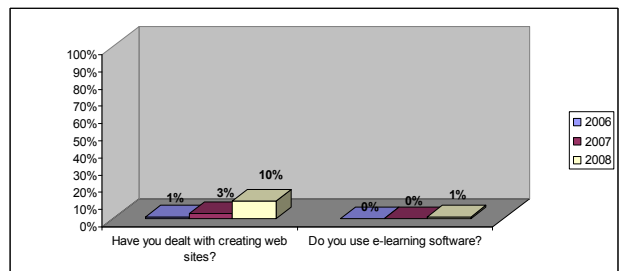

Fig.6 The percentage of Web site design and use of e-learning software

The level of usage of e-learning software is very small. In 2008. only 1% of the respondents said that the they use some e-learning software or service. The only service that is listed is www.kreativnaskola.com . The fact that in 2008. the 10% of students declared that they manufactures web sites certainly goes in favor of greater popularization of the Internet.

Since the survey was done, students are trained to use existing web services. To be able to use the

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service, they supposed to have a computer, Internet connection, a valid e-mail address and Web browser through which they communicate with the service. Students who do not have a computer at home (according to data from the 2008. only 2%) were able to use in school in terms when the work in the computer labs are allowed.

4 Description of existing system

The staff of this college have been using a specific type of e-learning web services for more than 5 years. In our case we are using the original product that has been developed and implemented by our own team. After 5 years of application there is a need for improving this system.

4.1 Architecture of system

The architecture of that system is a three-tier client server application. On the client's side, only a common web browser is needed. The server side consists of an application server and a database server. The application server receives a request from the client, interprets it and performs the needed procedures. During the calculation process, the application communicates with the database. The result is passed back to the client.
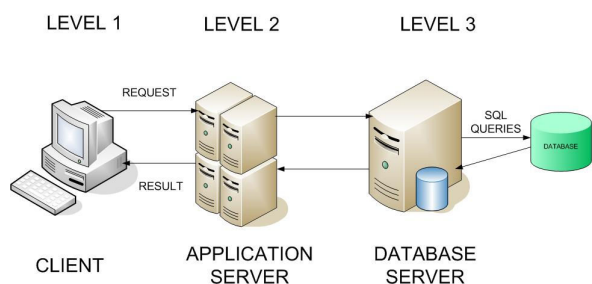

Fig.7 Three-tier client server application.

In the three-tier client server application the greater part of the application business services are transferred to the server application, which leads to a significant part of the data transferred from the "user-server database" line on the line "server application server database. Data flow management between the server application and database server is much improved, namely, in most cases, the database server is physically close to the server application, even in that case it is far easier (more simple) task to upgrade a connection to the data speed, which would in the case of thousands of users enable the appropriate transmission bandwidth. In the three-tier architecture the database and the application of the will can still share in the new layers. In this way, in

the case of Web applications, server applications can be separated from the Web server

4.2 Functionality of existing system

The goal of the system is to enable students to learn, practice and test their knowledge of Internet technologies outside the classes, at home by using the Internet. The possibilities include reading the topics, analyzing the examples and program codes, practice their obtained skills using the online editor and testing themselves.
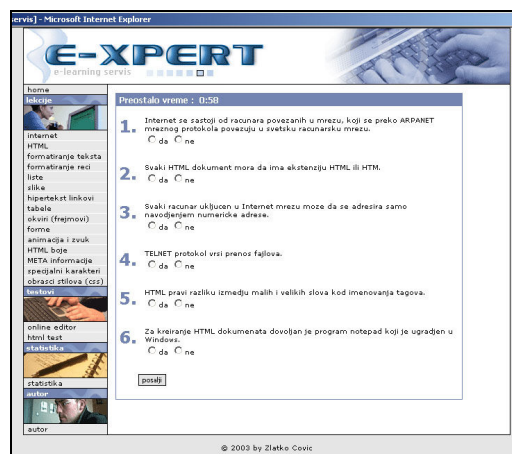

Fig.8 Example of entry test

4.3 Test as an instrument of knowledge checking

Tests are one of the most frequently used instruments for knowledge checking. In distance learning the test is the dominant, and often the only instrument of knowledge assessment.

Rules for writing tasks in the tests are as follows:
- grammatically correct, clear, well-known and precise words,
- to avoid ambiguous questions, suggestivenesses and traps,
- to avoid the formulation of the textbooks and stereotypical phrases, short sentences, questions,
- adjust the level of difficulty to that group,
- to avoid answers that overlap,
- the correct responsible not should be always the same,

One of the main features of our system is testing. The system provides two kinds of test. The first is the so-called entry test (Fig.8), and the second the real test. The first test contains 6 questions and the user has 60 seconds to answer them. The questions are true / false tasks. After having finished the test, the system checks how many correct answers that

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user has achieved and based on that it determines the level of the candidate's knowledge. If the user has achieved less than two correct answers he cannot continue to the real test. If the number of correct answers is between 2 and 4 user's level is intermediate. The advanced level is granted for 5 or 6 correct answers. The user has the possibility to re-take the entry test [2].

Our system takes an adaptive approach to the creation of tests. The system generates random questions for every test. The real test is a multiple-choice test consisting of 20 questions. The questions have the same level of difficulty as student's knowledge level. The user is given 45 seconds for every question. They choose between offered answers. The number of answers ranges from two or four. Each question has one or more correct answers.

Fig.9 Results of test

After the last question is finished, the system generates a report of the test success. To pass the test successfully, it is necessary to give correct answer for 70% of questions. In case the user failed the test, system shows the list of lessons where the correct answers can be found (Fig.9).

The system follows and archives all tests that every user had. Every user can look at his archive which shows the date of testing, the number of correct and incorrect answers and the percentage of effectiveness.

5 Results

Large oscillations in the performance of grade 10, where 19% of the students of experimental group got the highest score, in a control group amount of this data is 2%. As the rating decreases the difference between the two groups is lower. Very similar data were obtained for the assessment of 8, which represents a high grade, where the balance of

power 34% for the experimental group and 30% for the control group. Number of students who have not passed the exam was higher in the control group.
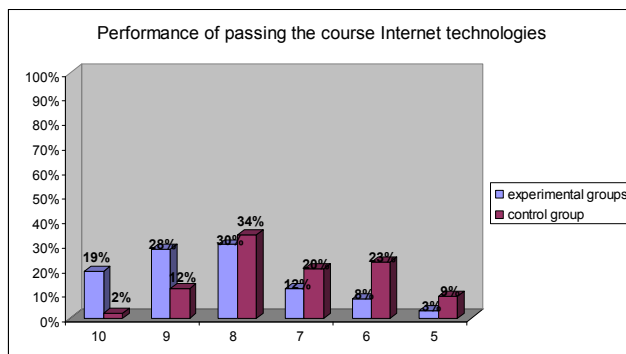

Fig. 10 Performance of passing the course Internet technologies

From these data we can say that the main hypothesis that says "Usage of e-learning services provides a statistically significant impact on increasing the efficiency of the teaching process in the Internet technologies subject" is approved. It can be said that the smaller percentage of success in the control group was caused by the fact that the control group had no motivation to strive for their maximum rating because this mark did not influence their average of marks, and it did not bring any credit points.

Auxiliary hypothesis "Traditional learning brings better results in overcoming material is partly proven because we could see from these data that the best results are achieved by a combination of traditional (face-to-face) access and remote learning.
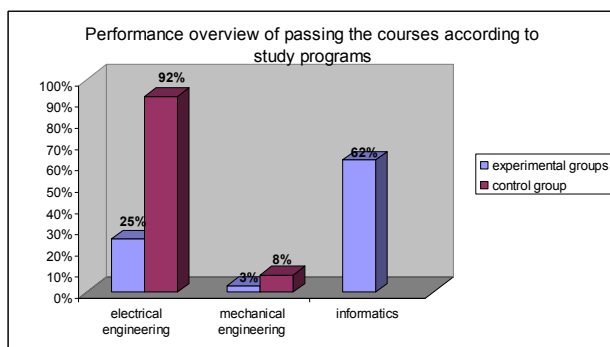

Fig. 11 Performance overview of passing the courses according to study programs

The course Internet technologies is obligatory for students of Informatics and optional for the Electrical and Mechanical engineering majors. The control group did not have the students of informatics because it was consisted of the students

which have not chosen the subject of Internet technologies. Auxiliary hypotheses, "Selection of the study program affects the efficiency of computer usage" have been proven based on the data shown in Fig. 11.

The Polytechnical Engineering College in Subotica has three study courses: electrical engineering, mechanical engineering and information technology. It can be assumed that students of informatics should have more informatics precognition from other students when they chose the course of information technology. If this is true the data obtained after taking the courses confirms this assumption

Auxiliary hypothesis "Using e-learning service contributes to the automation process of testing tasks" is correct, because the results appear immediately after the completion of the test. All results are archived and can be searched by various criteria.

6 Improvement of existing system

At the end of the semester, additional students interviewing was carried out.

To the question "Would you use e-learning services in further education?" the students said the following:

Yes 83%
No 17%

To the question "Would you use e-learning services in combination with the traditional way of learning?," students said the following:

Yes 72%
No 28%

To the question "Would you have used only traditional way of learning?," students said the following:

Yes 17%
No 83%

These answers give great contribution to the daily use of e-learning service in the teaching process.
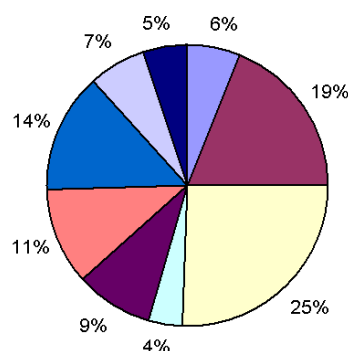

Fig.12 The results of survey conducted after the use of the web service

- higher level of interactivity (4%)
- remove the pop-up window (5%)
- more practical examples (6%)
- search based on keywords (7%)
- changes in service design (9%)
- providing comments and rating (11%)
- inserting the key words for each lesson (14%)
- use of video materials (tutorials) within lessons (19%)
- allow an unlimited number of test (25%)

The results of the survey conducted after the use of the web service are shown in the Fig. 12, the user can see the desire to increase the level of interactivity and the manner of distribution of information. The greatest number of proposals relate to the testing limit (25% of the total proposals), because the existing system users have a limit on the duration of 24 hours if they did not pass the test.

Following the trends in web service development and the results of students' survey, it was decided to improve system with further functions: video tutorials, lecture marking, giving suggests, comments and critics, keywords related lectures with tag cloud and make learning more adaptive. For programming improvements it is necessary to bundle pop-up windows because they reduce usability of web site. Also the use of AJAX technique is suggested for getting faster interactivity, and to made possible to enter questions and answers in XML format. We are also thinking of the implementation of a desktop application in Python programming language that communicates with web application using XML-RPC web service.

With this application the administrator could be able to access information on the web server in the environment desktop applications without the need to directly visit the web page.

In order to maximize the easiness of distribution of material in the way to be the platform independent we decided to enable the creation of questions in the XML format. System on the basis of the formats will make the inputs in database. Some of the queries would be compliant with the assistance of a Xquery.

All lectures are written in Serbian language, thus the decision was made to change name of existing service (E-xpert) to Web profa. In Serbian the word 'profa' is the short form of the word 'profesor'. A new logo was designed for this service (Fig.13) [3].

Fig.13 The new logo of service

Most of the lectures will have video tutorials. They are very suitably for visual representation of some material.

All registered and logged users should have an option to rate each lecture, to give their own comments or suggestions. This way we could have more information for future development of system.

A tag cloud or word cloud (or weighted list in visual design) is a visual depiction of user-generated tags, or simply the word content of a site, used typically to describe the content of web sites. Tags are usually single words and are typically listed alphabetically, and the importance of a tag is shown with font size or color.

We will enter the changes in the testing and monitoring the level of knowledge of users. After finishing the test, the system will assign a new level of knowledge based on the results of all tests that the user had. In the case that the level of user has increased, in the next test that user will get questions that matches his new level. In the case that a user showed very low success on tests in the long term, the system would warn the user that his level of knowledge is very low.

6.1 Development process

The most important tool for getting helpful information is a survey. An anonymous survey was made for the students who used this distance learning system. Based on the collected and analyzed answers it was conclude that students have similar or same requests for the improvement of system.

The implementation of this service emphasizes two very important items, security and user-friendly interface. The system is secured. Every web form is secure from web robots. During the test process there is no possibility to refresh the time left for solving. For security of web forms we will use Captcha method.

This information system is developed by use of following techniques: XHTML, CSS, JavaScript, PHP, AJAX, MySQL,XML and Python. For object oriented modeling UML is used. For the needs of web server Apache is used.

6.2 Web services

The definition of web service - According to the W3C web service is a software system that is designed to enable interoperable interaction between computers in the network, such as. Internet. It has a strong interface in a format understandable to a computer (eg WDSL - Web Service Definition Language).

Web services use XML technology as a presentation layer data for all protocols and technologies. Web services are loosely coupled. User of web service does not directly depending on the web service. Web service interface can be changed, and that when this does not affect the ability of the client to communicate with service

XML-RPC - is a protocol for remote procedure call (RPC) that uses XML to encode its calls and HTTP as a transfer mechanism. It is a simple protocol that defines the only useful types of data and commands the entire description can print on two pages of paper. This is the opposite in relation to most RPC systems, where the standard documentation, and extends to hundreds of pages and require considerable support for the software to be used. XML-RPC was created in 1998. by the Dave Winer-a (UserLand Software) and Microsoft. So the new functionality is shown, a standard evaluate in what is now called SOAP. Some users prefer the XML-RPC and SOAP-due to its simplicity, minimalism and ease of use, and JSON-RPC is similar to him. XML is widely used and understood, and can be interpreted by most programming languages. This makes it a good and solid choice for the use of the data type for the web service, which can be used by different users and platforms [6].
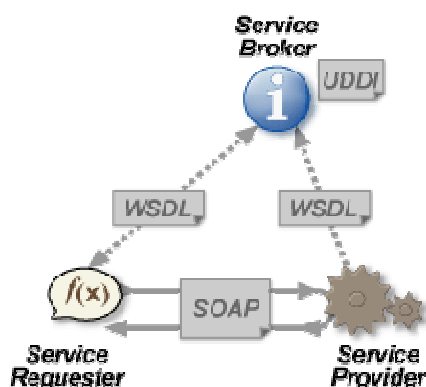
Fig.14 The architecture of web services

6.3 Desktop application

As we previously said, we will create a desktop application that would allow easier access to the information in the desktop environment. Web service will allow communication between Web and desktop applications.

For the server of web service we chose Zend_XmlRpc_Server component from a very powerful framework PHP: Zend Framework. Using these components, creating a server for Web service is reduced to only a few lines of code.

```php
1  <?php
2  require_once("Zend/XmlRpc/Server.php");
3
4  class Calculator
5  {
6      /**
7       * Return the result of addition of two numbers
8       *
9       * @param int $x
10      * @param int $y
11      * @return int
12      */
13     public function add($x, $y)
14     {
15         return $x + $y;
16     }
17 }
18
19 $server = new Zend_XmlRpc_Server();
20 // Indicate what functionality is available:
21 $server->setClass('Calculator', 'calculator');
22 // Handle the request:
23 echo $server->handle();
```

Fig.15 Example of a web server service -
this is all that is needed, the whole process
from the server side is concerned about
Zend Framework

6.4 AJAX

AJAX (Asynchronous JavaScript and XML) is not a new programming language, but a technique for creating better, faster, and more interactive web applications.

With AJAX, your JavaScript can communicate directly with the server, using the JavaScript XMLHttpRequest object. With this object, your JavaScript can trade data with a web server, without reloading the page.

AJAX uses asynchronous data transfer (HTTP requests) between the browser and the web server, allowing web pages to request small bits of information from the server instead of whole pages.

The AJAX technique makes Internet applications smaller, faster and more user-friendly.

AJAX is based on the following web standards: JavaScript, XML, HTML and CSS [3].

6.5 PYTHON

Python is a dynamic object-oriented programming language that can be used for many kinds of software development. It offers strong support for integration with other languages and tools, comes with extensive standard libraries, and can be learned in a few days. Many Python programmers report substantial productivity gains and feel the language encourages the development of higher quality, more maintainable code.

Python runs on Windows, Linux/Unix, Mac OS X, OS/2, Amiga, Palm Handhelds, and Nokia mobile phones. Python has also been ported to the Java and .NET virtual machines.
Python is a remarkably powerful dynamic programming language that is used in a wide variety of application domains.

The language itself is a flexible powerhouse that can handle practically any problem domain [4].

6.6 XML

Recently the XML has increasingly been treated as a data model that the system as a set of mutually related types of documents, a database as a collection of inter related documents that appear defined types.

Differences between XML and relational data model are as follows:

XML data model
- data are stored in one hierarchy structure
- nodes have elements and / or attributes
- elements can be nested
- elements have a defined order
- cheme is optional

Relation data model
- data are stored in multiple tables
- characteristics have a value
- value of characteristics are indivisible

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- the order of tuples is not defined
- scheme is required

Systems for managing data according to the way we treat the XML data model, can be divided into two groups:

• XML-enabled - systems that map the XML data model in a classic model, the most frequent relation, and so it is stored in a database. At the entrance and exit of such systems are XML data. From the well-known systems that are MS SQL Server, Oracle;

• Native XML (XML source) - systems that use XML data model in its original form

A query language that intelligently uses the structure of XML can be used for a query of any kind of data, whether the data is saved as XML documents or in another data model transformed into XML. This standard prescribes the XQuery XML query language, and the XQuery with the XPath language that is used for addressing parts of XML documents, which is built into XQuery, is dealt with below.

7 Modularity of system

The new created system is a modular. Existing modules are the module for learning lessons and testing module. The module for learning the lessons contain video tutorials as well as the code editor. Each of these modules can be accessed separately, as they are independent of one another. They can be excluded or included as needed.

8 Conclusion

This paper presents the development of web based modular information system for the needs of distance learning, describes the reasons why distance learning is so important. Also some information is given on the self made e-learning system and their possibilities.

An anonymous survey was made with students. Based on the collected and analyzed answers it was concluded that students have similar or the same requests for the improvement of the system. With the use of AJAX, XML and Python technologies the system will be improved with some new functions.

After finishing the new version of this system it is hoped that the number of internet service users in Serbia will increase. The second aim that is to be realized is to make other areas available for learning and testing via the internet.

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