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RUSE

The Ruse Branch of the Union of Scientists in Bulgaria was founded in 1956. Its first Chairman was Prof. Stoyan Petrov. He was followed by Prof. Trifon Georgiev, Prof. Kolyo Vasilev, Prof. Georgi Popov, Prof. Mityo Kanev, Assoc. Prof. Boris Borisov, Prof. Emil Marinov. The individual members number nearly 300 recognized scientists from Ruse, organized in 13 scientific sections. There are several collective members too – organizations and companies from Ruse, known for their success in the field of science and higher education, or their applied research activities. The activities of the Union of Scientists – Ruse are numerous: scientific, educational and other humanitarian events directly related to hot issues in the development of Ruse region, including its infrastructure, environment, history and future development; commitment to the development of the scientific organizations in Ruse, the professional development and growth of the scientists and the protection of their individual rights.

The Union of Scientists – Ruse (US – Ruse) organizes publishing of scientific and popular informative literature, and since 1998 – the "Proceedings of the Union of Scientists- Ruse".

SERIES 5

"MATHEMATICS, INFORMATICS AND PHYSICS"

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INFORMATION TECHNOLOGIES FOR OPTIMIZATION OF THE LEARNING PROCESS IN THE UNIVERSITIES

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Abstract: *The presented work envisages collaboration of researchers from different scientific fields and directions. This useful interdisciplinary cooperation contributes to finding common interfaces that improve the scientific activity and enable the students to gain insight into the modern technology for access to information anytime and anywhere. It is a summary of an offered project on optimization of the learning process in the universities using up-to-date information technologies. It is aimed at the creation, maintenance and development of appropriate methods and tools for interactive training.*
Keywords: *information and communication technologies, mobile communications, distance learning*

MODERN SCIENTIFIC PROBLEMS IN BULGARIA AND EUROPE

The Lisbon Meeting of the European Council in March 2000 outlined to the European Union a strategic goal to become the most competitive and dynamic society based on knowledge of the world. The meeting of the European Council in Barcelona in March 2002 reaffirmed this important role and gave a mandate to make the European education a world standard by 2010. Ministers of Education of the European Union united around the main objectives to be achieved by 2010 for the benefit of citizens and the EU as a whole, one of which is improving the quality and efficiency of education systems of the European Union. The milestones set out in the strategy for introducing information and communication technologies in Bulgarian education, are:

- Development of a European educational services and software;
- Accelerating the construction of a single academic network;
- Training teachers to use digital technologies.

MAIN AIMS AND TASKS

The main attention of the authors is aimed at the creation, maintenance and development of appropriate methods and tools for interactive training, primarily in the following subjects:

- Introduction to Information and Computer Technologies;
- Mobile Communications;
- Communication Networks and Terminals;
- Physics;
- Applied Physics;
- Atomic and Nuclear Physics;
- Theoretical Physics.

Up to now there are a number of textbooks and educational materials in electronic form, published on the Internet and accessible to students, and some testing systems on paper for current and final control. Ahead is the processing of these resources and their basing on appropriate platforms for online use, and developing new resources in these and other disciplines for interactive learning.

The scientific tasks are, as follows:

1. To improve possibilities for access to media training in modern communication channels and in particular in the mobile networks of third and next generation (NGN) and to extend the set of devices (mobile phones, personal organizers and others) having access to the environments.

2. To improve the flexibility of the system for evaluating students.
3. To study options for automatically generating of materials for control of knowledge (questions, tests and other assignments) with different data for each student. The materials have to allow a remote access.
4. To develop a methodology for creating multimedia multilanguage terminological dictionaries.
5. Experimenting with the electronic version in order to establish the loading of the communication channels.
6. Formulation of conclusions and recommendations to reduce the workload of the communication channels in view of their high price.
7. Optimizing the developed dictionaries to reduce workloads on the base of the recommendations.

For our purposes we use the distance e-learning environment MOODLE. The improving of MOODLE accessibility enlists:
- To research possibilities for access to MOODLE from different classes of laptops, mobile terminals, connectors and other household devices with access to communication channels;
- To propose a decision to increase the number of access devices and to implement the decision to a part of or the whole environment MOODLE;
- To carry out tests for access to MOODLE of new types of devices;
- To develop recommendations for further expanding the access of new types of devices.

Improving the capabilities of MOODLE to create materials for control of knowledge implies:
- To study the needs of teachers of customized materials for control of knowledge in MOODLE;
- To develop a specialized unit for generating customized test materials;
- To elaborate a sample of test materials;
- To test the materials and analyze the effectiveness of their application to the absorption of knowledge;
- To make experiments with the test materials in order to establish the loading of the communication channels;
- To formulate conclusions and recommendations in order to reduce the workload of the communication channels;
- To optimize the developed test materials in order to reduce workloads according to the recommendations;
- To develop the recommendations for further improvement of the module.

Improving the flexibility of the system for evaluating students covers:
- To investigate MOODLE's grading methods based on Bulgarian education technology for grading;
- To develop assessment scales corresponding to the methods of evaluation;
- To improve MOODLE's possibilities for evaluation;
- To apply the assessment scales to pupils and students and gather information about their effectiveness.

INVESTIGATION OF THE MULTILANGUAGE AND IMPROVING OF THE MULTIMEDIA POTENTIAL OF MOODLE

Obviously a proper adjustment of MOODLE for generating of courses with a multilanguage content is necessary. The multilanguage content filter (Fig.1) allows the visualization of the elaborated in several languages cognitive content according to the preferences of the particular user. When the filter is on it looks for labels <span lang="xx" class="multilang">, indicating that the resource (text, questions, etc.) is available in different languages. Then MOODLE chooses a resource variant in the preferred by the current user language. The chosen resource language can be changed in accordance with the language chosen in the user's profile. It can be changed in the heading page of the environment.
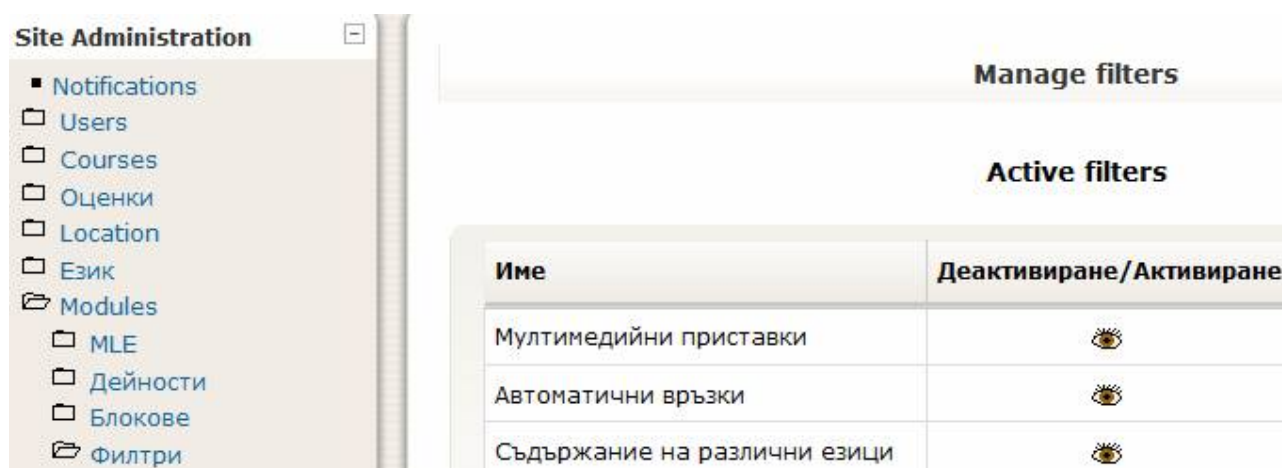

Fig. 1. Multilanguage content filter

In the process of multilanguage courses generation the first thing to be done is to put the cognitive content in different languages in the particular resource. Afterwards each multilanguage block (known as 'multilang block') should be enclosed in the following marks:

<span lang="XX" class="multilang"> your_content_here </ педя>
<span lang="YY" class="multilang"> your_content_in_other_language_here </ педя>

The authors should be able to set multilanguage text versions in specific resources like titles and summaries. So the site administrator has to activate the setting 'Filter all strings in the site'.

Even after the improvements the generating of multilanguage elements in the teaching courses is an expensive and complicated process imposing different language skillfulness or even linguistic specialists involvement. The authors of this work plan an additional automation of the multilanguage cognitive content creation. The results will be presented in another publication.

The e-learning environment MOODLE offers different multimedia possibilities for visualization of the teaching subjects that could be improved. The main problems are the necessity of special knowledge concerning the work with multimedia or even an additional involving of computer specialists for the elaboration of multimedia courses.

One of the ways to resolve this problem is to create standard solutions, deriving multimedia information from open resources using keywords set by the teacher. For

example the following multimedia dictionary template (Fig. 2) finds appropriate video-clips for each of the terms in it using Google.

Fig. 2. Searching through a keyphrase using Google

For an automatic clips-finding the multimedia dictionary is improved by a program code similar to the following:

```
<div id="videoControl">
  <span style="color:#676767;font-
size:11px;margin:10px;padding:4px;">Loading...</span>
 </div>


 <script src="http://www.google.com/uds/api?file=uds.js&v=1.0&source=uds-
vsw&key=ABQIAAAA8vSnL1RKjd_iQgPStnborBRmD5vPkakFsLxXgJfCfBdx2JGTfxQD15
SvP0dKmEVMS4i0LNYQ2MB40Q"
   type="text/javascript"></script>
 <style type="text/css">
   @import url("http://www.google.com/uds/css/gsearch.css");
 </style>


 <script type="text/javascript">
   window._uds_vsw_donotrepair = true;
 </script>
 <script
src="http://www.google.com/uds/solutions/videosearch/gsvideosearch.js?mode=new"
```

```
    type="text/javascript"></script>
  <style type="text/css">
    @import url(„http://www.google.com/uds/solutions/videosearch/gsvideosearch.css");
  </style>
  <script type="text/javascript">
    function LoadVideoSearchControl() {
      var options = {
        twoRowMode : true
      };
      var videoSearch = new GsvideoSearchControl(
                    document.getElementById(„videoControl"),
                    [{ query : „nuclear fission"}], null, null, options);
    }
    Gsearch.setOnLoadCallback(LoadVideoSearchControl);
  </script>
```

As a result of the authors work the distance e-learning environment MOODLE disposes of a multimedia dictionary and the university lecturers have the possibility to insert in it a multilanguage content. The proposed solutions facilitate their labour and reduce the time for multimedia and multilanguage content generation.

POTENTIAL FOR KNOWLEDGE TRANSFER AND APPLICATION OF RESULTS

At this time there are approximately 400 000 registered members of MOODLE community (teachers, administrators and developers) from 193 countries, 44 382 registered MOODLE servers with 1 945 229 courses located on them. The courses are used by 20 497 598 consumers, 1 901 398 of them are teachers. In the world have been made 20 447 152 entries in the servers. Teachers have developed 14 282 283 resources (tests, lessons, etc.), and 18 223 082 test questions.

Many teachers will be able to use the results of this elaboration to facilitate their work on generating distance learning materials. This will improve their work and will increase its efficiency.

Products of the team work can be spread across the universities and schools to enhance the qualification of teachers and the rates of students.

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ИНФОРМАЦИОННИ ТЕХНОЛОГИИ ЗА ОПТИМИЗИРАНЕ НА УЧЕБНИЯ ПРОЦЕС В УНИВЕРСИТЕТИТЕ

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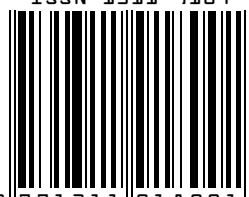
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Резюме: Тази работа е резултат от интердисциплинарно сътрудничество. Тя помага за намиране на общите допирни точки и предоставя на студентите възможност за обучение съобразно съвременните технологии за придобиване на знания по всяко време и на всяко място. Тя е кратко описание на предложен проект за оптимизация на учебния процес в университетите с помощта на съвременни информационни технологии. Насочена е към създаване, поддържане и развитие на подходящи методи и средства за интерактивно обучение.
Ключови думи: информационни и комуникационни технологии, мобилни комуникации, дистанционно обучение