The Slovak EVLM portal

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Abstract

The Slovak EVLM portal, freely accessible on the internet, belongs to the portal network of National Centres of Mathematics working under the European Community's programme Leonardo da Vinci. The main idea of the project was to build the communal supranational platform providing mutual sharing of high-quality educational on-line materials and consultancy service in order to increase better understanding and utilisation of mathematical knowledge. The documents are available also in Slovak language, what facilitates the process of study especially for the interested party with foreign language barrier.

1. Introduction

The Slovak EVLM portal stands as a part of the European Virtual Laboratory of Mathematics (for further use: EVLM) [1], the international project in the Leonardo da Vinci programme. The coordinator of the EVLM project is the Slovak University of Technology in Bratislava, Institute of Natural Sciences, Humanities and Social Sciences, Faculty of Mechanical Engineering, and besides 6 universities from Europe, two nongovernment organizations: Slovak Society for Geometry and Graphics and Finnish educational organization Tulossilta Ltd. participated on the project as the partners.
The partners of the project are:

- University of Plovdiv, Faculty of Mathematics and Informatics, Bulgaria – www.fmi-plovdiv.org/
- University of West Bohemia, Pilsen, Czech Republic – www.zcu.cz
- University of Salamanca, Salamanca, Espana – www.usal.es
- Miskolc University, Miskolc, Hungary – www.uni-miskolc.hu
- University of Limerick, Limerick, Ireland – www.ul.il
- Faculty of Engineering and Computing, Coventry University, Coventry, Great Britain – www.coventry.ac.uk
- Slovak Society for Geometry and Graphics, Bratislava, Slovakia – www.ssgg.sk
- Tulossilta Ltd., Tampere, Finland - www.tulossilda.fi.

The aim of the EVLM project is to establish a multi-national platform for sharing high-quality on-line educational materials and providing consultancy services in order to improve mathematical competencies of all interested parties, to promote general mathematical awareness.

The primary target group are university students of all levels, students of secondary schools, secondary and university teachers, lecturers, researchers, and scientists who need to improve understanding, knowledge and competence in the field of mathematics or who need a professional assistance in solving mathematical problems. The first target sectors are educational institutions from secondary schools to universities. *The second target group* are interested people from non-academic sector, industry, science and research, who need a deeper knowledge of mathematics - including the latest results and details of available information - or who need help with the solution of specific mathematical problems. The target sectors are research and training organizations, partners of university training centres, research centres and scientific institutions. *The third target group* is represented by various educational facilities, school and university training centres for further education, post-graduate, distance and lifelong learning students. Potential users are also private individuals, self-taught people, self-learning people, and also those who from various personal reasons cannot attend standard organizational forms of teaching, including the disabled people and people who suffer from discrimination, whether based on gender or other social stereotypes.

The National Centres of Mathematics have been launched under the partners' organizations and they are linked through a network of communication portals. The central portal EVLM [2] works on a multi-national level in English language. It provides consultancy services and electronic learning materials in different areas of mathematics. National portals work on a national level in national languages and are located on partner servers of participating organizations.

The Slovak Centre of Mathematics operates at the Faculty of Mechanical Engineering STU in Bratislava. It is open to all interested parties - from secondary school students to PhD. students, university teachers and researchers at

universities or outside academic area. The Slovak Centre of Mathematics offers consultations on an individual basis and mediates diverse learning materials in several areas of mathematics, particularly in Slovak language in order to significantly improve the availability of mathematical education in the national language and create favourable conditions to increase the level of mathematical thinking and understanding. A part of the philosophy is to enforce the latest methods of e-learning in teaching and learning, including interactive on-line calculations.

2. The Slovak EVLM portal

The Slovak EVLM portal (Figure 1) was created by the Slovak Centre of Mathematics as a communication portal on website address http://slovak.evlm.stuba.sk/portal/ [4].

Fig.1. The Slovak EVLM portal web page

The Slovak EVLM portal contains several subpages with

- Entry into the database of teaching materials (database portal)
- A file type description of each file in the database
- Teacher's guide
- Student's guide
- Information about consultation opportunities
- Assessment Questionnaire (poll)
- Links to sites on mathematics in Slovak or Czech languages
- Other products of the project (information and promotional materials)
- Entry to the information pages about EVLM project
- Visitor statistics of the Slovak portal.

3. The Database portal

The Slovak database portal (for further use: database) [5] is an open platform for use as well as for storage of a variety of electronic teaching materials. Its structure is based on an interactive basis. The database flexibly responds to the requirements of the target groups. Currently, there are available the following major areas of mathematics: algebra, mathematical analysis, statistics, geometry, numerical mathematics, programming and probability. The areas are gradually supplemented with new coming materials. Published documents are stored with the metadata - the date of entry, the author's name, the type of the document (FACTS, RLO, MODULE, EXAMPLES), the area of mathematics, topic and a brief description, under which they can be easily searched and sorted.

FACTs [Frequently Asked Consultation Topics]

are documents containing brief, general and comprehensive information on the mathematical concepts and themes often repeated in the consultation issues.

RLOs [Reusable Learning Objects]

are teaching materials, which are reusable in different contexts, as they have more detailed information on each of the basic mathematical concepts and themes.

MODULs

contain more than one type of RLO materials placed most often in the same directory. It offers comprehensive information on the subject, or from the required field.

PROBLEMS

represent lists of problems to be solved, or collections of solved examples.

Files in the database can be of different file extensions - such as. jsp, html or htm, xml, pdf, rtf, talk, pps, avi, exe, and so on.

The database is easy to use and navigate. A user finds all necessary information on the home page of database portal.

Generally, the displayed materials are sorted by the date of entry in descending order, so a regular visitor may immediately reach the latest teaching materials. Besides this, the database has also a quick search, available simply by setting the searching options in a special table (Figure 2 – the table on the right).

- Setting the particular options, displayed materials can be selected by the mathematical subject, topic, document type, file name, date of entry into the

database, description of the material, or the author's name.

- It is not necessary to fill all of the search options. If no option is selected, all files will be shown.
- When searching by a file name, description or an author, only a part of the text can be entered (for example a sequence of characters in the middle of the characterizing text).

Work with the database does not require complicated instructions, it is easy and intuitive.
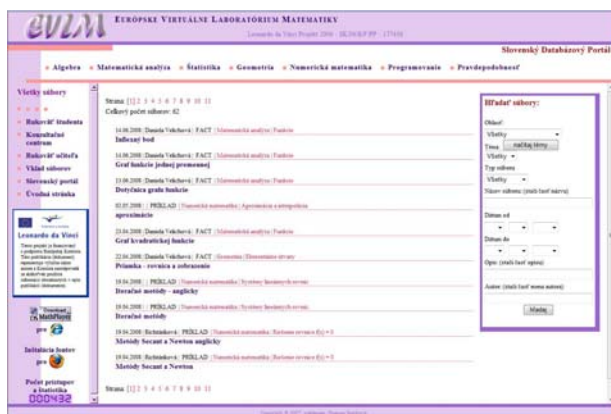

Fig.2. The Slovak database portal web page

4. Teacher's guide and Student's guide books

Two didactic handbooks placed on the portal are addressed mostly to the users from the main target groups. They have been designed by the international team of the project researchers in English language and subsequently translated into national languages of participating partners.

4.1. Teacher's guide

The Teacher's book introduces the basic opportunities of creation one's own electronic teaching or learning materials in the environments of the most commonly used software within the computer aided mathematical education. It contains 16 chapters, where a reader finds the materials dedicated computer aided teaching, brief description and examples of using different branches of the *Mathematica* software (*Mathematica, Calculus WiZ, Mathematical Explorer, Mathematica CalcCenter*), software GeoGebra, DERIVE, Maple, and MATLAB. Teachers will learn how to write applets in the webMathematica program and also understand the rules of MathML coding language, which allows to code both, the visual as well as the content of technical special notation and, contrary to the hypertext markup language (HTML) or common editing tools, it leaves the technical

notation on the Internet active and fully searchable. The introductory chapter brings a brief description of all involved parts.

4.2. Student's guide

Student's guide is focused more on practice. It contains 25 chapters, and offers the opportunity to inspect the particular solutions of mathematical problems in selected areas of mathematics using the mathematics oriented software such as *Mathematica* and its applications, Maple, MATLAB, or SPSS (Statistical Package for Social Science). It also provides a brief manual with examples on how to write a student's work using the Publicon software.

5. EVLM Consultancy Centre

The Consultancy Centre was established as a part of the Slovak Centre of Mathematics. First it started to answer the electronic requests delivered from portals or send by e-mail and later, in January 2008 also the present form of consultancies was launched. Personal consultancies are available in the building of FME STU at the Institute of natural sciences, humanities and social sciences. It is open to the general public 5 days a week. During the first 6 months the lectors provided up to 700 face to face consultancies. The Centre is visited mostly by BSc and MSc students of FME STU, but learners come also from secondary schools and from PhD studies. The main usual reasons for the visit are:

- Preparation for exams
- Help with work on a project
- Help with homework or coursework question
- Assistance in a student's work
- Preparation for leaving examination at secondary schools and entrance interviews at universities (secondary school students).

Visitors of the Consultation Centre mostly appreciate its availability, openness to all interested and personal approach of lectors. Regular service, fixed meeting place, and willingness of teachers have brought high popularity to the centre in relatively short time, especially among the students of bachelor studies. Informal and friendly atmosphere removes stress and uncertainty of comers. In principle, consultations are anonymous - visitors do not have to provide any personal information. Those, interested in consultation may send a request either by post or electronically, in English from the site of the Central portal [2] or the Central database portal [3], or in Slovak from the Slovak portal site [4] or Slovak database portal [5]. The feedback is obtained by an anonymous evaluation questionnaire placed on the Slovak portal.

6. Conclusion

EVLM project objectives gradually meet the expectations of investigators. The network of seven national portals, seven national and one central database provide an open space for high quality educational materials, their sharing and use. There is a strong probability that a consultation service (responding to the requirements of interested parties) together with free learning and teaching materials will help to raise mathematical knowledge, understanding and skills of all target group users: to complete the missing basics from the previous school levels, to provide an opportunity to consult and practice topical teachware, or to help with mathematical part of a problem in research or at work. Materials available via the network of EVLM project databases also serve to all interested from teaching staff –teachers, tutors, consultants who find there a wide range of various teaching documents, as well as the assistance in preparing their own materials. The existence of national portals would be appreciated especially by those, who prefer studying in their native language. The national sites provide a wide space for placing a number of high-quality materials, produced from own resources or via translations of research team partners' materials. Since the information is available both in English and native languages of countries participating in the project, this fact can be considered as a positive element in acquiring new knowledge and experience in mathematics and through mathematics. From the student´s perspective, for a relatively large group (particularly students of technical schools) the availability of materials in the native language is essential.

7. References

[1] D. Szarková, D. Velichová, "Európske virtuálne laboratórium matematiky", *Sborník 27. Konference o geometrii a počítačové grafice*, VUT Brno, ČR, 2007, pp. 223-224, ISBN 978-80-85763-41-6.

[2] The Central EVLM Portal, <http://www.evlm.stuba.sk>.

[3] The Central Database Portal, <http://evlm.stuba.sk/databasemenu/menu_files/frame.htm>

[4] The Slovak EVLM Portal, <http://slovak.evlm.stuba.sk/portal/>.

[5] The Slovak Database Portal, <http://slovak.evlm.stuba.sk/elearning/>.