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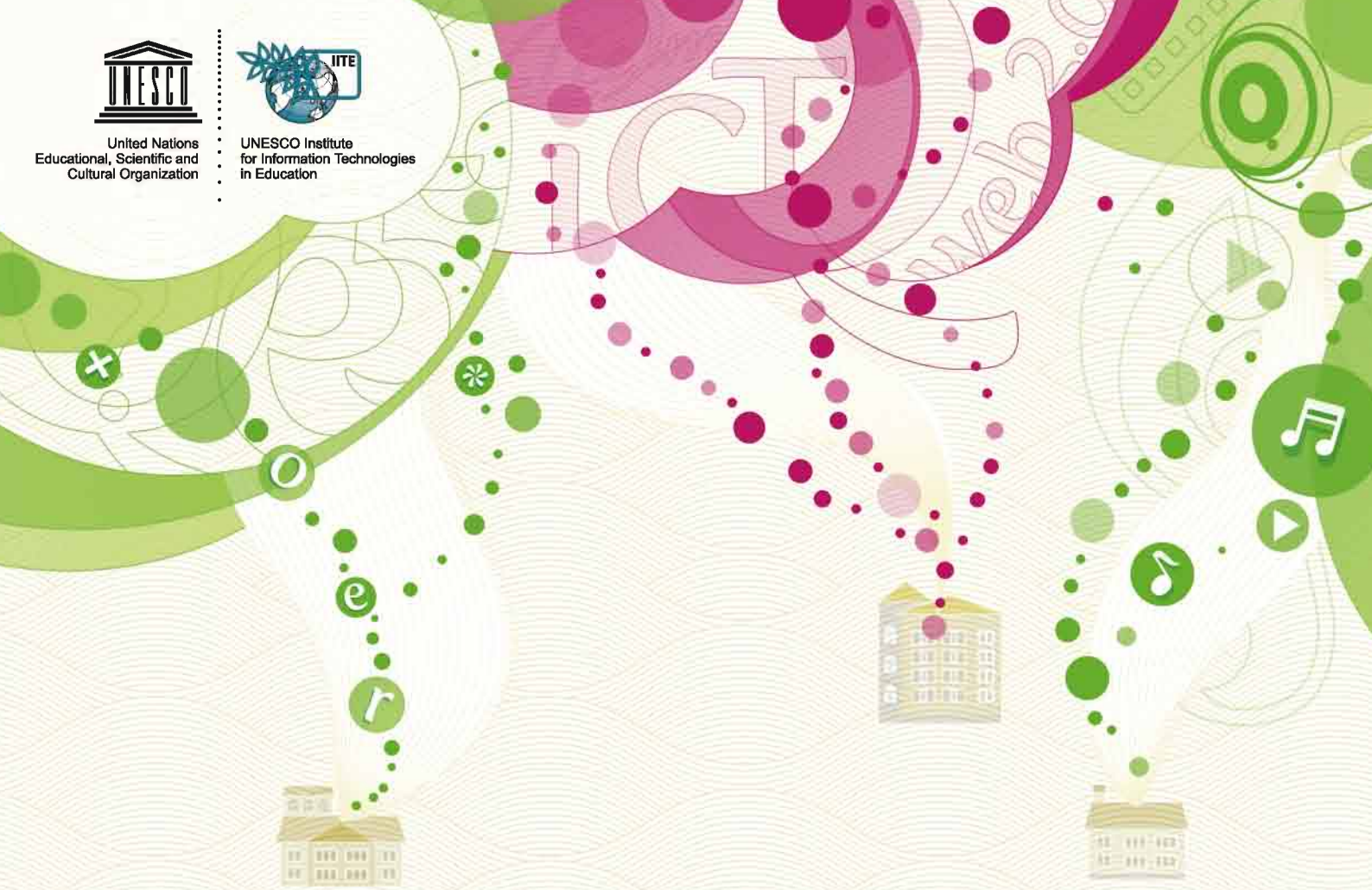
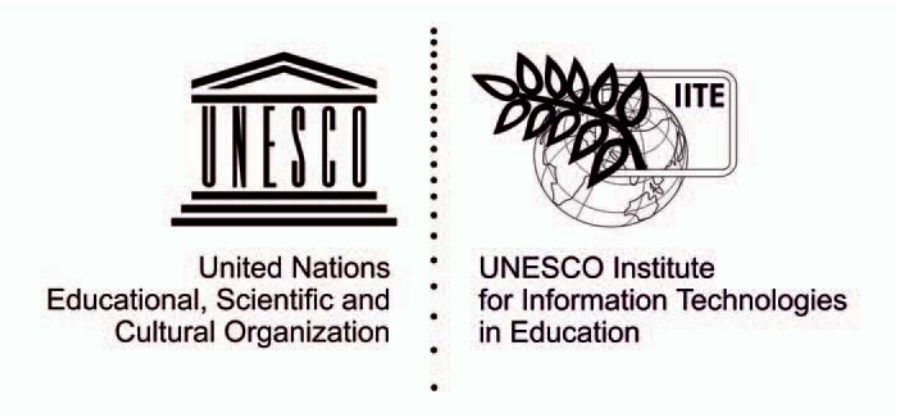


Airina Volungevičienė

Open Educational Resources in Lithuania:

State-of-the-Art, Challenges and Prospects for Development



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Open Educational Resources in Lithuania:

State-of-the-Art, Challenges and Prospects for Development

UDC 37.01(474.5)
Vo-133

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ISBN 978-9955-12-702-4

Published by Vytautas Magnus University Press, Kaunas, Lithuania, 2011

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Foreword

Since 2009 the UNESCO Institute for Information Technologies in Education (IITE) has been implementing its project on Open Educational Resources (OER) aimed at promotion of the OER movement in non-English-speaking countries. During the first stage of the project a survey of the state-of-the-art of OER in Armenia, Azerbaijan, Belarus, Kazakhstan, Moldova, the Russian Federation, Ukraine, Uzbekistan, and in two Baltic countries - Latvia and Lithuania - was completed. Later on the geographical scope of the IITE survey expanded to include Japan, People's Republic of China, Brazil and Turkey to provide further insight into the diversity of OER-related patterns in non-English-speaking countries.

The results of the cross-national survey of OER in the Commonwealth of Independent States were published in the monograph "CIS on the Way towards OER". The case study "Open Educational Resources in Lithuania: State-of-the-Art, Challenges and Prospects for Development" prepared by Airina Volungevičienė opens the series of case studies summarizing best practices in OER in several surveyed countries – Brazil, China, Lithuania, Russia and Turkey.

The case of Lithuania is remarkable because there are good preconditions for OER: advanced ICT infrastructure established for distance learning resource development and broadband connection provided by the Lithuanian Academic and Research Network, as well as the Lithuanian Distance and eLearning Association, which explores optimal solutions for effective retrieval and use of ICT and digital resources. There are few examples of existing OER repositories for higher education and a large national online OER repository for secondary education, funded by the Ministry of Education and Science, that is very useful for school teachers.

The study contains an overview of the national policy for application of ICT in education, a survey of the current status of OER in Lithuania, and analysis of most promising trends, opportunities and challenges for the development of OER. Recommendations for expanding the use of OER proposed in this publication, in line with those stated in IITE policy briefs "Global trends in the development and use of open educational resources to reform educational practices" and "Open Educational Resources and Intellectual Property Rights", are addressed to policy makers and educators. They cover a broad spectrum of issues varying from creation of enabling environment harnessing the potential of OER and provision of incentives for OER repositories and producers to curriculum development and open licenses. These recommendations can contribute to formulation of the national strategies aimed at wider introduction of open educational content in the teaching and learning processes and intensified OER sharing and use in Lithuania.

Dendev Badarch
UNESCO IITE Director a.i.

Definitions

Distance learning – a kind of online education, when online resources are used for learning, and learners do not have face to face contact with teachers or other learners. Communication is ensured with information communication technology tools (Lauzackas, 2005, Paulsen, 2003).

Electronic content (e-content) – teaching, learning and research electronic resources designed with ICT tools in electronic format.

Information communication technologies (ICT) – technologies, through which information is generated, selected, saved and transformed (Targamadze, Petrauskiene, 2008).

Information Technologies for Science and Studies (ITMiS) program – the program funded by the Ministry of Education and Science of Lithuania in 2001–2006.

Lithuanian Academic Library Network (LABT) – a sub-program funded from ITMiS and LVU program funds.

Lithuanian Academic and Research Network (LITNET) – a project funded by the Ministry of Education and Science to establish internet broadband connection for Lithuanian academic and research community.

Lithuanian Distance and eLearning (LieDM) Association (LieDM association) – a user association, a legal body established by the consortium of educational institutions under the agreement to share services and resources in a cost-effective way to organize distance education and e-learning.

Lithuanian Distance Learning Network (LieDM network) – a project and a sub-program in ITMiS and Lithuanian Virtual University programs funded by the Government of Lithuania in 1998–2008.

Lithuanian Virtual University (LVU) program – the program funded by the Ministry of Education and Science in 2007 – 2012.

Open educational resources (OER) – teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge (Atkins, Brown, Hammond, 2007).

Background

Open educational resources (OER) have been promoted by UNESCO since 2002. Academics, education administrators and professionals benefit from the use of OER in their practices, building online communities for OER cooperative development, re-use and integration into lifelong learning (LLL) process, while addressing the needs of adult learners in both formal and non-formal process of education. Differences mainly occur in how far institutions use information communication technologies (ICT) in learning and teaching practices and which solutions they choose.

There are huge online repositories of learning resources. The importance of open access to these repositories is stressed in major policy documents: 2009 World Conference in Education Communiqué (UNESCO, Paris, 5-8 July, 2009), Maastricht message including OER as a priority area (Global ICDE and EADTU conference, June, 2009), and other initiatives.

The study has been completed within the project "Open Education Resources for Higher Education and Life-Long Learning in CIS countries and Baltic States" of the UNESCO Institute for Information Technologies in Education (UNESCO IITE) aimed at exploring, identifying and capacity building in the use of OER in these countries. The study is focussed on the state-of-the-art of OER development and use in Lithuania and is intended to identify country-based needs and opportunities in promoting and supporting OER development in the context of higher education and LLL.

Introduction

Lithuania's initiatives aimed at the promotion of the use of ICT in education are mainly oriented towards supporting educational institutions in ensuring conditions for LLL implementation and focussing all necessary efforts towards the establishment of knowledge and information society. Current European and global priorities in ICT development are related to the establishment of infrastructure adequate to the needs of virtual user communities. The first state-funded projects and programs aimed at the development of infrastructure in Lithuania, along with Phare 2000 projects, were successfully implemented already in the early 21st century.

The term of OER was agreed upon in 2002 during the UNESCO Forum on the Impact of Open Courseware for Higher Education in Developing Countries. Researchers and educational institution practitioners are confident about the benefits of the use and complete integration of OER in education (institutional infrastructure, learning curriculum and organization). International researcher groups and institutional managers claim that there are "three imperatives for finding effective new ways to expand access to quality education opportunities […]: more citizens with high level skills, […] using technology and distance education to reach more learners in a more cost-effective manner, and […] extend education to many more people, in a model appropriate to the twenty-first century" (Gourly, 2004, cited by D'Antoni, 2009, p.19). They agree on the fact that infrastructure development is simply too costly, takes too much time, and is not feasible in the 21st century.

In Lithuania, very high emphasis is still put on physical infrastructure in distance learning development and implementation. Under financial crisis educational institutions face difficulties when the Government reduces funding for centralized support of distance learning and teaching activities. Educational institutions have to find new contextual solutions by themselves.

At present Lithuanian academic institutions have to tackle the following challenges: market economy conditions make them compete with one another, while decreased funding for ICT resources reduces motivation for curriculum modernization. The concept of OER is not yet fully realized and integrated into the educational context. Academic communities in Lithuania are just on the threshold of joining and contributing to international online communities.

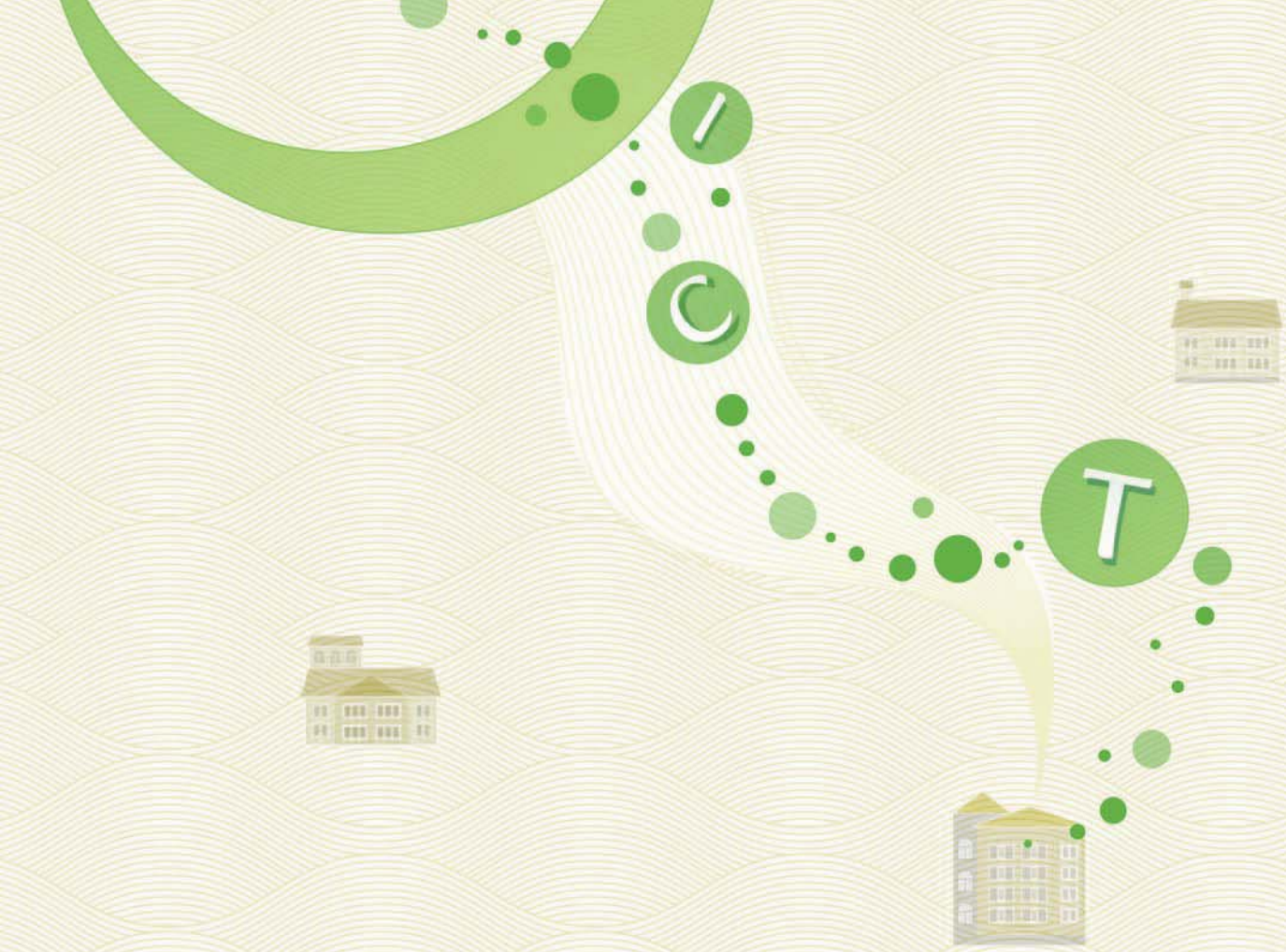
Instead of waiting for financial help to be provided by national bodies, or for favourable conditions to be created by technology service providers in Lithuania, educational institutions should introduce

OER conception in their strategies, daily practices and start benefitting from them, solving various management, academic, financial and marketing problems.

To achieve the objectives of the study on OER in Lithuania, the following tasks had to be fulfilled:

1. to overview basic principles, political, strategic, regulatory, financial and other issues related to ICT policy in education with a focus on OER development in Lithuania;
2. to describe current state of advancement of OER in Lithuania, including main technologies, resources, OER repositories, distribution of OER, intellectual property rights and quality assurance issues, as well as success stories;
3. to identify factors which prevent a wider introduction of OER into educational practices, to foresee potentials and steps to be undertaken in educational policy to raise accessibility and quality of education through the use of OER (including competence development, international partnership, and OER development and expanding).

All statistical data used in this study was obtained from previously published surveys which are cited or used in this document with the consent of survey organizers.



I. National Policy for Application of ICT in Education

I.I. Strategies and policy documents

Lithuanian strategic guidelines in the context of the European Policy support the development of information society, research and development of new ideas as one of strategic guidelines, underlying the need to promote open and competitive digital economy and to create a single European information space, as well as to facilitate the development of the internal market for open and competitive Information Society (Strategic Guidelines of Lithuania's European Union Policy for 2008-2013).

The development of Information Society is among general (horizontal) areas that address cross-priority areas in human resource development program and European Social Fund assistance strategy implementation for the period 2007-2013. The focus on Information Society development continues from the assistance period (2001-2006). Lithuania experienced a rapid growth in the area of information and communication technologies (ICT). However, the majority of households in rural areas suffer from the lack of computer and internet access (National General Strategy, 2006), especially having high needs for broadband internet access (to participate on equal opportunities in LLL process and telework). The National General Strategy states that the level of online public service delivery remains rather low, online availability of services for business is far higher than for individuals, and the country lacks solutions necessary for the development of electronic democracy, spread of the Lithuanian language and culture in multicultural information society. Special attention, as indicated in the document, should be paid to safety and interoperability of information systems.

The National General Strategy (2006) claims that special attention will be paid to the development of *electronic conten*t and ICT infrastructure. The *electronic content* should support the "development of the state provided public services (e.g. e-Government services, e-Health services), promotion of electronic democracy, creation of solutions of preserving the Lithuanian language and culture in global information society, as well as promotion of introducing information technologies in business through creation of the environment favourable for the development of electronic business" (National General Strategy, 2006, p. 37). This term *electronic content* is used at a higher, strategic, national level, rather than in the sense education curriculum content.

While developing ICT infrastructure, the National General Strategy (2006) suggests that the emphasis should be on broadband connection "last mile". Though strategic priorities cover the aim to improve

education and vocational training system through ensuring the accessibility of services for the residents in rural areas and the disabled, the National General Strategy cover foresees the following measures:

1. development of general competences,
2. transfer of services into the electronic environment and common ICT infrastructure,
3. modernization of health, education and other fundamental public services through efficient use of ICT.

As a guideline, the vision encompasses that European Social Fund investment will help to achieve the indicator of 70% of the population being internet users in Lithuania (as compared to 30% in 2005) by 2013 (National General Strategy, 2006).

General competence and ICT competence development strategies are implemented under individual action strategies in Lithuania. The main strategic principles in the National General Strategy (2006), or Strategic Guidelines of Lithuania's European Union Policy for 2008-2013, are also expressed in more detail for the priorities areas, such as:

1. Lithuanian e-Government Program (e-Government objectives, 2010).
2. e-Business strategy (defined as carrying out transactions and organization of enterprise's activities using ICT in the network environment).
3. e-Health strategy (aiming at the use of ICT in order to meet the requirements of the population, patients, health care specialists, providers of health care services, administrators and politicians).
4. e-Commerce strategy (referring to the order of goods and services via the computer network, irrespective of the form of accountancy).

Thus, the establishment of ICT infrastructure is well harmonized with the actions addressing development of competences in the public sector, for example, commercial e-services, or e-Health services among customers and health care specialists. Internet use and *electronic content* are planned as the means for implementation of the strategic goals and national services. However, no references are found in national strategic documents with respect to *electronic content* as learning material provided in any electronic form to support access to knowledge and to maintain characteristics of OER, e.g. residing in public domain or providing free access to knowledge. There is no e-education strategy in Lithuania, defining and promoting e-education (open *electronic content* and learning support) services.

Statistical Yearbook of Lithuania (2008) shows that, in 2008, internet was used for these purposes more frequently than in 2001–2007. The main purposes of internet use were:

- communication,
- search for information,
- reading newspapers and magazines,

- downloading music or video files,
- e-mail (78% of internet users), and
- information about goods or services (70% or internet users).

Another important sector that experiences reforms is the sector of education. Teachers' computer literacy standard was approved by the order No. 1694 of the Minister of Education and Science on December 21, 2001. It defined professional qualification requirements compulsory for teachers, as well as teacher training and requalification study program requirements, and teacher certification requirements to achieve higher qualification category.

General computer literacy program was approved by Resolution No. 1176 signed by the Government of the Republic of Lithuania on September 15, 2004. The program provided the legal basis and the pre-conditions for the development of the information and knowledge based society in Lithuania.

In 2004, the Centre of Information Technologies of the Institute of Mathematics and Informatics at the Ministry of Education and Science of the Republic of Lithuania produced a research report on the study of open source in education. This study, the first and very important for the area of OER in Lithuania, was based on questionnaire survey on the use of system software, general purpose software used in Lithuanian schools and education applications.

Recommendations and proposals drawn at the government level stated that *open source software development in the country reduced the prices of commercial software and gives impetus to the translation of software into Lithuanian. "Therefore, it is necessary to take care of the cultural and linguistic quality of open source software"* (Report on Open Source in Education, p.5).

Another recommendation clearly indicated that *promotion and support of open source software should help solve problems of legality of software and would save funds which can be invested in improvement, adaptation and maintenance of open source software. Institutions that use open source software should be promoted. Certification of software should be introduced to ensure compatibility of documents produced using open source software and commercial software of various companies*.

Also recommendations for the level of the Ministry of Education and Science were drawn up indicating the need to analyse and determine the use of different operational systems, to introduce both, commercial and open source software at schools, along with one or several commercial and open source virtual learning environments at schools.

Several other strategic documents on the use of ICT in education were approved in 2004. The Strategy for the Implementation of Information and Communication Technologies in Vocational Training was

approved by the Minister of Education and Science (order No. 17222) on November 4. The analysis of training programs, computer literacy of students and teacher competence to use ICT revealed that the levels of the use of ICT are very different from school to school and from teacher to teacher. The strategy indicated the need to describe the competences in the use of ICT for professional activities. Very positive preconditions for distance learning activities and distance learning technology integration are mentioned in the strategy and potential uptake of promoting ICT integration in vocational education and training; namely, Lithuanian Academic Internet Network (LITNET) established for research and education. The strategy highlights recommendations for vocational schools to get connected to LITNET network.

In 2005, a National Study on Distance Education in Lithuania was produced within the Phare program project (79-PHARE-LI-PAO). In Lithuania, LLL is implemented through universities, colleges, vocational schools, adult education centres and other relevant institutions. Thus, LLL system should be established at all education levels – vocational, tertiary, higher education, etc. There is a widespread consensus in the Government and non-governmental educational sector institutions that distance education (DE) has enormous potential to cope with the new challenges.

Significant policy groundwork has been laid for the development of an advanced and comprehensive DE system. The importance of DE development in Lithuania was early enough acknowledged in a number of summit documents: the Conception of the National Information Society Development of Lithuania approved by resolution No. 229 (paragraph 7.3) of the Government of the Republic of Lithuania on February 2, 2001; Action Plan for the Information Society Development in Lithuania approved by resolution No. 984 (paragraph 1.5) of the Government of the Republic of Lithuania on August 10, 2001; and the Implementation Measures of the Program for 2001-2004 of the Government of the Republic of Lithuania approved by resolution No. 1196 of the Government of the Republic of Lithuania on October 4, 2001.

The study implemented in 2004-2005 provided the basis for the formulation of key strategic organizational and management issues to be addressed in the Strategy for the Development of Lithuanian Distance Learning Network (LieDM) (further *Strategy*), which was approved by the Minister of Education and Science in 2005.

This Strategy report includes a set of recommendations indicating actions for decision-makers, teachers, learners, employers, and commercial suppliers to support the increasing and widening contributions of DE to Lithuanian society in the years ahead. The set of recommendations cover the following issues:

- development of DE infrastructure while emphasizing regional aspects, evaluating human resources and accumulated experience;

- development of a legal basis for DE;
- creation of quality assurance systems;
- activities of DE centres seeking self-sustainability and cost-effectiveness of the Lithuanian DE network;
- development of DE technologies;
- strengthening administrative skills, qualification improvement and support for DE network staff and DE professionals;
- creation of a student consultation and methodological support system;
- broadening the possibilities of applying libraries, full text document databases and e-publishing in DE;
- cooperation possibilities to collaborate with national and international DE institutions and networks;
- initiatives and means to attract required funds for Strategy implementation;
- monitoring Strategy implementation.

Important national strategic documents are the Strategies of Application of ICT in secondary and vocational education and training for 2008-2012, approved by the Minister of Education and Science in 2008. The strategies claim that special attention should be paid to preparation and implementation, as well as update of electronic teaching material, constantly improving its quality, visibility and accessibility.

In 2007 and 2008, the strategies on application of ICT in secondary education and vocational education and training were prepared and approved by the Minister of Education and Science.

I.2. National initiatives to support ICT application in education in Lithuania

Phare 2000 Regional vocational distance training networks. Phare 2000 Economic and Social Cohesion Program Human Resource Development Fund projects were implemented to establish a vocational training infrastructure based on DE and e-learning technologies in Lithuania, in 2002. Klaipėda – Tauragė, Marijampolė and Utena were identified in the National Development Plan 2000-2002 as the target regions for the social and economic development assistance financed jointly by the Lithuanian national budget and the EU budget. The establishment of regional distance vocational education and training networks was intended to strengthen the employability and adaptability of the regional labour force through increased accessibility of vocational training in the Klaipeda – Taurage, Marijampole and Utena target regions.

Specific objectives of the project were as follows:

- to establish infrastructure for DE and training;
- to train the staff at DE centres and classes;
- to develop and deliver DE courses/ programs and training corresponding to the lifelong vocational education and training needs of the regional population;
- to ensure sustainability of the established regional DE networks.

The projects resulted in the establishment of three distance vocational training regional networks. Marijampole regional network was created in 2002; Utena regional vocational training network was created and joined LieDM network in 2004. However, the activities of the networks were organized under centralized approach and were not regionalized. Regional centres were not encouraged to gain self-sustainability and direct funding from national ICT development programs.

The Open Society Foundation (OSFL) in Lithuania launched its activities in 1990, as an independent, non-governmental, non-profit organization. The main objective of OSFL was to support the development of an open, democratic, civil society in Lithuania in the period of transition. OSFL supported different projects focused on education, science, civil society, law, culture and communication.

The OSFL provided support to the creation and modernization of civil structures in Lithuania, and is oriented towards the needs of all country regions. "Moving towards digital communities" and "For the Progress of Libraries" were among the largest projects run by OSFL.

The alliance "Window to the Future". The project "Window to the Future" was launched in early 2002, by two largest telecommunication companies: Lietuvos Telekomas and mobile operator Omnitel,

together with the two largest banks (Hansa-LTB and Vilniaus bankas) and two IT companies (Sonex and Alna). The goal of the project was to achieve the average EU internet penetration in Lithuania within three years. In order to meet this goal, the project included three stages:

- establishment of public internet access points (PIAPs),
- training of new internet users,
- development of new relevant e-content (e-content maintaining characteristics of curriculum electronic access, *author note*).

PIAPs were established in close collaboration with the local governmental institutions. Institutions provided premises for PIAPs, took care of their administration, and covered 50 per cent of a monthly subscription fee, while the alliance arranged internet connection, donated computers and provided technical services.

The project was very enthusiastically welcomed by local communities and became very popular in all regions. As a result, local governments and communities ensured very rapid establishment of PIAP's and supported their operations. First usage results exceeded expectations. Up to 2000 users visited PIAP every month. Some local governments and communities started expanding their PIAPs capacities by providing additional computers and providing training on internet basics.

The Ministry of the Interior financed establishment of about 300 access points in three years for 5.2 mln LTL (~1.5 mln Euros). Further 300 access points were established using PHARE funds (more than 3 mln Euro). The agreement with the Ministry of Education was signed to cooperate in organizing large-scale internet training. In 2003, "Window to the Future" financed pilot internet basic skills training for 20 000 citizens.

The initial project success was followed by EU RegioStar Award, in 2010, under the category 3 "ICT applications for e-inclusion" for the successful implementation of the European Social Fund project "Computer literacy basics for a Lithuanian e-citizen, Lithuania" (2 mln Euro).

ITMiS national program. After the completion of the PHARE project "Multi-country cooperation in Distance Education", Lithuanian investment project "Development of Distance Education Network in Lithuania" (LieDM) was initiated in 1998. The network was established alongside with the program "Information Technologies for Higher Education and Science (2001-2006)" (ITMiS) approved by the decree of the Minister of Education and Science No 115 on January 30, 2001. The Program included three main interrelated sub-programs: Lithuanian Science and Higher Education Information System (LieMSIS), Lithuanian Academic Libraries Network (LABT) and Lithuanian Distance Education Network (LieDM). The dynamics of ITMiS funding is illustrated by the data of Table 1.

Table 1. ITMiS program, funding for the year 2001 – 2006.

Tasks	Budget (thousands of litas, LTL)					
	2001	**2002**	**2003**	**2004**	**2005**	**2006**
LieMSIS activities	175	400	1.700	5.950	7.768	6.680
LieMSIS investment	-	-	-	2.800	5.200	1.393
LABT activities	750	1.300	1.100	1.300	1.300	1.425
LieDM activities	350	600	580	950	1.100	1.575
LieDM investments	1.000	500	558	254	831	-
Coordination	75	100	70	200	150	120
Total:	2.350	2.900	4.008	11.454	16.349	11.393

Projects supported by EU structural funds had a strong impact. For example, two projects of national importance initiated by the Ministry of Education and Science addressed the aims identified in the ITMiS project: through the ERDF project "Development of Information and Communication Technologies based on the Distance Education Network in Lithuania" (Ministry of Education and Science, priority 1.5, budget 3.6 mln LTL), while the infrastructure of the LieDM network was supplemented by up-to-date videoconferencing equipment and expanded to 60 centres all over Lithuania. Another project, "Integral Development of Activities in the Lithuanian Distance Education System" supported human resources and DE course development (Ministry of Education and Science, priority 2.4, budget 4.3 mln. LTL).

ITMiS sub-programs are considered in more detail in section 2.1 of this study that deals with ICT infrastructure resource investments in Lithuania.

LVU national program was launched in 2007. Its description was recently updated, on July 15, 2010, by the order No. V-1189 of the Minister of Education and Science. The program is a successor of ITMiS program. The main objective of LVU program is to expand physical information infrastructure of Lithuanian science and studies using available resources. The program (*http://www.lvu.lt/cms/files/liedm/resources/3810_LVU_programa_keitimas0715.pdf*) includes the following tasks:

1. to promote e-learning processes in virtual space (EMSaS task),
2. to develop Lithuanian e-learning physical infrastructure (LieDM task),
3. to develop integrated information space for Lithuanian science and studies (LABT task),
4. to develop Lithuanian study and science management and self-service infrastructure (LieMSIS task).

Table 2. LVU program funding for the years 2007 – 2008.

LVU tasks	Budget in 2007 (thousands of litas, LTL)		Budget in 2008 (thousands of litas, LTL)	
	activities	infrastructure	activities	infrastructure
EMSaS	1.665	-	1.775	-
LieDM	720	-	955	-
LABT	1.220	500	1.480	2100
LieMSIS	5.060	2.300	4.355	-
Coordination	35		135	
Total:	8.700	2.800	8.700	2.100

Global crisis affected LVU program, and since 2008, none of LieDM centres received funding for infrastructure development and support from the program. Technology service providers are the managers of the program. As existing resources and repositories described in later chapters will demonstrate, very few resources that are for free and open use are available for educational institutions in Lithuania. The majority of solutions were either licensed (not for free, but from the program funds mentioned above) or were developed with the support of the program funding. However, funding from educational institutions is required for ICT resource and tool maintenance.

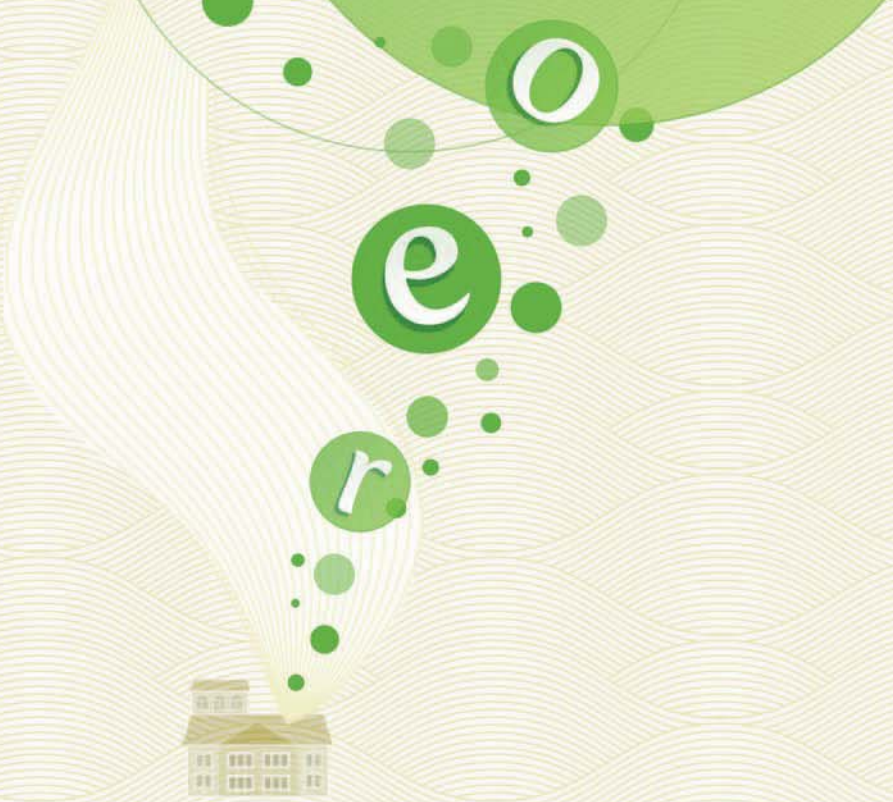
Moreover, the program does not meet European strategic priorities announced by the International Maastricht Conference organized by the International Council for Distance Education (ICDE) and European Association of Distance Education (EADTU) in 2009, and formulated in the Maastricht message (*http://www.eadtu.nl/files/Maastricht%20Message.pdf*):

1. Technical infrastructure.
2. Open Educational Resources.
3. Public/private responsibility.
4. Quality assurance.
5. Virtual mobility.

Even though LVU program description was updated on July 15, 2010, none of the European priorities claimed in the Maastricht message (2009) are addressed directly, except for infrastructure development. Moreover, the burden of designing distance learning curriculum, learning resources, as well as organization of studies is shifted to educational institutions. The program does not provide further funding for full services.

LieDM association. On the basis of these decisions, LieDM network institutions made an agreement to establish a legal body of the Lithuanian Distance and eLearning (LieDM) association (*http://www.liedm.net*) representing 26 educational institutions, which is in charge of exploring optimal means and tools to strive for survival and joint solutions to search for effective use of resources, technology services, ICT development, market offers and to assist educational institutions in adapting to market economy conditions. The LieDM association was established in January, 2010.

The LieDM association was set up on the basis of the priorities set out in the Maastricht message (2009). It agreed to use joint technological resources, OER, contribute to their development and re-use, public and private responsibility harmonization strategy development, quality assurance procedures to be agreed among LieDM association member institutions, as well as virtual national and international mobility. These five priorities are the milestones for the activities of the LieDM association.



2. Current State of Advancement of OER in Lithuania

2.1. Infrastructure development and technological advancement

According to statistical data, in 2006 Lithuania, along with Greece, Poland and Cyprus, had the lowest broadband penetration rates at schools in EU25 (less than half of the EU25 average of 70%):

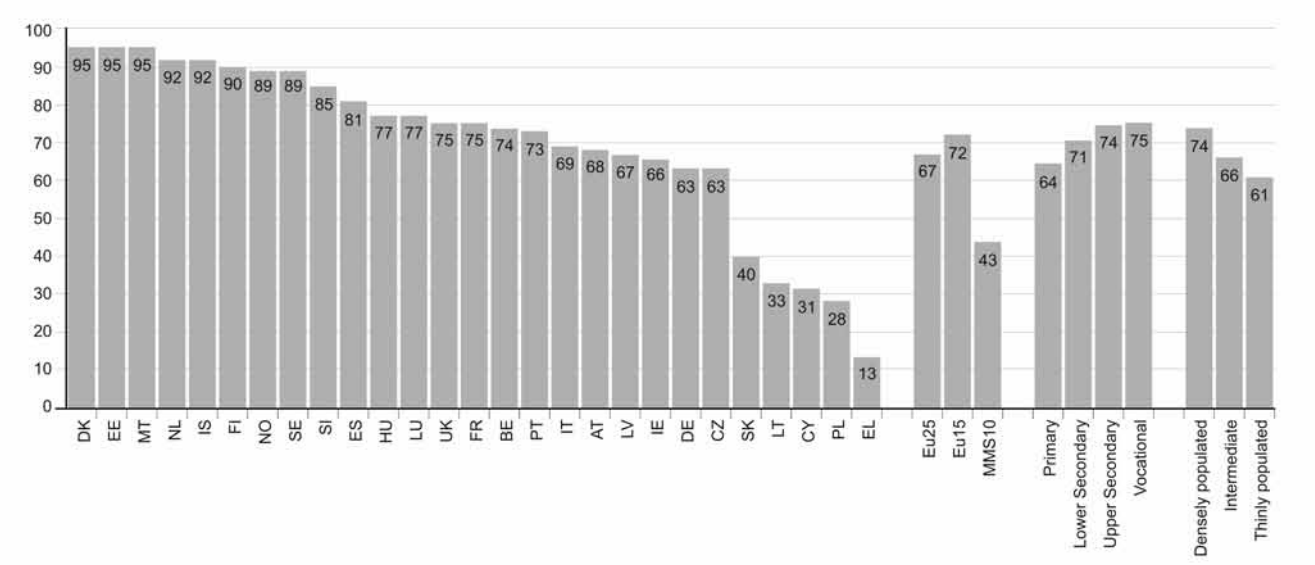


Fig. 1. Percent of schools having broad band internet access in 2006.
Retrieved from *http://www.empirica.com*.
Source: empirica LearnInd Head Teacher Surveys 2006.

The number of computers was also the lowest (5.9 computers per 100 pupils, Source: empirica LearnInd Head Teacher Surveys 2006).

Internet infrastructure for schools is provided by LITNET, which is funded by the Ministry of Education and Science and participates in several international support programs and projects financed by external funds. The governing body of LITNET is the LITNET Board whose structure and regulations are approved by the Ministry of Education and Science of Lithuania.

The LITNET Board coordinates the development and management of the network. An Expert Group prepares plans and projects for LITNET development. The Network Operation Centre (NOC), based in Kaunas, operates the network and acts as the largest Regional Centre for Lithuania. Regional Centres in 16 cities are responsible for the operation of access links and user support. The activities of the NOC include network operation, GÉANT connectivity, network planning and implementation, procurement,

CERT, pilot projects (including IPv6, which is enabled on the university campuses but not on the backbone) and the .lt domain registry.

An international link connects LITNET to GÉANT. The LITNET backbone has 10 Gbps links between Vilnius and Kaunas and a 1-1,2 Gbps ring between the 5 major cities, as well as 10-12 Mbps connectivity to another 11 cities (see Figure 2).

LITNET connects all R&D institutions in Lithuania, including 15 universities and 40 research institutes, and serves about 500 education organizations. LITNET also serves various not-for-profit organizations, including 30 libraries, several museums, health, environment and government institutions, science and technology parks, the main criteria is that the service is provided for joint research activities or social activities. The overall customer base of LITNET is about 400,000 end users. LITNET has regional centres in 16 cities.

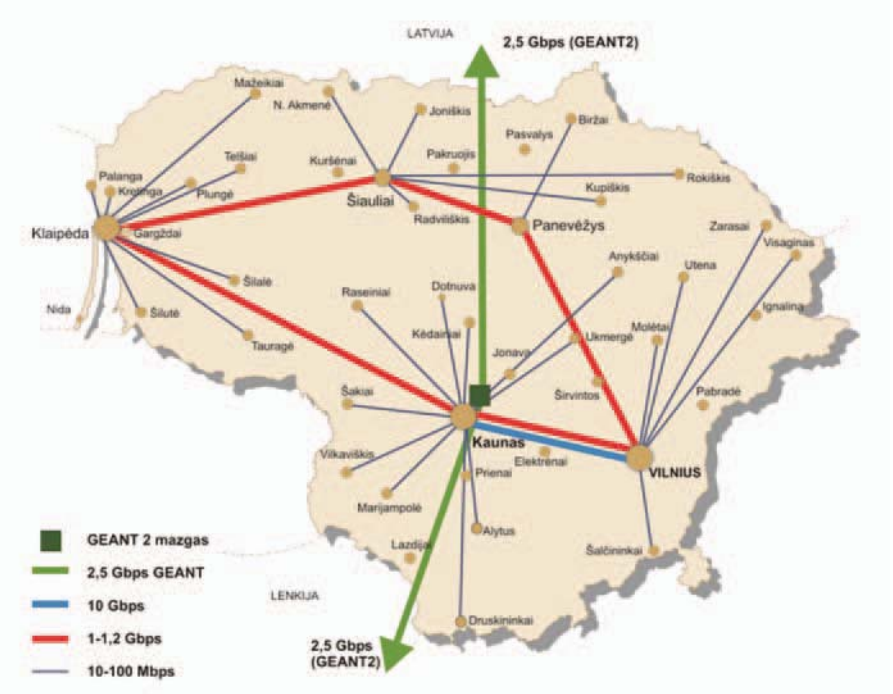


Fig. 2. LITNET connections between major Lithuanian cities (2010).

According to the Strategy for application of ICT in school education and vocational education and training, 97 per cent of schools use computers, 95 per cent of schools have internet connection. The graduate improvement of indicators (see Table 3) can be considered as prerequisites for further ICT application development.

Table 3. Dynamics of computers and internet access at educational institutions (2005 – 2008). Statistical report on information technologies in Lithuania, 2008.

	Total number of computers	Number of computers with internet access		Computers for teaching purposes		Number of computers per 100 pupils and students
		total	%	total	%	
General schools						
2005 – 2006	36110	28138	77.9	27436	76.0	5.1
2006 – 2007	44741	36053	80.6	33520	74.9	6.5
2007 – 2008	47452	39521	83.3	35313	74.4	7.2
2008 - 2009	53546	45628	85.2	39399	73.5	8.5
Vocational schools						
2005 – 2006	5601	4829	86.2	3622	64.7	7.8
2006 – 2007	6230	5595	89.8	3948	63.4	8.7
2007 – 2008	6653	6010	90.3	4366	65.6	9.9
2008 - 2009	7747	6950	89.7	5598	72.3	12.8
Professional colleges						
2005 – 2006	342	324	94.7	229	67.0	27.5
2006 – 2007	-	-	-	-	-	-
2007 – 2008	-	-	-	-	-	-
2008 - 2009	-	-	-	-	-	-
Colleges						
2005 – 2006	5937	5363	90.3	3736	62.9	6.7
2006 – 2007	6700	6332	94.5	4275	63.8	7.6
2007 – 2008	9082	8649	95.2	5807	63.9	9.7
2008 - 2009	9276	8775	94.6	5975	64.4	9.7
Universities						
2005 – 2006	14544	14189	97.6	7771	53.4	5.5
2006 – 2007	16861	16041	95.1	9125	54.1	6.4
2007 – 2008	20716	20231	97.7	10204	49.3	7.1
2008 - 2009	20995	20549	97.9	10564	50.3	7.1

As indicated in the Strategy for application of ICT in school education and vocational education and training:

- the number of schools and teachers within the schools who use internet resources increases every day,
- more than 30 per cent of schools participate in „eTwinning" program,
- digital content is being developed and suggested for learners,
- only 1 per cent of learners is completely ICT illiterate.

The following facts can be considered as hindering factors for the implementation of ICT application strategic priorities:

- Lithuania is still far behind the other EU countries (only 5.9 computers per 100 pupils),
- only 59 per cent of teachers use ICT in practice at school,
- there is the lack for learning resources in Lithuanian language,
- teachers claim that digital content is of poor quality,
- only 33 per cents of schools use broad band internet connection.

The opportunities indicated in the strategy of application of ICT at school and vocational education and training institutions build upon infrastructure projects RAIN (*www.rain.lt*) and LITNET (*www.lm.lt*) and the use of European and global projects (Calibrate, EUN, and others).

However, several threats are mentioned in the study and strategy, which highlight the points that need to be taken into consideration:

- there is no teacher training on autonomous use of ICT in professional practice,
- poor offer of learning resources in Lithuanian language, very slow process of localization of software, poor internet connection in households in rural areas,
- learners are not encouraged to use creative and innovative approach due to very strict and rigid assessment systems in schools.

Analysis of the use of ICT and methodological tools at school in different subject areas was performed by T. Kriliuviene at Education Information Technology Centre at the Lithuanian Ministry of Education and Sciences in 2008 (Kriliuviene, 2008) with the aim of surveying existing experience in application of ICT in various subjects at school. The outcomes of the research were less exhaustive as the contents of the research. The author states that schools do not use modern ICT tools, but prefer outdated tools and resources.

The LieDM network provided Lithuanian citizens with an opportunity to maintain and raise their qualification and skills on the use of ICT in education. It improved conditions for LLL, and expanded the

variety of education services. The network provided equal learning opportunities for citizens, regardless of their location, gender, nationality, social status, and physical abilities. The LieDM network served not only the academic world of universities, colleges and vocational schools, but was also available for State officers and specialists providing infrastructure of ICT. The LieDM association continues network mission with the change in focus and approach, from technology-driven to user-driven processes.

Recording and online broadcasting of video lectures used to be empowered by LieDM video conferencing network. One type of software used for video lecturing was implemented in the framework of EUREKA project "Tele-Education Software for Interactive Video-Lecturing". It is owned by Kaunas University of Technology and is not for free use. Another solution which was very popular in Lithuania was Tandberg software and servers that are still actively used at higher educational institutions, but more and more rarely due to licence fee and content server resources.

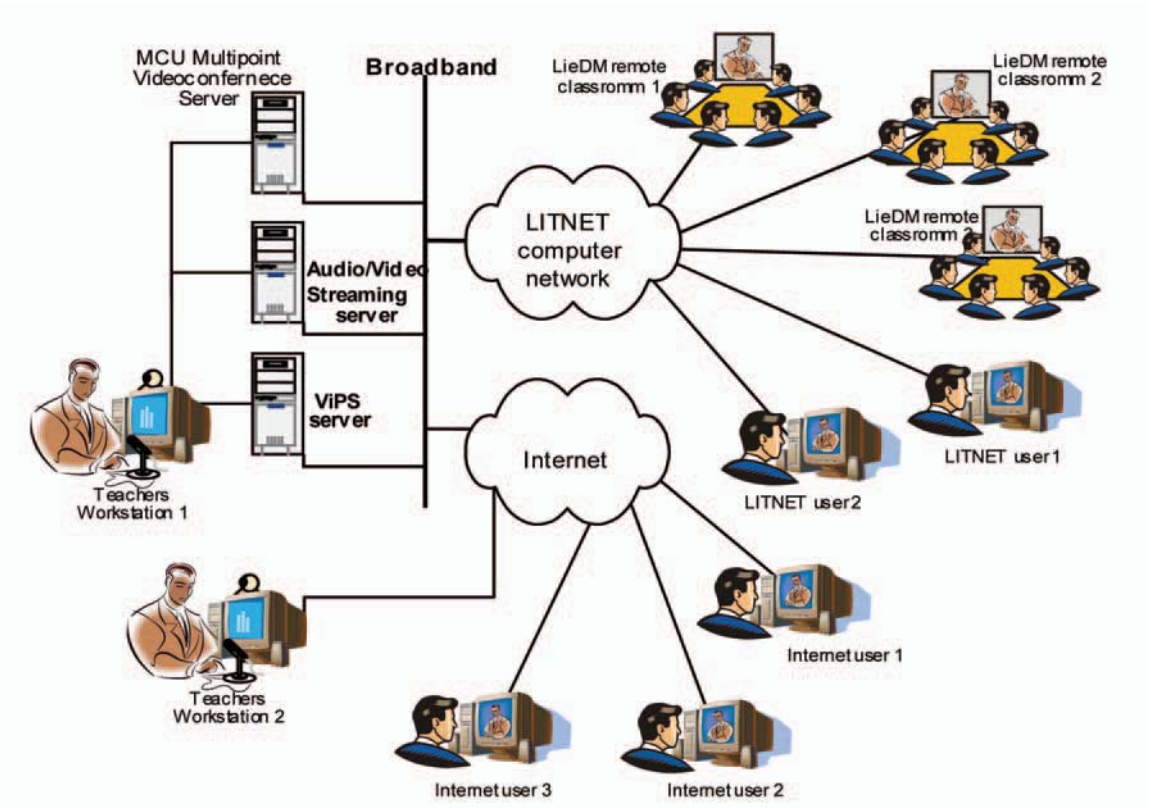


Fig. 3. Video conferencing physical infrastructure in LieDM network in 2001–2008.

Geographically, video conferencing network covered almost the whole territory of Lithuania, with the main emphasis on large cities which have the greatest number of universities, institutes and colleges, as well as students and educators. Video conferencing network included the following units: 3 video

conference studios, 7 video conference mini studios, 2 regional DE centres, 18 DE classrooms, and 6 DE internet access classrooms with 340 computerized work places. Their development within LieDM network can be seen in Fig. 4.

Fig. 4. Distance conferencing network development phases in Lithuania.

However, the software tools used for video conferences and recordings are for limited use, they are owned by technology providers, and this brings new problems to educational institutions for finding new solutions, especially during crisis period. Moreover, even if these tools were available for free access, their use is not interoperable with other systems and tools.

The main elements of LieDM network infrastructure that were for open access and use in 2001-2008 were physical infrastructure, organizational infrastructure, operational coordination, coordinated expansion, and interconnections. However, technical infrastructure investment already requires update in terms of hardware and software, and higher educational institutions, vocational education and training institutions, as well as schools are responsible themselves with further re-development or improvement of existing ICT resources. It becomes an expenditure item, which requires constant expenses year after year for educational institutions.

Another important infrastructure is the initiative of PIAPs (see chapter 1.2) established during the projects mentioned in chapter 1 of this study and implemented by the alliance "Windows to the Future". The territory of Lithuania is covered with internet access points. Lithuanian citizens are advised to visit the nearest one by selecting them on Google interactive map provided at the portal of the alliance *http://www.vipt.lt*:

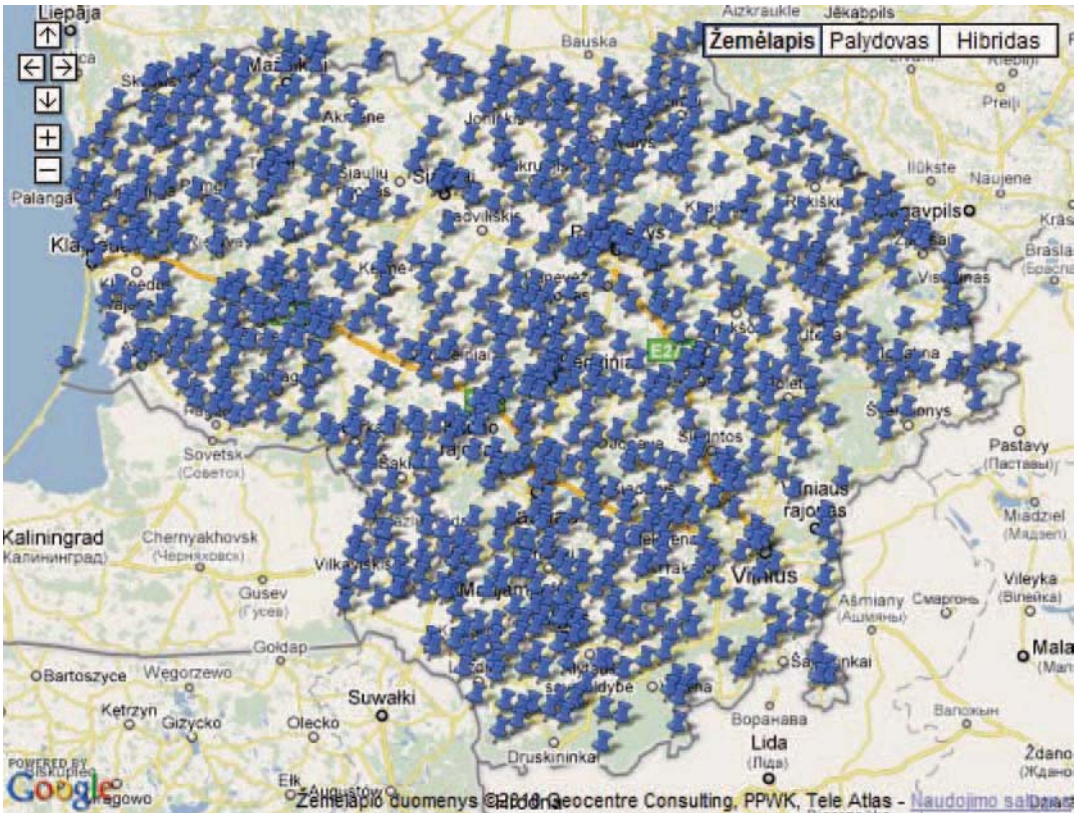


Fig. 5. Distribution of internet access points in Lithuania (2010). Source *www.vipt.lt.*

There are also individual initiatives undertaken by institutions to facilitate technological advancement in (formal and non-formal) education activities in Lithuania, as well as technical infrastructure.

2.2. Curriculum modernization issues

Each educational institution is responsible for curriculum designing for study programs and study and teaching plans. Educational institutions are acting on the basis of the Law of Education and internal regulations for study organization.

Higher educational institutions provide reports each year stating how much attention was paid to curriculum modernization issues. Higher educational institutions that are LieDM network members used to report to the Ministry of Education and Sciences on how much of the curriculum was uploaded to virtual learning environments and how many students were involved each year in distance studies and e-learning. However, as these indicators were normally taken into account during distribution of funding from ITMiS (and later from LVU) program, the information provided usually did not represent active learning process, but rather curriculum content that is available via central virtual learning environments (Blackboard Vista Enterprise and Moodle), which is often not for open access and only for individual institutional use.

Training for teachers and trainers at higher educational institutions was provided in the framework of ITMiS and LVU programs up to 2009. Teachers were trained to use content management systems, video conferencing tools and virtual learning environments, to transfer curriculum content from traditional studies to online learning environment.

LieDM association together with Vytautas Magnus University completed a couple of surveys to analyze the virtual learning environment choices and how far it is open for introducing OER during implementation. One survey was implemented in the framework of eContentplus program OpenScout project (ECP-2008-EDU-428016). The report on the choice of the system stated that Blackboard was chosen because it was easy to use. No HTML or programming skills are needed to create a course using Blackboard. Customers used the teaching and learning platform either to enhance traditional classroom instruction by publishing course materials, quizzes, syllabi and other information online, or to teach full distance-learning courses over the internet that take advantage of integrated discussion and chat tools.

The content in Blackboard Vista is organized by title description and content text. Tags are used to search and link to dictionary words. Combined mechanism, for example, a title and tags are used or just text. For user search, it is possible to make combined mechanism using first and last name, institution, faculty names, group, user name, etc., as well as for course search.

From the analysis of the online courses produced using Blackboard Vista learning environment one could state that all courses were similar in structure and curriculum presentation. Teachers used links to outer sources of learning resources to supplement learning and teaching material needed. However, this was a restricted access system for registered users only.

Moodle is another virtual learning environment provided as infrastructure for previous LieDM network, and current LieDM association institutions. It is installed on LieDM association server at *http://moodle.liedm.net*. Administration of users and resources is provided to association members for free. Thus open source software, as well as open access to administration and help should be mentioned here as OER.

During the implementation of European Social Fund project "Integral Development of Operability of Lithuanian Distance Learning System" a lot of products were developed to modernize curriculum.

First, theoretical learner skill and competence assessment model were developed to facilitate teachers and trainers at higher education, vocational education and training institutions, as well as the centres of education to design curriculum conception. According to theoretical model, online tools were designed to support teachers and trainers in application of the model during preparation of online course curriculum conception. The tools were integrated neither with existing learning management systems, nor with virtual learning environments. It was a didactical model and was not very popular after the end of the project. It is unfortunately no longer accessible or used, most probably because the model was quite complicated to use and it was not interoperable with exiting virtual learning environments (neither Blackboard, nor Moodle, which were used among LieDM members).

However, the development of the model inspired methodology specialists to continue research and find other open educational tools and resources to realize these scenarios as OER compatible with other online systems. Thus these results should be treated as potential OER development factor.

Another product developed during the same project for free licensing was a set of five courses at Blackboard Vista virtual learning environment for teachers and trainers to develop their very basic skills and competences: a) analysis of policy and strategic actions in Lithuania for distance and e-learning development, b) designing distance learning course conception, c) online tutoring and learner support provision, d) administering and planning distance learning at educational institution, e) using existing tools in LieDM network (Blackboard Vista Learning Environment, Moodle virtual learning environment, Course Development Kit (*http://distance.ktu.lt/cdk/*) to implement learning material online.

These courses were offered on regular basis for educational institutions participating in LVU program. They were accessible for registered users at Blackboard Vista Learning Management system licensed from LVU program funds. Educational institutions could benefit from the courses in two ways:

1. teachers and trainers could participate as learners to gain necessary skills and knowledge by registering for tutored sessions for learning,
2. institutions could license these courses by asking Kaunas University of Technology to grant tutor access to restricted access curriculum in order to use this curriculum for internal non-commercial use afterwards inside the institutions.

These courses should be available to all Lithuanian academic institutions for free licensing (with tutor access rights) at Backboard Vista learning management system until 2012, as stipulated by the contract between the Lithuanian European Social Fund Agency and Kaunas University of Technology for the implementation of Social Fund project "Integral Development of Operability of Lithuanian Distance Learning System" (SFMIS No. BPD2004-ESF-2.4.0-02-04/0001).

In addition, 60 distance learning courses were designed in specific academic areas. An open tender was organized for distance learning course development. Courses were developed by groups of subject specialists at Blackboard virtual learning environment and, according to multilateral contract among project coordinator, the European Social Fund Agency and the Ministry of Education, these courses are available as free licence courses for all educational institutions.

However, the use of these resources was restricted by the fact that the owner of the resources did not allow to modify the content. These conditions refrained institutions from using the courses, as teachers and trainers at educational institutions are eager to modify contents adapting it to their own and their learners' needs, as well as to study program requirements. Therefore, these courses were not used as much, as was expected. Still this should be treated as one of the biggest efforts to establish OER in Lithuania.

Both cases, the model and the courses, prove that technological solutions which were not in favour of users had negative influence for the use of the resources.

Another significant and popular product of the project was teacher handbook. Teacher handbook was published online *http://distance.ktu.lt/cdk/courses/2710/index.html* as OER and in a hard copy, and it was among the first handbooks available in Lithuanian for teachers and trainers designing distance learning materials in Lithuania.

Schools and vocational education and training institutions benefit from national support provided by the Ministry of Education and Science via e-school portal *http://portalas.emokykla.lt* run by the Education Information Technology Centre at the Ministry of Education and Science. School teachers are encouraged to modernize teaching curriculum, as well as curriculum itself, but the results are open for institutional access only. Nevertheless, software resources are open and available for all Lithuanian schools and education and training centres funded from the national budget.

A survey was carried out by LieDM association, in March, 2010, to clarify institutional problems and needs to be addressed within joint activities. Among other questions the survey also addressed OER, quality assurance and IPR issues. None of the 23 participating institutions indicated that they have regulations for intellectual property rights. 13 institutions expressed the need for such regulation and examples on how this could be solved. Institutions indicated that they do not have a policy for the development or use of OER and they cannot indicate any documents for internal regulations on assessing quality (quality indicators or factors) of curriculum modernization integrating any type of online, distance or e–learning.

LieDM association survey results showed that institutions have high demand for training on how to assess and decide on quality of online studies, intellectual property rights, as well as innovations related to learning strategies, methods and tools used for online studies.

Eight institutions out of 23 stated that they have regulations indicating the rules and mechanisms for distance learning and distance study design and organization. As much as 10 institutions selected the answer "no need for such regulation". Only 6 institutions out of 23 indicated that they have regulations for quality assurance, but these documents are not necessarily addressing distance studies or distance learning. Sometimes they are general regulations for teaching plans, 10 institutions stated that they need such regulations.

2.3. Training of education personnel

All the above initiatives paid considerable attention to training for academic personnel and staff.

ITMiS program initiated distance learning course design and online tutoring courses delivered in a distance mode to LieDM network members. European Social Fund projects, as well as Lithuanian Governmental funds, were spent to train teachers and trainers on how to work with virtual learning environments providing technical skills and basic methodological knowledge on didactics at virtual learning environment.

However, trainings organized under ITMiS and LVU program initiatives usually were limited to the development of skills to use ICT tools and resources which were used and maintained under central provision, suggesting comfortable working settings for teachers and trainers, and did not inspire creativity and innovation. They were hardly related to the inclusion of OER and management of these resources, as target group opinion was always supporting a more comfortable and easy-to-use – and – work solution rather than trying to search and find more innovative, open, independent resources for academic processes. This was due to convenient funding scheme when funding was distributed to network institutions. However, when funding was reduced and then stopped, and technology providers increased administrative costs and transferred the burden of costs to academic institutions themselves, academic institutions that were not ready for new initiatives and practices, such as development, access and use of OER were lacking motivation and resources for curriculum modernization, staff competence development and new innovative practices.

Another initiative strongly supported by the Ministry of Education and Science and the European Social Fund, and implemented by OSFL since 2008, is "For the Progress of Public Library". The project targeted city library infrastructure development (in 2008), rural public library infrastructure development (in 2009 and 2010), and trainings of librarians and other personnel to provide non-formal education services for their customers. In addition, the basics of computer literacy, the initiative supported training on how to use OER, web 2.0 tools and resources. For example, one of the courses that reached very broad audience was "23 things", which is highly accessible and very popular training material on the internet.

A similar initiative supported through the European Social Fund project was dedicated to Lithuanian Labour Market Training Authority services – "Development of Means to Decrease Social Exclusion in Lithuanian Labour Market Training System". OER and training material were produced and provided online for open access in Lithuanian for consultants working with socially disadvantaged groups with the purpose to prepare them for employment.

Labour market training system authority and partner institutions developed online open-access virtual learning environment at http://mokymai.ldrmt.lt for labour market training system staff members and their customers. Motivation e-tools and training material on how to use online social networking tools in daily practice and how to use them for self-presentation and visibility were developed for Lithuanian audience (in the Lithuanian language). Motivational e-tools and training materials are available online at *http://mokymai.ldrmt.lt*.

2.4. OER repositories

Though within some of the various initiatives on ICT use in education in Lithuania described in the chapters above repositories of educational content were established, the educational materials did not maintain characteristics of OER: they are either established in private institutional domain, do not ensure free and open access to the content or content development resources, they are either copyright protected or provide licence only for the use of already created resources with restricted access, restricted or no re-purposing and very limited or no possibilities for user to access resources and use them in educational setting.

Having analysed available educational content in online repositories, general findings can be categorised under: a) repositories that maintain characteristics of OER and are potential OER repositories, b) ICT tools for education (digital libraries and other practices), c) web 2.0 resources for education.

Repositories that can be identified as OER repositories mainly provide educational content in Lithuanian with some exceptions where the material is in English. Analysis of institutional websites revealed very few examples of OER. Scientific journals published by higher educational institutions open access to their articles online, as some art collection repositories (like virtual museum galleries) are accessible for the users.

As it was already mentioned, the survey implemented at the LieDM association indicated that there is no institutional encouragement policy for OER repository development and these activities are mainly implemented by individual enthusiasts. However, institutions provide technical support for OER publication. Institutions also use OER examples as attractive means for marketing purposes in Lithuanian education market. Usually institutional resources are copyrighted and do not indicate how the resource could be used. It is either not clear, or there is no evident technical possibility to do so.

Secondary schools, on the contrary, are the only ones that benefit from the national online OER repository. Its development and support is funded by the government. This repository is suggested by the portal e-school (*http://portalas.emokykla.lt*) and is extremely useful for secondary school teachers, as it offers teaching plans, teaching tools for teachers from primary school to gymnasium for all subjects (*http://portalas.emokykla.lt/Puslapiai/KompiuterinesMokymoPriemones.aspx*). Teachers can find here methodological material and ask for advice on application of ICT in education. This initiative is very well organized and supported by the Ministry of Education and Science, the Centre for Information Technologies at the Ministry, as well as by Microsoft corporation.

Other individual institutional initiatives are funded from various European projects. Temporary project initiatives and results that could be indicated as OER produced during project work are described in the following chapter, as well as in the chapter dedicated for curriculum modernization issues.

Another example of OER repository can be mentioned – this is educational content in a streaming video format available at the LieDM association (*www.liedm.net*) website linking to international conferences (*http://conference.liedm.net/?cat=1*). This is a very small repository providing video records in English. The conference website containing OER was developed by the LieDM association in 2010, after establishment of the legal body of the previous network.

Some institutions support the idea of developing OER content and suggest video lectures and video integrating formal education content, as well as informal education content for public use in embedded format (e.g. *http://www.tvdu.lt/*):

Fig. 6. OER at video archive at Vytautas Magnus University repository.

Figure 6 presents an example of a video archive, which lists video records under lecture categories for formal studies (history – 7 topics, psychology – 15 topics, journalism – 15 topics, natural sciences – 3 topics) and for informal education (lectures from informal club meetings "Beer, teacher and myself" – 5 event

records, university events – 6 public lectures, and other occasions – 7 records). Lectures and other public records are prepared by university professors, as well as international visiting honourable guests, who introduce public heritage of the university and make records to historic references and live testimonies.

Some organizations provide open courses for the public. For example, the alliance "Window to the Future" provides open courses for all public internet access points' visitors (*www.vipt.lt*). Courses to develop skills to use Microsoft Office programs (MS Excel, MS PowerPoint), as well as internet safety and communication on the internet are open access courses for all Lithuanian citizens delivered by the alliance. However, registration is necessary to access the training sessions and the courses. Some courses are tutored only when there is project funding available for training sessions, thus they cannot be considered as OER.

Wikipedia is another repository, which is widely popular among Lithuanian students. For example, the students of Philosophy at the Vytautas Magnus University upload their homework to Wikipedia.lt upon assessment and evaluation by their professor (*http://lt.wikipedia.org/wiki/Pagrindinis_puslapis*).

Lithuanian Wikipedia is accessible at lt.wikipedia.org: it includes more than 113000 articles and wiki dictionary exceeds 500000 definitions. There is a cross-reference link for Facebook group (*http://www.facebook.com/vikipedija?v=wall*). Wikipedia rules are strictly applied to wiki community. Statistics show that 2,920,638 pages were edited since Lithuanian wiki was established, there are 64 contributing members, 24 administrators, and over 38000 registered users, of which 481 users contributed by suggesting article improvements over the past month. Lithuanian wiki suggests wiki dictionary, wiki citations, wiki news, wikimedia commons, wiki resources, wiki books, wiki species, and metawiki for project coordinating.

For informal education, various thematic online journals open access to articles on culture, family healthcare, religion, society, political sciences, nature and science, multimedia, and other topics (*http://www.bernardinai.lt*). Some Lithuanian contemporary literature and reviews are published at „Siaures atenai" page (*http://www.culture.lt/satenai/?leid_id=922&kas=straipsnis&st_id=16475*). Online articles and reviews are published weekly in hard copy and online with the support of a private company. The online archive is available at "Siaures atenai" repository (*http://www.culture.lt/satenai/?leid_id=922&kas=leidpasirink*). First short online essays were published online in 2002. Today there are more than 370 volumes of essays, poems, reviews and other art critic writings available for the reader.

"Siaures atenai" practice to provide OER inspired other culture publications to support OER idea and to develop OER. Namely, "The Vilnius Review" publishes reviews of latest literature and art publications at online repository at *http://test.svs.lt/?Vilnius* since spring, 2009. Both repositories allow comments

and feedback to be provided on OER. Commented short stories, poems and also reviews (only in Lithuanian, with a possibility to comment) are provided as OER at "Literature and Art" online repository at *http://www.culture.lt/lmenas/*. "Literature and Art" weekly online journal provides a repository of more than 400 volumes with various pieces or art. The journal is published by the Union of Lithuanian Writers.

Lithuanian museums provide virtual museum expositions. These expositions are copyrighted by the Lithuanian Art Museum and the Association of Lithuanian Museums. Licenses are not specified. The list of museums and art pieces can be found at *http://www.muziejai.lt/Index.en.htm*. First, museum and exposition search is enabled at the website, information important for visitors on newsworthy educational events, exhibitions, restoration work, and other details are provided. Most interesting offers are virtual expositions and galleries: links and references lead to national museums' repositories suggesting various art collections (temporary and permanent), as well as national and regional events. Museum panoramas are available where OER on museum premises and exhibition is uploaded for open and free access. The National M. K. Čiurlionis Art Museum, The Devils' Museum, The Vytautas the Great War Museum, The Vilnius Picture Gallery, The Alexander Pushkin Literary Museum, The Sacral Art Exposition at The Museum of Applied Art, The Amber Gallery-Museum, The Palanga Amber Museum and The Trakai Castle open their resources to public online.

The virtual exhibitions by Niko Pirosmanasvili, Alfred Kubin, Antanas Gudaitis, Mikalojus Konstantinas Čiurlionis, Liudas Truikys, Carlo Dolci, Samuel Bak, Vytautas Valius and Rafael Chwoles, as well as thematic exhibitions for memorable events and different cultures are presented in the online repositories opened by the national museums.

2.5. ICT tools for education (digital libraries and other practices)

Another initiative started during the implementation of ITMiS program was the establishment of the Lithuanian Academic Library Network (LABT, *www.labt.lt*). The goal of the project funded by the Lithuanian Ministry of Education and Science through ITMiS and then through LVU program was to create Lithuania's academic virtual library through the automation of libraries, unification of search and access to information sources and virtual services. In 2010, LABT linked together the libraries of 16 universities, 18 colleges, 39 research institutions of science and the Library of the Lithuanian Academy of Sciences.

A well known Aleph (Ex Libris Ltd.) library automation software was adopted and implemented in all LABT member libraries.

Many librarians, decision-makers and program board members consider LABT resources as open access resources. Thus it is relevant to discuss LABT scheme as potential repository for OER.

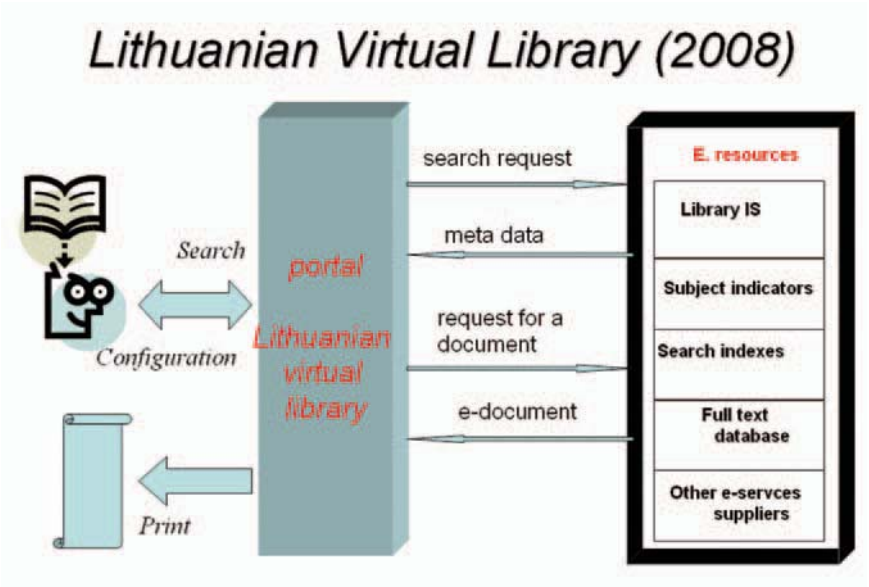


Fig. 7. Operational scheme of the Lithuanian Virtual Library (2008).

The Lithuanian Scientific Library Association is a legal body attracting resources to the LABT network. The Association is subscribed to a variety of data bases for academic research and studies (the list of all databases is available at *http://www.lmba.lt/db/liet/kitos.htm*). There are various consortia that access different databases. For example, law information centres and other professional consortia subscribe

to Hein Online and Westlaw International databases. National program funds are allocated to access ISI Journals Citation Report, ISI Essential Science Indicators, ISI Proceedings, ISI Web of Science. Libraries within the association of Lithuanian Scientific Libraries are subscribed to different databases on the basis of institutional needs.

Since 2005, access has been open to such databases as Blackwell Publishing, Springer LINK + Kluwer, AMP Package, American Institute of Physics, American Physical Society, Euromonitor International / GMID, Institute of Physics, SAGE, Wiley, since 2007 – to Grove Music Online, Grove Art Online, Oxford English Dictionary, Annual Reviews, Lippincott Williams & Wilkins Custom, 11 DB via EBSCO Publishing, Springer LINK E-Books, Source OECD, IEEE/IET. Since 2008, libraries have been subscribed to Ebrary and MD Consult.

All these resources have been treated as OER for higher educational institutions (teachers and students) by the majority of Lithuanian academics and decision-makers. However, referring to the definition of OER by Hewlett Foundation accepted by UNESCO, "*OER are teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge*" (Atkins, Brown, Hammond, 2007), LABT practices can be treated as ICT tool for education only.

In LABT case, the provision of access to full-texts by commercial publishers through digital libraries is not a pure example of OER repositories, because this access is paid for (not by the user, but by the library consortium) and the texts are copyright-protected.

There are other ICT tools and practices suggested for educational institutions, teachers and trainers, but they are not numerous. Video interactive lecturing and support system (ViPS) can be mentioned here as one of them.

As Kaunas University of Technology is the manager institution for LVU (previously ITMiS) program, it used to offer its tool ViPS for the members of the former LieDM network. The tool was developed during the implementation of EUREKA project and was copyrighted by Kaunas University of Technology and Baltic Education Technology Institute. All institutions (more than 60) as former members of LieDM network used the tool to record and upload video lecturing at the server of this tool since 2003, thus now more than 3000 video records (some are only for registered users) are available at http://distance.ktu.lt/vips (see Fig.8):

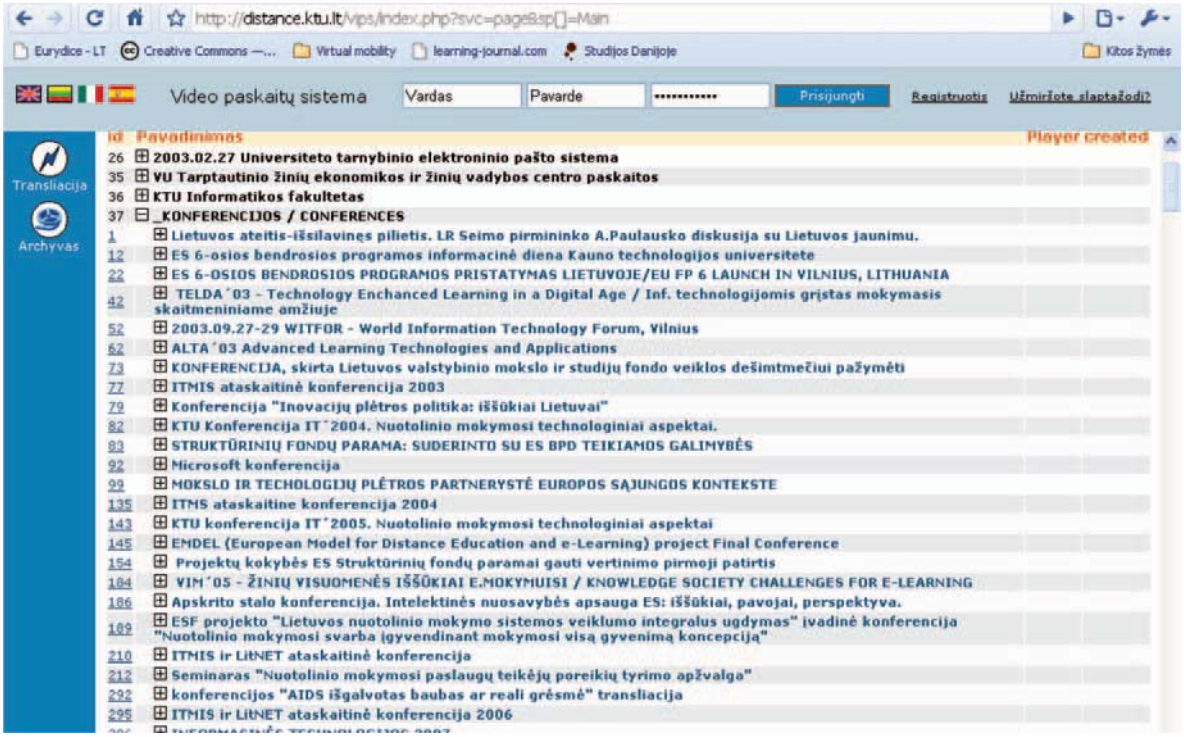


Fig. 8. Video records archived at ViPS system.

However, the use of this tool and resources archived bring several problems for educational institutions.

First, copyright of the resources in terms of content and the tools themselves should be defined and separately described, which has not been done. Contributors of the archive were the teachers from many Lithuanian academic institutions and international institutions. Tool development was funded by national programs and international projects. IPR-related issues are not specified, and though separating content from the tools is technically possible, skills and resources are needed. Owners of the tools ask for funding for maintenance of the tools and service provisions for further use.

Second issue arises when users and contributors themselves need to access direct link code to the record. It is not possible to provide a reference of a record in any other media once you are not able to access the code of the link (you need special request to be sent to administrators of the repository). Link can be initially provided only to the archive itself where search is very complicated.

Third, Kaunas University of Technology owns the tools, and the costs asked to be paid for the use of the tools in 2009 were too high for educational institutions, thus now not only the use of the records is quite limited, but also institutions are forced to look for other options to broadcast or record video lectures, as well as to retrieve contents separately from the tools.

2.6. Web 2.0 resources in education

As mentioned in previous chapters, open source virtual learning environments with central support and user administration are provided for educational institutions. One Moodle virtual learning environment is suggested by LVU program managers – Kaunas University of Technology:

Fig. 9. LVU Moodle virtual learning environment.

There is a very limited number of institutions that use the environment (Fig. 9), as educational institutions increasingly install and operate their own Moodle systems.

The LimeSurvey tool used to produce survey instruments is adapted to national context (translated into Lithuanian) and provided at *www.lvu.lt* for free use to all educational institutions (for registered users) by LVU program. However, Google forms are very popular among educational institutions and individual researchers as well.

The other centralized support and web 2.0 tools adapted to educational needs are provided by the LieDM association via the websites of its members. Moodle support and administration is free for LieDM association members (*http://moodle.liedm.net/*), as well as Dimdim open source tool version and Big Blue Button tool for video communication. The Open University UK has provided booking management rights for educational institution managers to use Flashmeeting tools, which become more and more popular.

Educational institutions in Lithuania do not regularly use existing OER repositories, such as MERLOT, MIT OCW, or OpenLearn, with rare individual exceptions. Language is a very important criteria in choosing curriculum content. Articles and papers are still more popular among teachers and students than course content or course material available as OER. OER culture has still to be introduced and barriers to be overcome.

OER search engines for available OER are very popular in Lithuania. Google search engine is used very widely. For research articles and publications, especially among academics working on dissertations, Google Scholar repository is used very often. Search has been facilitated once internet 3.0 called option became available in Lithuania with the advent of Lithuanian linguistic version of the search engine and other applications in Lithuanian. Citation index is also very popular search factor among academics and professionals. There is no statistical data available on how often Google Scholar is used for academic activities, but it is definitely very strongly advancing and solving huge problems of funding and accessing OER for references and readings.

Huge move on the use and designing of OER was inspired by adaptation of Google tools and repositories introducing Lithuanian semantics on the web resources. Web interface in the Lithuanian language was a very significant move forward and opening web 2.0 tools for Lithuanian communities.

Lithuanian web semantics is supported by the national program for the Development of Lithuanian Language approved by the Lithuanian Board of Sciences on May, 8, 2009, for the period of 2009 - 2015. Several projects are funded by the program dedicated to computer linguistics on the national level. For example, the project "Automatic Identification of Education and Science Terms" implemented under the same program with the aim to expand web taxonomy in the Lithuanian language. The project contributes to semantic web research and Lithuanian taxonomy development. However, no further progress is available yet on project work, thus no further information can be included in this study up to date.

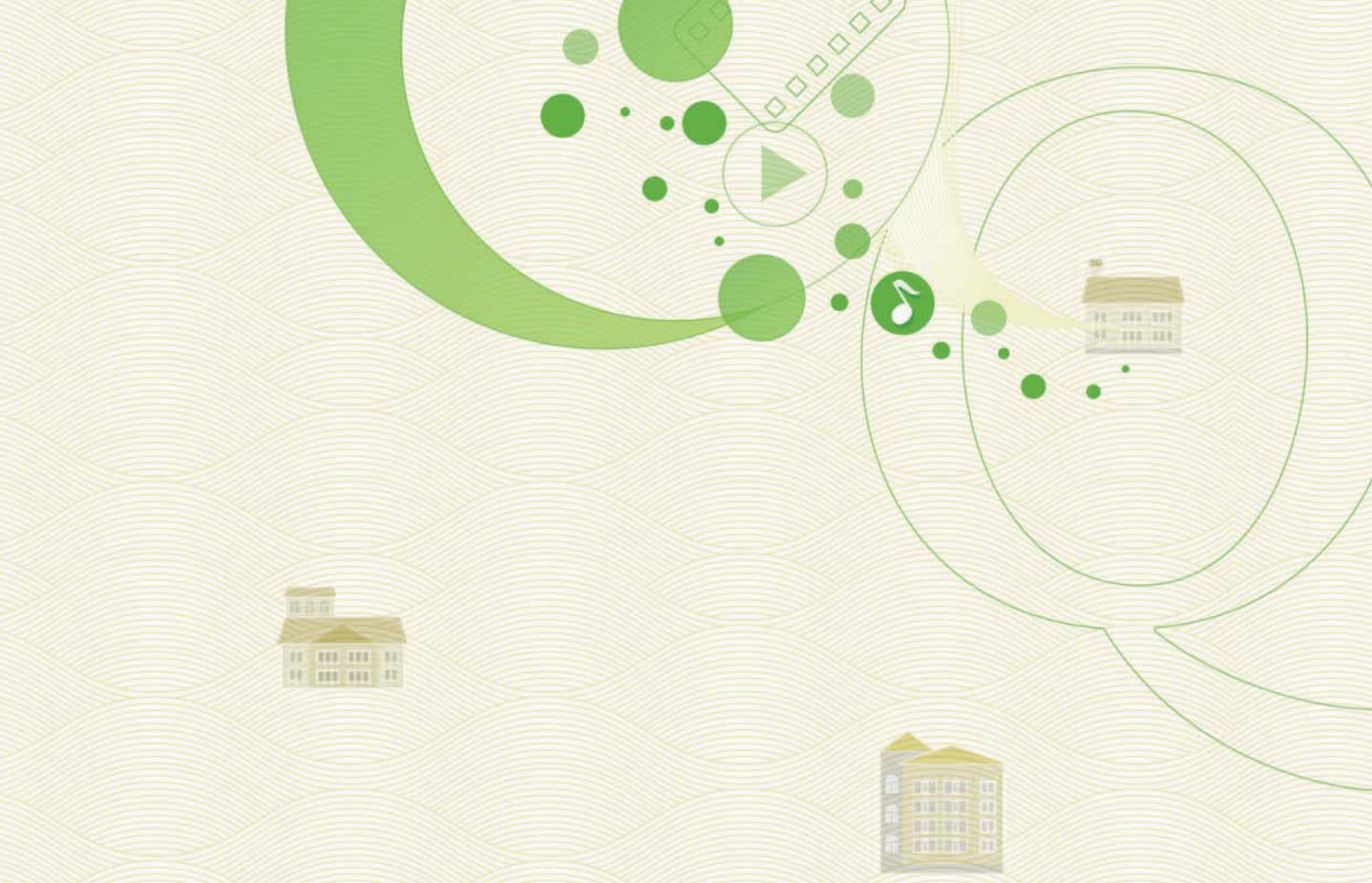
2.7. Engagement in EU projects and initiatives on OER

International project activities in the area of OER are still very rare in Lithuania. Only a couple of projects directly addressing OER development and use can be referred to.

One project - iCoper for "Interoperable Content for Performance in a Competency-driven Society" (ECP-2007-EDU-417007) started in 2008 is the Best Practice Network project co-funded by the eContentplus program of the European Community. The Kaunas University of Technology is a partner in this project. The objectives of the project are to analyse and facilitate the adoption of standards and specifications, to make learning resources accessible, and to validate standards and specifications and condense them into the ICOPER Reference Model (IRM) (*http://www.icoper.org*).

The second project whose aims and objectives are interrelated with iCoper project is OpenScout (Skill based scouting of open user-generated and community-improved content for management education and training) co-funded by the European Commission within the eContentplus Program as a Targeted Project in the area of Educational Content (Grant ECP 2008 EDU 428016). OpenScout started in 2009 and is aimed at providing an education service in the internet that enables users to easily find, access, use and exchange open content for management education and training (*http://www.openscout.net*). The Vytautas Magnus University is a partner representing user association in the Baltic States.

Another project dedicated directly to OER development is Nordplus program Horizontal sub-program project NORDLET - Nordic Baltic Community for Open Education, representing practitioners and researchers in the field of Open Content for Learning, Education and Training. NORDLET project aims to build a Nordic-Baltic network and community of practice set to develop and harness a region-specific perspective on the use of technology in Learning, Education and Training. NORDLET project creates the conditions for networking and cooperation in OER use and development. Project website is *http://www.nordlet.org*. Numerous regional international events, including those held in Lithuania, have already been organized within the project.



3. Most Promising Trends, Perspectives and Factors for the Development of OER in Lithuania

Having reviewed Lithuanian national policy documents and strategies, initiatives and programs, one can state that due to early understanding early actions were undertaken to integrate ICT into education, and how important this priority is in the development of knowledge and information society. Such initiatives, as development of physical infrastructure for collaboration of educational institutions (at a very early stage), research and studies on necessary actions to be undertaken to facilitate experience sharing, technological tool development, establishment of OER like repositories for libraries, as well as educational content should be highly appraised.

Very important steps in the development of such infrastructure and preparedness for managing ICT in education were surveys on system interoperability, preparation of study and strategy for further development of national programs and initiatives, training society and academic personnel providing the basic skills and resources for creativity and innovation.

The conception of *e-content* was defined on a very high level in the General National Strategy and referred to such huge reforms as e-Government, e-Health, and e-Business. However, e-Education program that would be representing *electronic content* which is open for free access was not developed.

There are evident obstacles for successful further development of the system. First, ITMiS and LVU programs were too much oriented to infrastructure development, while technological investment and system choice have not been estimated from the point of view of user needs. Though a couple of useful, but very expensive tools were developed in the framework of these initiatives, they were not interoperable with the other technological resources and were not compatible with updated use needs. Too much investment was made from the national resources into complex tool development, when OER appeared to be at hand. However, neither experienced staff at coordinating institutions, nor staff at other educational institutions was prepared to use the software developed under creative commons licence.

Regarding curriculum modernization issues, academic personnel was trained to gain basic skills to use one commercial, and one free access virtual learning environment. That was the decision that could be treated today as one of the major strengths of the national experience. Though teachers and trainers at educational institutions for many years felt comfortable being served by coordinating centres and did not become autonomous actors capable of selecting the tools available online and applying them in daily practice.

On the one hand, there are no policies setup at educational institutions for OER use and development. All initiatives are spontaneous and encouraged by individual enthusiasts rather than communities of

users. On the other hand, at the national level, there is no agreement that didactical needs and user (institutional) needs are the driving force targeted at improving curriculum, teaching and learning organization, and decreasing service costs.

Nonetheless, though economic crisis and market economy affected educational institutions in Lithuania very strongly, and in the area of application of ICT in particular, there is a very positive outcome: educational institutions are forced to look for and find very economical solutions that fulfil their needs today. They are not ready to assess the quality of OER systems and tools yet, but they were not trained to assess the quality of the tools used in LieDM network either. International experience and help is very much needed. Moreover, though not spontaneously, institutions start cooperation on the basis of mutual needs, shared experience, knowledge and resources. Therefore, they start opening their repositories for each other and thus join user association to solve problems in a community of professionals.

Thus, most promising and efficient institutional strategies for OER policy implementation should involve national and international partnerships, synergy of efforts and resources, as well as contribution to OER development, assessment and use. Though lot is still to be done to reach this vision, this is the nearest future for all Lithuanian educational institutions that continue being oriented to international market and qualitative curriculum for their customers. SWOT analysis provided the following distribution of strengths, weaknesses, opportunities and threats which describe national context and influence development and use of OER in Lithuania.

Strengths	Weaknesses
• Broadband connection ensured by LITNET • ICT infrastructure established for distance learning resource development (potential OER) • LieDM association established to promote user needs and mutual activities using LieDM network infrastructure • A commercial and an open source virtual learning environment mode experienced • Lithuanian society gained basic computer skills by OSFL and the alliance "Window to the Future" • International partnership and networking via consortia and project work started • Semantic web 3.0 development started in Lithuanian • Initial professional competence necessary to create OER among LieDM association professionals developed	• European priorities (including OER development) are not taken into account on the national level • There is neither e-Education program nor strategy in Lithuania to promote OER • Top–down approach is used in promoting technology services in the country which are not interoperable with OER • OER culture is not introduced in educational institutions • There is neither management, nor economic cost–efficiency research done to establish resource optimization practices • There are neither IPR nor quality assurance policy nor regulations at educational institutions
Opportunities and Potentials	**Threats**
• User associations agreed to build their activities on the basis of international priorities and OER culture • Academic staff can benefit from online user communities to start using OER • Integration into international communities can be facilitated by sharing online free access educational resources • International projects and partnerships can be built though experience development, sharing and growth.	• ICT practices and infrastructure continue being the main focus of national level programs • Investments into infrastructure development and commercial services on the national level outrage OER development initiatives highly • There are no quality criteria and indicators defined for technological services suggested and promoted on the national level by technology service providers • Lack of funding and institutional policy promoting OER development may discourage teachers to use and develop OER, as well as to accept the culture of OER in general

Conclusions

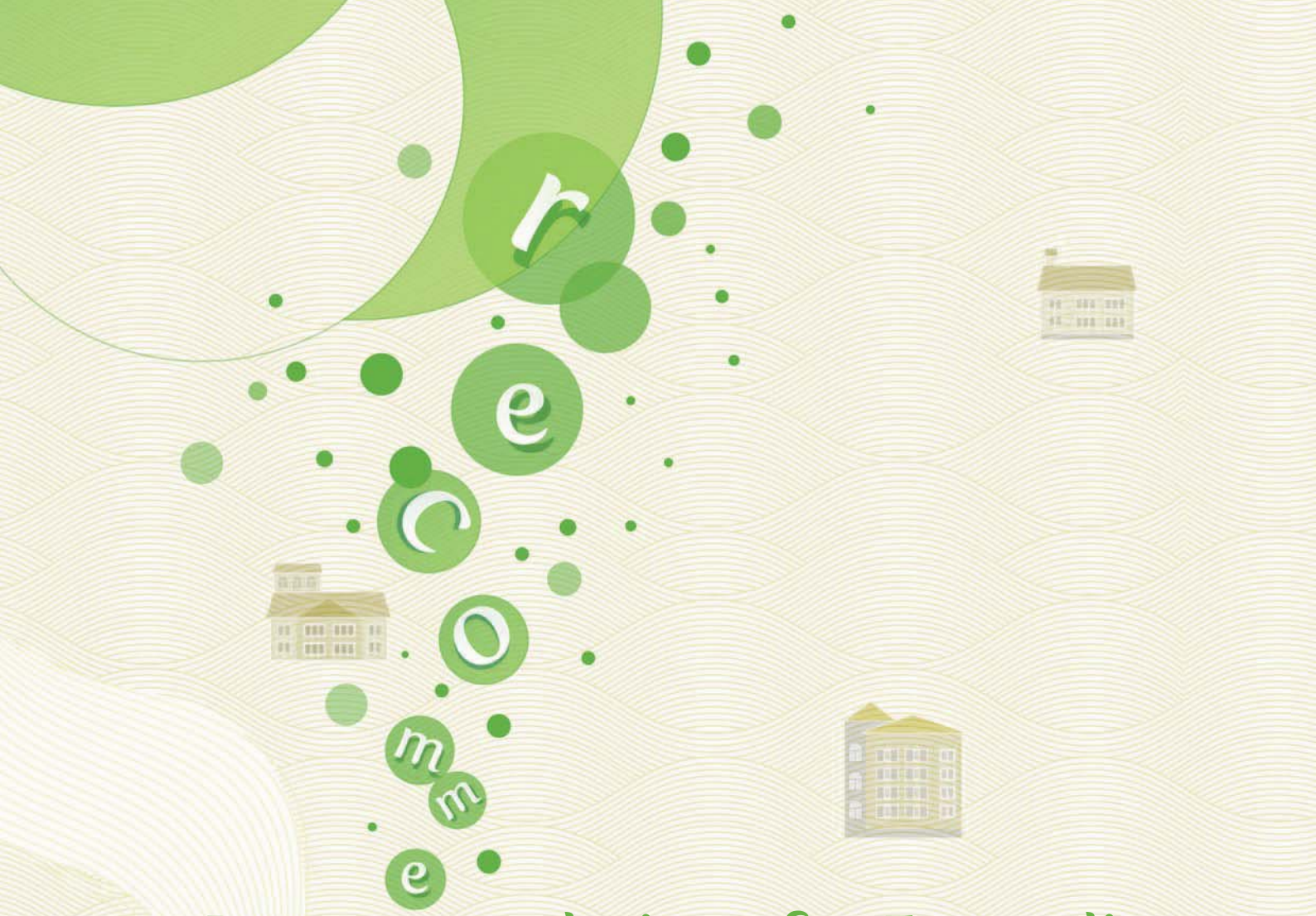
The review of major national political documents, strategies and regulations, as well as the current status on the use of ICT at educational institutions, including intellectual property rights, access to resources, and quality assurance issues made it possible to identify the factors that prevent wider introduction of OER into educational practices:

1. National programs dedicated to application of ICT continue focusing on infrastructure development. European priorities (including OER development) are not taken into account in program description. Available resources do not enjoy the properties of OER.
2. There is no program developed in Lithuania to assess OER potential and needs to promote OER in the country from education policy aspect.
3. General National Strategy does not imply the development of e-Education program (along with e-Government, e-Business, and e-Health), and the definition of e-content does not correlate with education curriculum.
4. Technological tools and systems available for DE and supported by national programs are suggested by Lithuanian technology service providers; however, they are not oriented to OER development and are not interoperable with other applications (though interoperability is emphasized in the National General Strategy). There is neither agreement nor description of quality assessment requirements for the tools used and promoted by technology service providers in Lithuania.
5. Top – down approach is used in promoting technology services in the country managed by technology service providers. This becomes a threat to academic institutions which have less internal capacity to manage technological resources, as their personnel will not be encouraged to develop skills allowing them for independent activities and decisions, but instead, the situation will continue when they remain dependent upon technology providers' services.
6. There is neither management, nor economic cost-efficiency research done in distance learning targeted at cost-effective administration and optimization model. Instead, expensive investment into physical infrastructure is continued.
7. Lithuanian academic library resources are not compatible and interoperable technically with virtual learning environments, thus their use is complicated and is not promoting OER.
8. Lack of intellectual property rights regulations at educational institutions may continue bringing problems in using resources in the process of education. Institutions are unable to decide individually, cooperative approach and international experience is necessary in setting up such regulations.
9. The crucial majority of educational institutions need to develop or re-develop quality assessment and assurance regulations for curriculum and learning organization process in the light of new OER.

10. Poor use of OER has been identified in Lithuania, teachers and trainers lack skills to accept autonomous and individual decisions, and individual, innovative and creative approach. Academic personnel at educational institutions is not trained to use open source software and OER in daily practice. Motivational or reward/encouragement system to introduce OER in practice is non-existing at educational institutions.
11. Recommendations provided by the Strategy for Distance Education Network Development in Lithuania (2005) were not implemented and are not monitored, except for those related to infrastructure and project funding.
12. Regional support is not established as planned in Phare 2000 projects and Lithuanian Distance Education Network Development strategy (2005).

The following factors supporting the introduction of OER were revealed:

1. LITNET academic network ensures broadband connection and access to online resources.
2. LieDM network was an efficient investment into ICT infrastructure, initiation of curriculum digitalization and staff training. LieDM association as user association can fill the gaps and foster institutional collaboration shifting from centralized technological tools to open and online free access OER.
3. Two types of virtual learning environments were introduced, one commercial, and one open sources environment available for all educational institutions. This provided experience, skills and knowledge on open source environment development and administration already.
4. The Open Society Foundation and the alliance "Window to the Future" contributed to preparing Lithuanian society for LLL introducing basic computer skills and even open online resources. Now the society can move online for online resources.
5. International networking and partnership with leading institutions in Europe was successfully started via consortia and project work. The LieDM association has been established to apply didactic–based and user needs based shift approach. LieDM association professionals from the majority of Lithuanian educational institutions already have strong competence and recognition for fostering innovations, creativity and OER advancement.
6. Lithuanian semantic web 3.0 development was a considerable move towards spread and use of online social networking tools and OER (software, search engines, publishing and collaboration tools) among Lithuanian citizens and academic communities.



Recommendations for Expanding the Use of OER in Lithuania

In order to promote the production, repurposing and use of OER in Lithuania it is recommended to undertake the following measures:

- ***Establish OER development culture in Lithuania*** via three major steps: a) invite international experts and consult international leading initiatives to promote and bring awareness on OER development and use, b) establish international partnerships and contribute to online international discussions to start using OER and mainstreaming among user communities, preparing national strategy and policy issues as action plan, c) contribute to development, assessment, use and re-use of OER on both, national and international level.
- ***Undertake immediate actions using LieDM association infrastructure, experience and potential to promote OER repositories and possibilities for educational institutions***, and to encourage educational institutions and their communities to benefit from OER solving distance learning challenges and issues.
- ***Invite advanced international OER experts to lead research to prepare a white paper on implementation of OER policy in Lithuania***, at national, institutional and individual levels, assessing didactical, social, managerial and cost-efficient economic, as well as technological factors. Invite as many national stakeholders, user associations, research organizations, experts and technology developers, as possible to find the most optimal action plan and fastest integration into the global OER movement.
- ***Prepare the umbrella program for e-Education in Lithuania based on OER development and use*** in all education sectors, applying previously implemented research and practices in Lithuania (Report on Open Source in Education, 2004, Lithuanian DE Strategy, 2005, Strategies of Application of ICT in Secondary and Vocational Education and Training, 2008) and suggesting strategies for other sectors representing all LLL groups.
- ***Review responsibilities and functions of distance study centres/ DE centres at educational institutions in Lithuania with the potential for re-organization of their roles and responsibilities, and shift in their activities***. There is a potential for these units to become research and methodology units, providing intervention for local academic OER user communities serving for teaching and learning, as well as curriculum design improvement. These units would aim at awareness raising in available OER solutions and would formulate requirements for IT specialists.
- ***Investigate and suggest the action model for interaction among educational institutions*** in cost-effective and efficient way, designing and/ or applying resources – optimisation of management model, changing top – down approach to bottom – up approach, introducing user – need implementation practices and didactical methodological leading practices to apply ICT solutions for learning and teaching scenario realization (not vice versa), with the focus on OER development, adaptation, quality assessment, use and re-use in educational practices.

- ***Direct all efforts to support and promotion of OER practices through adaptation of existing OER repositories and tools*** to cultural needs and settings (linguistic and other options), maintaining all possibilities to participate in international ongoing discussions on OER development and promotion.
- ***Invite individuals, institutions and user communities to contribute to implementation of OER policy levels*** suggested by UNESCO and other leading institutions and researchers by:
    - ***preparing OER promotion strategy*** for academic institutions, including the issues related to motivation and encouragement to use OER,
    - ***suggesting examples on how OER can be introduced*** into education practices,
    - ***working out quality assessment procedures*** for distance learning curriculum quality assurance when OER are integrated and used in study and learning process (both, didactical and technological quality indicators),
    - ***overviewing legal documents regulating intellectual property rights*** and defining intellectual property rights' scenarios for OER development and use at educational institutions,
    - ***implementing training for personnel at educational institutions*** introducing OER policy levels suggested by UNESCO and other leading organizations,
    - ***promoting OER success practices at national level*** raising awareness on their practices,
    - ***formulating the needs for OER tools and software for technology developers*** and designers to establish offer for academic institutions to use unlimited free access resources for OER developing under do-it-yourself conditions, and to ensure self-sustainability.

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Airina Volungevičienė
Vo-133
Open Educational Resources in Lithuania: State-of-the-Art, Challenges and Prospects for Development. Study – Kaunas: Vytautas Magnus University Press, 2011, - 68 p.

ISBN 978-9955-12-702-4

The study contains an overview of the national policy for application of ICT in education, a survey of the current status of OER in Lithuania, and analysis of most promising trends, opportunities and challenges for the development of OER. Recommendations for expanding the use of OER are proposed in this publication for policy makers and education institutions in Lithuania.

Airina Volungevičienė

Open Educational Resources in Lithuania: State-of-the-Art, Challenges and Prospects for Development

Study

Coordinator of the project Svetlana Knyazeva, UNESCO Institute for Information Technologies in Education
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Published by Vytautas Magnus University Press, 2011-08-30. Run: 200 copies.
S.Daukanto str., 27, Kaunas, Lithuania

Printed by "Printing House Morkūnas and Ko", Draugystės str., 17, Kaunas, Lithuania

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