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# Educational Portals and Open Educational Resources in the Russian Federation

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Moscow 2012

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# Foreword

The main objective of the project "Open Educational Resources in non-English-speaking countries" implemented by the UNESCO Institute for Information Technologies in Education (IITE) is promotion of OER in non-English-speaking countries based on the examination of needs and challenges for open education in these countries. During the early stages 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 two Baltic countries — Latvia and Lithuania — was completed. The results of the cross-national survey of OER in the Commonwealth of Independent States (CIS) were published in the monograph "CIS on the Way towards OER". At a later stage, to compare OER-related patterns in non-English-speaking countries, the geographical scope of the IITE survey was expanded to include Japan, People's Republic of China, Brazil, Turkey and Vietnam. Several case studies on best practices in OER identified in some selected countries were published by IITE: Brazil (Andreia Inamorato dos Santos), Lithuania (Airina Volungevičienė), and the People's Republic of China (Chunyan Wang and Guodong Zhao).

I am pleased to present a new publication in this series — "Educational Portals and Open Educational Resources in the Russian Federation" — prepared by the experts of the Federal Research Institute of Information Technologies and Telecommunications "Informika", a long-term partner of IITE. The book provides an up-to-date survey of the current level of development of educational materials and repositories of educational resources in Russia.

As a result of implementation of Federal Targeted Programmes supported by the Ministry for Education and Science of the Russian Federation, Russia has accumulated exceptional potential and capacity in high-quality educational resources, most of which are accessible through the system of federal educational portals and websites of organizations-developers. A bulk of resources is available at the websites of educational institutions, specialized projects and individual teachers. Electronic educational resources are developed in traditional text and sophisticated advanced formats, the latter often suggest introduction of interactivity in the educational process. However, as UNESCO suggests that OER should be available under an open license, most of these educational resources can be attributed to Open Educational Resources only with a certain reserve. Russia still has to pave its way towards a wider use of open licenses, which would become one more prerequisite for the promotion of OER.

To date, the advantages of OER and the opportunities they offer to different levels of the educational system are not yet fully recognized by policy-makers and practitioners. Additional measures are needed to create enabling environments for OER, new steps should be taken to encourage the use of open courseware in higher education institutions. Special efforts should be invested into nurturing sharing culture within the educational community. According to OECD's *Giving Knowledge for Free*, "wider circulation, sharing and reuse of learning resources and tools developed by public funding — which

can ensure a better return on investment of taxpayers' money — should be of interest both to policy makers and representatives of institutions and funding bodies" and "academic and research output as well as the national cultural heritage made available in digital format with the use of public funds should also be available for free for education".

The openness of the resources described in this book is often limited by national boundaries, some materials and repositories are not open to users from abroad, which is pity, as these high-quality materials are of interest and would be of help for many Russians and Russian-speaking teachers and students outside Russia. Next step would be making the Russian resources available to a wider community of users, at least within CIS. I would like to conclude by voicing support to the initiative proposed by the First CIS Congress of Teachers and Educators (Astana, 2010) to promote "development of electronic resources that would create conditions for generalization of the relevant pedagogical experience accumulated in partner countries; setting up of a video library of best lessons, instructional manuals and educational materials".

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UNESCO IITE Director a.i

# Introduction

The most widely accepted definitions of Open Educational Resources involve the following major components: the purpose of resources, their intellectual properties rights (IPR) status and an option of free use, modification and distribution.

Open licenses are increasingly employed in various spheres of human activities: literature, science, education, arts, music, cinema, etc. Among the dozens of open licenses applied to specify the terms of use of content, codes and data, Creative Commons (CC) licenses are ranked among the most popular licenses for content. UNESCO IITE policy brief "Open Educational Resources and Intellectual Property Rights", as well as two workshops organized by IITE in 2011 in Moscow together with the UNESCO Moscow Office, National Research University "Higher School of Economics" and the Institute of the Information Society, were intended to raise awareness on open licenses in Russia and CIS.

> Open Educational Resources are teaching, learning or research materials that are in the public domain or released with an intellectual property license that allows for free use, adaptation, and distribution (OECD/CERI, 2007).

The concept of open licensing with respect to content has arrived to Russia relatively recently: people producing and using intellectual products in Russia are predominantly familiar with the concepts of copyright and author rights and unaware or know very little about open licenses, the more so as the culture of sharing is not prevailing yet. Though the use of CC licenses has been gradually expanding in Russia and the number and range of resources distributed under their terms is increasing, the most widely spread practice of opening access to resources suggests publication of a disclaimer that specifies the terms of use. Thus, for example, the materials of the official website of the President of the Russian Federation *(www.kremlin.ru)* can be freely distributed in all media without any limitations; the only condition is attribution required. This complies with the conditions of the CC BY 3.0 Unported License, which is confirmed by an official letter signed by a president administration official. The terms of use of the information on the website of the Premier Minister of the Russian Federation *(http://premier.gov.ru/eng/about.html)* are more limiting and can be interpreted as CC BY-NC-ND. The content of portals and websites of regional authorities in several Russian regions and the materials of an official information portal of state authorities of the Republic of Bashkortostan *(www.bashkortostan.ru)* are available for Internet users under conditions that fully correspond to the conditions of the CC BY license, which is confirmed in the terms of use. At the same time, the website of the Government of the Russian Federation *(http://government.ru/eng/)* contains an explicit specification of the applicable license — CC BY 3.0 Unported License.

Thanks to the joint efforts of Wikimedia RU, the Russian Association of Electronic Communications, the Association of Internet Publishers and other members of Internet communities, a considerable progress has been achieved in the recognition of importance of amending the national legislation to harmonize it with international IPR regulations. The Institute of the Information Society, acting since 2010 as Creative Commons Affiliate in Russia, has also contributed to these efforts by examining the legal status of CC licenses in the Russian legal context. In 2011, President Dmitry Medvedev met representatives of the Internet community to discuss the use of open licenses and approved a list of assignments on elaboration of the proposals for amending Russian laws in line with open licenses, in particular, Creative Commons, GNU and FDL, to facilitate open access to information materials for cultural, scientific and educational purposes.

Below are some examples of the use of CC licenses by Russian journalists, media professionals, musicians, educators, entrepreneurs, moviemakers, activists, etc.

The first ever online edition operating under CC BY «Private correspondent» *(www.chaskor.ru)* was launched by Ivan Zasursky, the Head of the Chair of New Media and Theory of Communication of the Journalism Department at Lomonosov Moscow State University. More than 15000 articles by 450 authors and more than 100 interviews with famous people are published in the online mass media.

One of the most noticeable projects using CC licenses in Russian media, the "Eternal Values", was launched jointly with Wikimedia RU on 23 June, 2011 to celebrate the 70th anniversary of the foundation the Russian Information Agency "RIA Novosti". Within the framework of the first tranche to the WikiStore, storage of free media files of the Wikimedia Foundation project, one hundred photographs of the Great Patriotic War have been uploaded under CC-BY-SA 3.0.

In 2011, the project «MusOcean» *(www.musocean.ru)* was launched to create a social and information service for musicians: young musicians upload their works to the project website under CC BY 3.0. Electronic music by Russian composers distributed under CC licenses can be also found on the famous website Jamendo. Some musicians involved in the project "Free music" allow access to their works under the conditions of CC licenses. The "Exit Project" *(http://exitproject.pdj.ru)* initiated by Valery Mifodovsky provides musical pieces under CC BY-ND license. CC licenses are used on web sites of some labels — network analogues of offline music publishers *(http://otium.ru, http://sonux.ru; http://mimonot.net, http://fragilite.com)* with the support of the P.I. Tchaikovsky Moscow Conservatory.

The first Russian movie licensed under CC licenses (CC BY-NC-ND 3.0) «You forgot what we were playing» appeared on the Internet on 24 September, 2011 *(http://video.finar.ru)*.

One of the examples of the use of the CC licenses for cultural purposes is the Chuvash national website *(http://ru.chuvash.org)* providing information on the history, culture and literature of the Chuvash people, Chuvash language, etc.

«The Internet Guide» magazine can also be mentioned among online magazines that are distributed under the conditions of CC licenses in Russia.

The books "The Economy of Symbolic Exchange" and "Manifesto of the New Economy" by Alexander Dolgin, professor of the Higher School of Economics, are published online *(http://www.adolgin.ru)* under a CC license. Sergey Yuriev, a well-known writer from Ulyanovsk, allowed online access to his

books for children and young people under CC BY-NC-ND *(http://ulgrad.ru/?p=58203.27)*. Some Russian writers post their works on the Ukrainian Russian-language literary resource Litfest *(http://litfest.ru)* mostly under CC BY-NC-ND 3.0 Unported.

Materials on the websites related to development and use of free software are posted under CC licenses:

- Moscow group Linux of users *(http://wiki.mlug.ru/index.php)* (CC BY-SA).
- The Mozilla Russia team *(http://mozilla-russia.org)* (CC BY-NC-SA 2.5).
- Open corpus of the Russian language "OpenCorpora" *(http://www.opencorpora.org)*.

As to the electronic educational materials available online in the Russian segment of the Internet, CC licenses are used by very few universities and projects. Since 2005, Moscow State Institute of International Relations (MGIMO) has allowed using the materials published on its website *(www.mgimo.ru)* under the CC licenses BY-NC 2.5. A portal of the Department of New Media and Theory of Communication of the Journalism Department at Lomonosov Moscow State University *(www.convergencelab.ru)* publishes materials under the CC BY license 3.0 Unported. All materials of a corporate portal of the National Research University «Higher School of Economics» *(www.hse.ru)* can be reproduced in all media, in the Internet or by any other means in accordance with the CC BY-SA 3.0 Unported License.

CC licenses are used by a number of international Internet projects compiled with Russian contribution or having a Russian version (most of the resources can be adapted for education purposes): Wikipedia, Wikistore, Wiktionary, Wikiquote, Wikisource, Wikispecies, Wikibooks, Wiknews, Wikiversity, OpenStreetMap, Wikitravel, online genealogical tree Rodovod, Google Books, Wikimapia, Flickr, Picasa, photo hosting Panoramio, Open Directory Project, etc.

Several other examples of the use of CC licenses in education are cited below:

- Educational project of the council of initiative groups and citizens of Tyumen "Free University" *(http://golosa.info/node/4797)* delivers popular scientific lectures and organizes public discussions under CC BY-SA.
- Open educational project «Theory&Practice» *(http://theoryandpractice.ru/videos)*, within the framework of which video lectures are available under CC BY-NC-ND License. It unites people who support a new way of knowledge exchange — Edutainment (education+entertainment).

Most educational materials described in this book are not covered by CC licenses. Federal portals usually properly specify the terms of use of available educational resources, whereas the IPR status of resources available at university websites and personal websites of educators is often unclear. Considering the wealth of existing electronic education, given the decision is taken to make them available to potential users in Russia and abroad, further progress on the way of popularizing open licenses, adoption and use of a new CC 4.0 version of CC licenses would better integrate Russia into the global OER community.

This section was prepared using the materials from the websites of Creative Commons and Creative Commons Russia and the analytical report "The Use of Creative Commons Licenses in the Russian Federation" commissioned by UNESCO IITE to the Institute of the Information Society in 2011.

# National Policy in ICT in Education and Open Educational Resources

Since the mid-1990s the Government of the Russian Federation has paid considerable attention to the informatization of education, the development of telecommunication networks and production of informational and educational resources. The first step towards wider use of ICT in education was setting up of the Russian Research and Educational Network RUNNet *(www.runnet.ru)* in the framework of the National Programme **"Universities of Russia"**. Within the Programme a nation-wide network of universities and large research institutes was established. Through regional research and educational networks shaped within federal and regional programmes and initiative projects, thousands of educational, research and cultural institutions were connected to RUNNet. This telecommunication infrastructure became the core of an integral informational and educational environment, which provided educational institutions with an access to Russian and foreign research and educational resources.
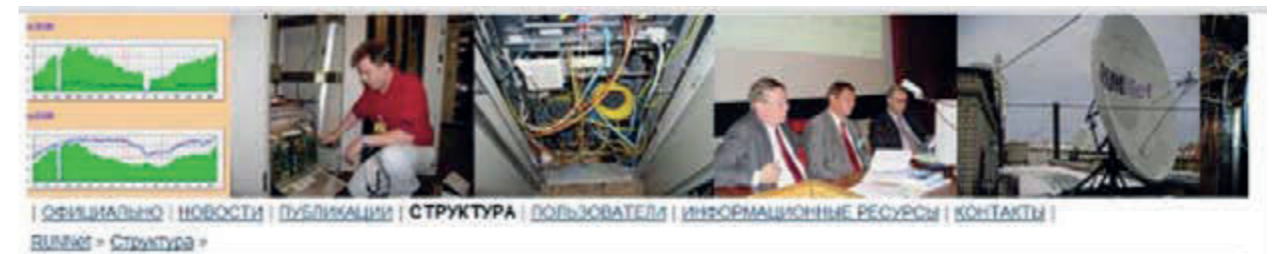


Figure 1. Geographical Coverage of RUNNet

Main lines of informatization of education as specified by the Development Strategy for 2008-2010:

- Production of informational educational content;
- Developing network research-educational infrastructure and improving access to the Internet;
- Enhancing informational systems and tools supporting the educational process;
- Elaboration of information management systems for the administration of educational process;
- Improving hardware and software (computers, system and applied software support);
- Further development of pedagogical, administrative and engineering and technical staff;
- Systematic approach to informatization of educational institutions.

The launch of a system of federal educational portals, including the Federal Portal **"Russian Education"** *(www.edu.ru)* and thematic portals for various disciplines and fields of educational activity, was an important step in the development of educational content of the Russian Internet. In the framework of the Federal Targeted Programme **"Development of the Integrated Educational Information Environment"** (2001-2005), several large-scale educational portals were designed at which for the first time dozens of thousands of educational resources were gathered and systematized for various applications. Due attention was paid to professional education and advanced training of pedagogical, administrative, engineering and technical staff, which is a prerequisite for successful introduction of new educational technologies into the educational process. In the course of implementation of the Programme, 42 regional centres with allocated Internet channels for distance training of teachers were established. By 2010, as much as 400,000 teachers completed training courses aimed at developing the basic competence in ICT and were granted an opportunity to obtain advice in ICT-related issues.

In 2005-2008, the National Training Foundation implemented a project **"Informatization of the Education System"** to create an environment that would support systematic implementation and active use of ICT in secondary and primary vocational schools. All 240 interschool methodological centres established within the Programme are connected to an allocated Internet channel and equipped with servers. The centres formed informational and educational environment for 6,000 schools.

Nowadays, almost all subjects of the Russian Federation host municipal centres for information technologies promoting the development of informational and educational environment of all schools within their territory. The most important result of the project was the **Integrated Internet Collection of Digital Educational Resources** *(www.school-collection.edu.ru)* enabling free access to the resources for all schools of the country.

The major result of the project "Informatization of the Education System" is the elaboration of the common models for the interschool informational environment in seven regions as an integral infrastructure involving all teachers and schools of each region and a single coordinating core of the system — a regional coordination centre. To ensure access to the integrated interschool informational and educational environment for pupils in the regions, arrangements for the systematic integration of the secondary education into a system for network connectivity of all schools and methodological services in each region were completed. Instead of ICT classes, special role in this environment is played by workbenches of teachers of various disciplines that are equipped with extra digital labs for specific subjects.

At the time, the **Priority National Project "Education"** was launched. The goal of the project was to ensure mass connection of schools to the Internet, to shape pedagogical community of creative teachers — winners of the contest of Project and innovative schools, to support gifted children, and to expand the system of competitions and contests for schoolchildren, including Internet contests.

The year of 2007 has become an important milestone in informatization of secondary education — it marked completion of the mass Internet connection that started in 2006 within the Priority National Project "Education". By the end of 2007, over 52,000 schools throughout Russia were connected to the Internet. The introduction of Internet technologies in schools and access of teachers and pupils to Internet resources is one of the most important elements of the national strategy in education.

Between 2006 and 2010, in the framework of the **Federal Targeted Programme of Education Development** *(http://www.fcpro.ru/)*, rural schools were equipped with new computer classes: schools were equipped with computerized working places for administrators and teachers, Internet collections of educational materials for all subjects of the national curriculum were developed, informational systems for school administration and workflow, as well as informational support of schools, were
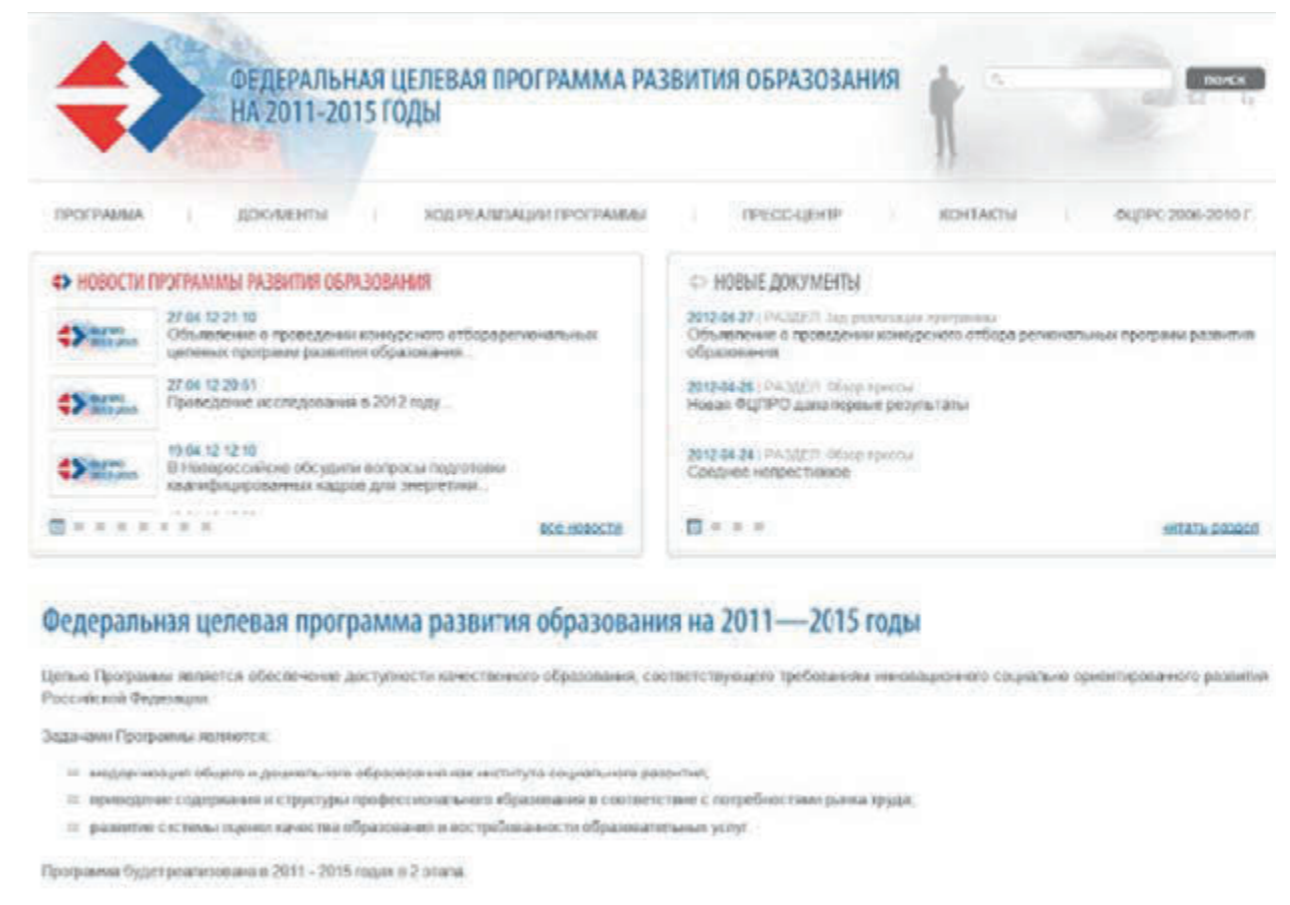


Figure 2. Webpage of the Federal Targeted Programme of Education Development

deployed through a network of regional educational portals. During these years about 20,000 modules of new-generation digital educational resources were developed to support teaching in general education for the following disciplines: physics, chemistry, biology, English, geography, culture and art, history, Russian, literature, natural sciences, mathematics, informatics. The collection contains also educational materials for the curriculum in the most demanded specialties of primary and secondary vocational education. All the digital educational resources are accessible on the website of the Federal Centre of Informational Educational Resources *(http://fcior.edu.ru)*.

To ensure software licenses clearance, a project "Provision of License Clearance for the Standard (Basic) Software Package to Be Used in Secondary Schools of the Russian Federation" was implemented in 2007-2009. In 2007, a purchase of a three-year license for the use of the software included in the standard (basic) package of the software was funded by the federal budget. The package "First Aid" installed at school computers includes 56 software products *(http://shkola.edu.ru)*.

In 2007-2009, with the support of the Federal Centre of Informational Educational Resources, open source software (OSS), as an alternative or a supplement to commercial proprietary software, was installed in educational institutions. In addition, a package of open source software *(http://linux.armd.ru)* was developed, tested and commissioned to schools. Along with the development and delivery of OPS distributives to schools, training for teachers was organized, as well as special activities on the software introduction and use in the teaching process.

# Federal System of Information and Educational Resources

Nowadays, key federal-level educational Internet projects are a part of the **Federal System of Informational and Educational Resources**. The system integrates the results of previous projects on education informatization implemented in 2002-2010 and is designed for the period from 2011 to 2020. It contains educational resources of federal and regional levels, which are accessible through the Single-Entry Window.

Setting up the system of federal educational portals, which included the Federal Portal **"Russian Education"** and thematic portals in various fields of knowledge and directions of educational activity, was an important step in the development of educational content of the Russian Internet. The works carried out in 2002-2004 within the Federal Targeted Programme "Development of the Integrated Educational Information Environment" supported establishment and functioning of a number of educational portals which collected and systematized dozens of thousands of educational resources of various types. Coordination of the works was performed by the Federal Research Institute of Information Technologies and Telecommunications "Informika" *(www.informika.ru)*.

**Federal Educational Portals Set up within the Federal Targeted Programme "Development of the Integrated Educational Information Environment"**

| Portal | URL | Basic Organization |
|---|---|---|
| Federal Portal "Russian Education" | *www.edu.ru* | "Informika" |
| Russian Comprehensive Education Portal | *www.school.edu.ru* | "Prosveshchenie" Publishing House. Institute of New Technologies |
| Informational Support to USE Portal | *www.ege.edu.ru* | People's Friendship University of Russia; then Gosinformobr; later "Informika" |
| Educational Portal "Economics. Sociology. Management" | *www.ecsocman. edu.ru* | State University — Higher School of Economics |
| Social, Humanitarian and Political Science Education Portal | *www.humanities. edu.ru* | People's Friendship University of Russia |
| Law Portal "Legal Russia" | *www.law.edu.ru* | Law Department, St. Petersburg State University |
| Educational Portal for Natural Sciences | *www.en.edu.ru* | St. Petersburg State University of Information technologies, Mechanics and Optics |
| "ICT in Education" Portal | *www.ict.edu.ru* | "Informika" |
| Russian Portal of Open Education | *www.openet.edu.ru* | Russian State Institute of Open Education, later Non-commercial partnership "Open University" |
| International Education Portal | *www.international. edu.ru* | Russian State Pedagogical University named after A.I. Herzen |

Figure 3. Start Page of the "Russian Education" Portal

The educational portals have evolved as an integrated system of educational Internet projects. The Federal Portal "Russian Education" is a backbone component, an "entry point" to the system. It contains not only a list of all the portals and links to them, but also provides information on approaches, standards, and technologies. There are also publications on the development of the system of portals. To unify metadata of resources according to international standards (IMS/LOM), the standard "Metadata of informational and educational resources for Internet catalogues" was developed by "Informika" (2004) and adopted by the community of portal developers. In particular, this standard suggests an integrated approach to classification of resources based on a "four-dimension" subject heading list: by the level of education, target audience, type of resources and subject field.

The Federal Educational Portal **"Russian Education"** (www.edu.ru) launched in late 2002 contains the following main sections:

- the catalogue of educational Internet resources with attribute and context search and classification by the type, subject field, level of education and target audience;

- the archive of state educational standards for various levels of general and vocational education;

- the archive of documents regulating the education system of the Russian Federation;

- data bases of Russian educational institutions;

- a section for university enrollees containing admission regulations for higher education and secondary vocational education institutions, information on universities and colleges, and online tests for Uniform State Exam and Final State Examination;

- "From Postgraduate to Professor" section containing information on the main aspects of the system for preparing academic and research staff in Russia, from admission to postgraduate courses to awarding a degree or an academic title;

- "Events" database: information on conferences, seminars, exhibitions, and other events that might be of interest for research and education community;

- "Competitions" database: information on open Russian and international bids, grants, and contests in the sphere of education;

- legal information on education, science and culture — a subdivision of the legal database "Garant";

- cartographic service: lab of educational maps (shaping of outline maps and thematic cartographic manuals), cartographic reference book "Higher Schools of the Russian Federation", interactive atlas of Russian education;

- forums for discussions on the implementation of the Federal Targeted Programme for the Development of Education and the National Project "Education", urgent problems of general and vocational education, issues related to the development of the educational portal system;

- a newswire with subscription, including the news imported from other portals and sites.

All the information is accessible for both anonymous and registered users of the portal. One should register to use the services that require user authorization: subscribing for news updates, contributing to forums, using personalized main page arranged according to individual preferences of a user, etc.

In addition, the "Russian Education" portal includes the following topical sections:

- the information and analysis system "Russian Education for Foreign Citizens" (http://www.russia.edu.ru) containing information on the available opportunities of studying in Russia. The project provides informational support for the export of Russian educational services and enrollment of foreign students to Russian higher schools. Information is available in several languages.

- a catalogue of manuals, equipment and digital resources for general education (http://ndce.edu.ru), which is the largest resource of the Russian Internet, includes a detailed description of products for general education (more than 25,000 titles). The catalogue contains

information on educational and instructional publications, visual aids, labs and computer equipment, as well as software designed for all participants of the educational process. Educational tools and organization of teaching/learning process are presented in five principal sections of the catalogue: Books, CD/DVD, Audio/VHS, Equipment and Software.



Figure 4. Website "Russian Education for Foreign Citizens"

A project supporting the use of ICT in education — the development of the **System of Computer Literacy and ICT Competences Monitoring and Certification** *(www.icttest.edu.ru)* — is implemented in line with the official Russian Federation documents regulating the education system: state educational standards, qualifying requirements for educators and other regulatory documents. Until now 21 certification centres were opened in 18 regions of Russia. Now there are two versions of test systems — a local and an online one. There are tests for five types of certification. The results of tests are recorded in an encoded protocol on the server, which after testing is sent to the master centre for results processing and check. Teachers who pass the tests successfully are awarded certificates.

To facilitate access to educational resources, a federal portal **Single-Entry Window** *(http://window.edu.ru)* was designed and launched in 2005. The portal integrates resources of all federal portals, as well as portals of higher schools and regional educational portals, through the creation of an integrated catalogue of
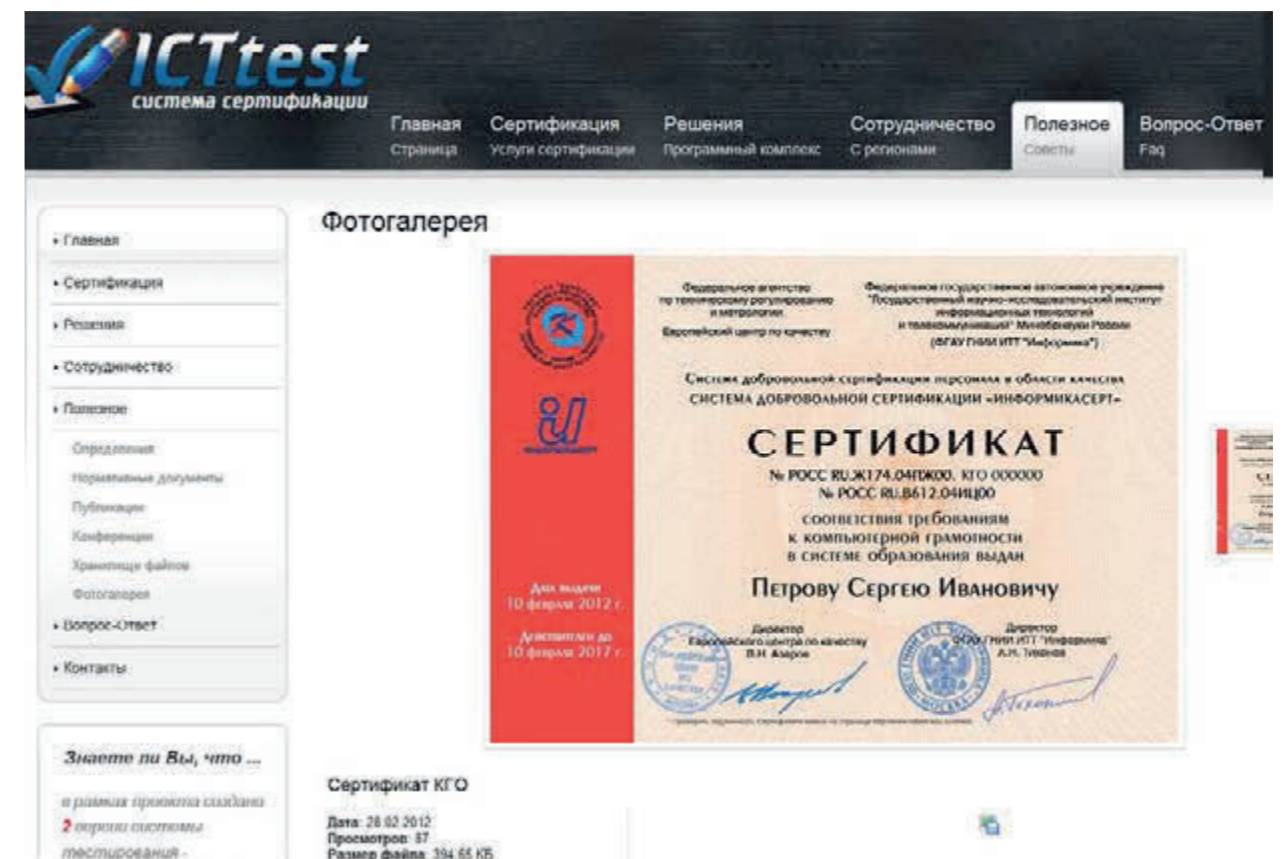


Figure 5. Website of the Monitoring and Certification System "Computer Literacy and ICT Competence"

resources and a digital library of learning and instructional publications. The catalogue and the library are regularly updated by "Informika" by means of monitoring updates on regional educational portals, portals of higher schools and websites of various educational and research institutions and projects. The portal has become a universal window of access to Runet educational resources. It supports the tasks of efficient navigation and search for educational and instructional resources, as well as references for all levels of general and vocational education, organization of exchange of opinions on the content, timely coverage of news and events in the sphere of education.

The portal includes the following components: a catalogue of Internet resources, a digital library, news, feedback subsystem (forum, questions and answers), instructional materials, information on the project, partners and suppliers of resources, statistical data collection, user registration, and search subsystem.

Nowadays, the "Single-Entry Window" portal is one of the most popular and requested projects of the educational Runet: 100,000-150,000 visits and 40,000-60,000 unique visitors per day during the school year. Informational content of the portal is thoroughly indexed by the leading search engines: Google — over 400,000 and Yandex — over 700,000 pages.

The analysis of geographical distribution shows that visitors from Russia make up 75-85%, shares of foreign visitors are as follows: Ukraine — 8-12%, Belarus — 3-5% and Kazakhstan — 3-4%.

Figure 6. Start Page of the Single-Entry Window

The integrated catalogue of resources contains metadata of educational Internet resources: descriptions of materials of the digital library of the Single-Entry Window portal and external resources published at other portals and websites.

The catalogue is indexed according to the following criteria:

- the level of education: pre-school, general, vocational and extended education;

- the target audience: university enrollee, researcher, manager, teacher, and student;

- resource type: educational sites, learning, instructional, reference, illustrative, research materials, regulatory documents, etc.;

- the subject field within general and vocational education.

The section "Educational Websites" contains information and links to the websites of education authorities, higher schools, libraries, research, educational and cultural projects.

The catalogue is enabled by advanced tools which ensure search according to specific sections together with context search in titles and descriptions of resources, in particular: by author name, key words, words in abstracts, URL (for Internet resources), year of publication and ISBN (for published materials). The search engine takes into account the context and morphology of the Russian language. Search queries can be refined by the use of logical operators (AND, OR, NOT) and parentheses.

To facilitate navigation in the catalogue and the library, the most important and useful Internet resources for general and vocational education are highlighted in the portal section "Editors Recommend" (http://window.edu.ru/window/recommended). Recommended resources enable visitors to find high-quality resources on a particular subject and also serve as starting points for further information retrieval and effective use of Internet resources.

The portal provides an option of contextual search using the tools of adjustable Google search service, which is rather efficient due to the fact that the Single-Entry Window resources are thoroughly indexed in Google. In particular, it provides excellent results for search in full texts of publications (PDF-files) in the digital library.

The digital library of the Single-Entry Window portal is the largest Internet repository of open-access full-text learning and methodical materials in the Russian segment. As of May 2012, the digital fund of the library contained over 29,000 materials the sources of which were over 300 Russian higher schools and research and educational institutions.

A significant part of catalogued resources (over 11,000) are educational websites: websites of universities, education authorities, scientific research institutes, primary and secondary vocational schools, institutions of extended education, libraries, publishing houses, museums, non-profit organizations, research and educational Internet projects, electronic periodicals, websites providing information support to exhibitions, conferences, competitions and Olympiads. Another well-represented type of educational Internet resources is the resources published at different websites: digital books, databases, encyclopedias, lecture courses, virtual workshops, etc.

Most of the resources in the digital library of the Single-Entry Window *(http://window.edu.ru/window/library)* have been developed by the departments, teaching labs and research centers of leading educational institutions and are being used in their educational process. One of the main tasks of the Single-Entry Window is to integrate the resources, which are of interest to a broad range of participants of educational process, but are dispersed among hundreds of websites of higher schools, faculties and departments (it is often difficult to find them and so they remain inaccessible for teachers and students from other educational institutions). The Single-Entry Window library contributes to the preservation of the teaching and methodological potential of Russian higher education institutions, facilitates the dissemination of pedagogical experience and promotes circulation of publications among wider audiences.

There are full-text versions of teaching, instructional, research, reference and other informational materials in the library, collected in the system of federal educational portals developed and published

Obtaining a permission of authors or rightholders is a must: all permissions for open dissemination for educational purposes are received before the materials are published in the digital library of the Single-Entry Window. Higher education institutions — owners of large collections of materials provide written consent on publication of digital copies of their materials in the library of the Single-Entry Window. The portal is granted a non-exclusive right to publish digital copies of materials; all other rights are kept by the higher school and authors. Digital copies uploaded to the Single-Entry Window are in full conformity with original materials provided by authors/rightholders; amending digital versions is not allowed. Agreements also stipulate that listed materials would be withdrawn if individual authors or rightholder requests. Authors are awarded certificates confirming publication of their materials in the Single-Entry Window.

by higher schools the country and provided by the editorial boards of educational publications, publishing houses or authors. All full-text materials are physically located at the server of the Single-Entry Window. Previously the portal included only metadata of library resources with references to the full-text files available on the websites of their creators or rightholders. However, a weak point of such approach was the lack of guarantees of stability of Internet addresses, which are references to these PDF, doc, DjVu, zip, rar and other types of files. If the structure of sites changes (restructuring, using other web-technologies, etc.), the initial address might be changed too. It is not a rare case when some pages with collections of resources or even complete sites disappear from the global network, especially if these sites of departments/ research groups/ teachers have been made by students and set in free-hosting servers. If the full-texts are uploaded to the Single-Entry Window library, their availability and integrity are guaranteed by the system operation.

The majority of the library materials are designed for use in higher vocational education. The library contains teaching and instructional manuals, lecture courses, instructional materials for practical trainings and labs, training complexes, curricula, instructional recommendations for course and diploma papers, or monographs published by higher schools and used by postgraduates and senior undergraduates, as well as collections of articles and proceedings of conferences.

In compiling the digital library, a special attention was given to teaching and instructional materials prepared by Russian universities and higher schools, where the materials are peer reviewed before publication. Dozens of leading universities provided their materials at the early stages of the library. Sources of materials were digital libraries and websites of higher schools and personal pages of teachers containing collections of teaching and instructional manuals. Original materials stored in various formats (doc, rtf, PostScript, TeX and others) were converted into PDF, described and classified under certain rubrics on the basis of the metadata model adopted for the Single-Entry Window portal.

Description of full-text digital publications include the following attributes:

- publication title;

- author(s) name(s) — a full list of all authors or compilers;

- subject field/discipline;

- abstract;

- year of publication;

- bibliographic description and ISBN (for printed publications);

- source — university/faculty/department, library, publishing house, portal, etc. with URL;

- resource type;

- audience;

- level of education.



Figure 7. A Sample Card with a Description of a Digital Library Resource

A card contains a field for feedback where users can rank the publication and a form for voting — evaluation of a resource on five-level scale. Reviews and current rating can be seen in the right-hand side of the screen.

Full texts are mainly available as one file in PDF and DjVu format. Some publications are presented in the library as a collection of files of various formats (html, PDF, DjVu, jpg, gif, etc.). In this case, there is always a "starting" file — an html-document usually designed in the form of a table of content of a certain publication that includes references to other files (for example, chapters or sections). There is a link to the "starting" file in resource description card. In some cases, there is an option of downloading all files of a "composite" resource as an archive.

Users of the Single-Entry Window portal enjoy an opportunity of providing feedback. They can discuss resources in the Forum section. One can leave a comment on a resource by filling in the Review field in resource's card and evaluate the resource on the five-grade scale. All users' messages pass through prior moderation. In the Questions-Answers section, visitors can ask questions related to both the
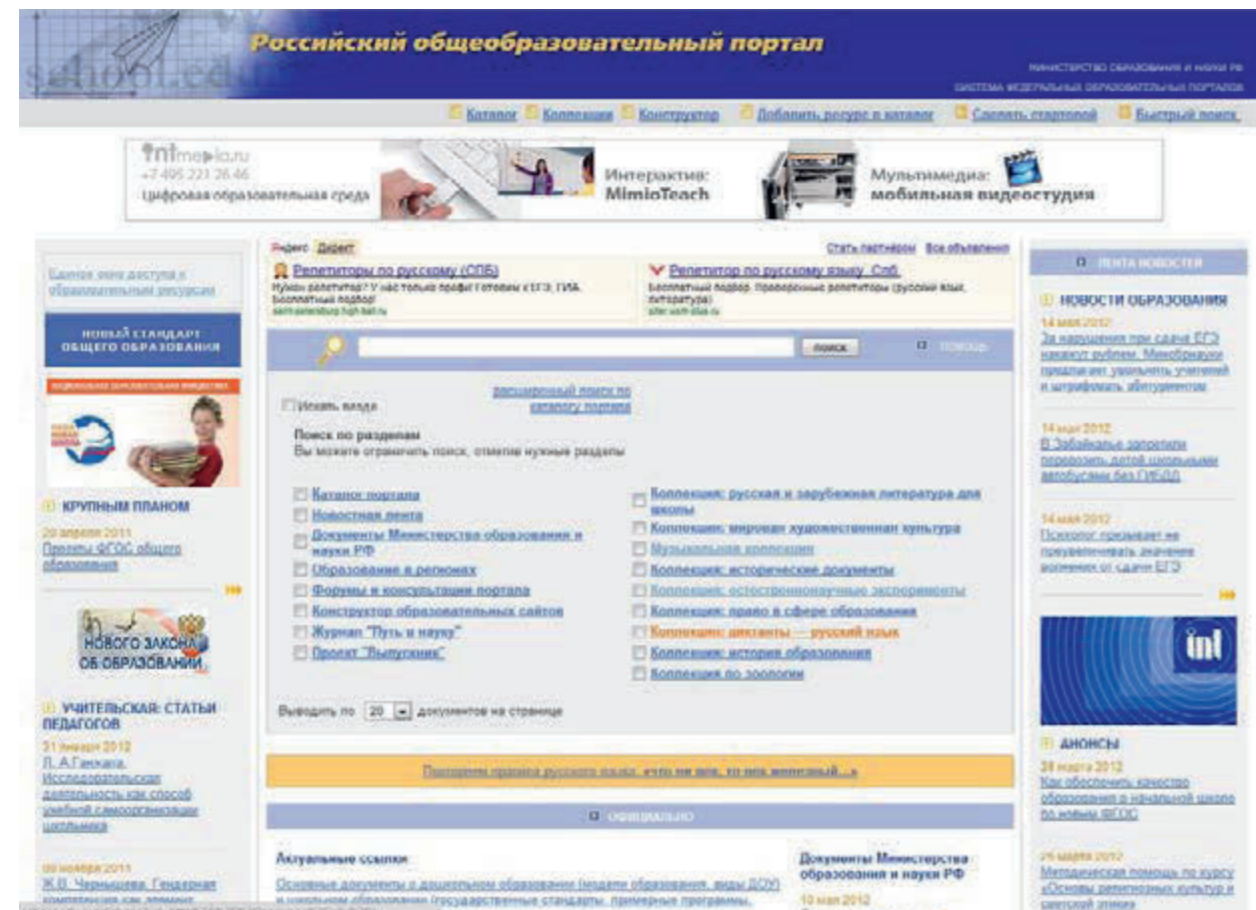


Figure 8. Start Page of the Russian General Education Portal

technology of the work with the system and its informational content, and receive answers from the portal helpdesk.

An important element of the feedback option, which supports supplementing new materials to the portal, is an opportunity provided to users to submit materials, which, in their opinion, might be of interest to educators, for uploading to the digital library, or to offer links to Internet resources to be added to the catalogue. The materials are checked by an editor, and, if a positive decision is taken, they are processed and uploaded with appropriate metadata to the portal.

Another large-scale initiative — the "Russian General Education Portal" *(www.school.edu.ru)* — has also been a success both in terms of provided services and informational content since its launch in 2002.

Main sections of the Portal:

- The Catalogue of Internet resources: more than 10,000 annotated descriptions of online educational resources for preschool and general (primary and secondary) education, extended education for children, advanced training for teachers.

- News: news of the educational community in Russia and worldwide, briefs and announcements of events and activities, mass media publications, news archive.

- Official documents of the Ministry of Education and Science of the Russian Federation related to general education.

- Education in regions: information on educational authorities and institutions, geography, culture and history of a region, links to educational Internet resources of a region (compiled with the support of portal users).

- Forums and consultations: interactive services supporting communication of all participants of the educational process. Forums are virtual discussion clubs; they are also used to publish announcements on forthcoming events and to hold online consultations.

- Thematic collections: full texts of fiction books and historical documents, texts and illustrative materials on history, painting, architecture, tracks of the Russian and world musical heritage as well as materials for practical use in teachers work: dictations, experiments in physics and chemistry, a collection of comments on educational laws. Thematic collections support full-text search with account of the Russian morphology.

Several projects are available at the Portal:

- Constructor of websites for general education institutions and projects (http://edu.of.ru) designed to encourage communication within the educational community and provide users with tools for quick design and embedding of websites in Constructor environment, promote designed pages and discuss website design related issues.

- Online popular-science magazine "Way to Science" (http://yos.ru) — a project with a focus on natural science for senior schoolchildren, students and teachers of related subjects.

- School Graduate (http://vypusknik.edu.ru) — a website for school leavers containing news, normative documents, links to Internet resources for those who wish to continue education or to find a job.

## Resources of thematic collections

| Section | Description |
|---------|-------------|
| Natural sciences experiments *(http://experiment.edu.ru)* | Over 90 experiments in physics and chemistry with descriptions and video demonstrations |
| Historical documents *(http://historydoc.edu.ru)* | More than 1,300 resources: texts of documents, images, articles, biographies, audio and video documents |
| Russian and world literature for chools *(http://litera.edu.ru)* | More than 1,700 text resources recommended to study at school both in classroom and as extracurricular activities: biographical data and fiction of Russian and foreign authors with literary criticism comments |
| World art *(http://artclassic.edu.ru)* | About 6,000 resources (images, articles, biographies) on Russian and foreign architecture and art, from antiquity to nowadays |
| Musical collection *(http://music.edu.ru)* | Over 500 resources: audio files with fragments of Russian and foreign musical pieces, biographies of composers, articles, reference materials, thesaurus of musical terms |
| Law and Education *(http://zakon.edu.ru)* | About 200 resources: regulatory legislative acts, comments and explanations to them, answers frequently asked questions, advices and consultations for participants of educational legal relations |
| History of education *(http://museum.edu.ru)* | Over 300 resources: biographies, documents, images and articles. Work with materials is facilitated by subject heading lists for education kinds and systems, historical periods, topics and name indexes |
| Dictations — Russian language *(http://language.edu.ru)* | Resources for independent use to improve spelling skills include an audio file and its description as well as grammar rules. User can listen to the file nonstop or sentence by sentence. A module for comparison of texts shows results highlighting user errors and providing explanations of rules |

In 2006, the portal **Integrated Collection of Digital Educational Resources** *(*further — "Integrated Collection", *school-collection.edu.ru)* was launched to integrate materials created within the project on Informatization of the System of Education implemented by the National Training Foundation. The Collection was intended to accumulate provide access to a wide range of modern educational tools designed for studying and teaching various subjects.

The repository provides free and open access (in technical and legal sense) to educational materials of the Integrated Collection. All resources are designed only for non-commercial use in the Russian Federation educational system. Nowadays, the Integrated Collection functioning on the basis of the
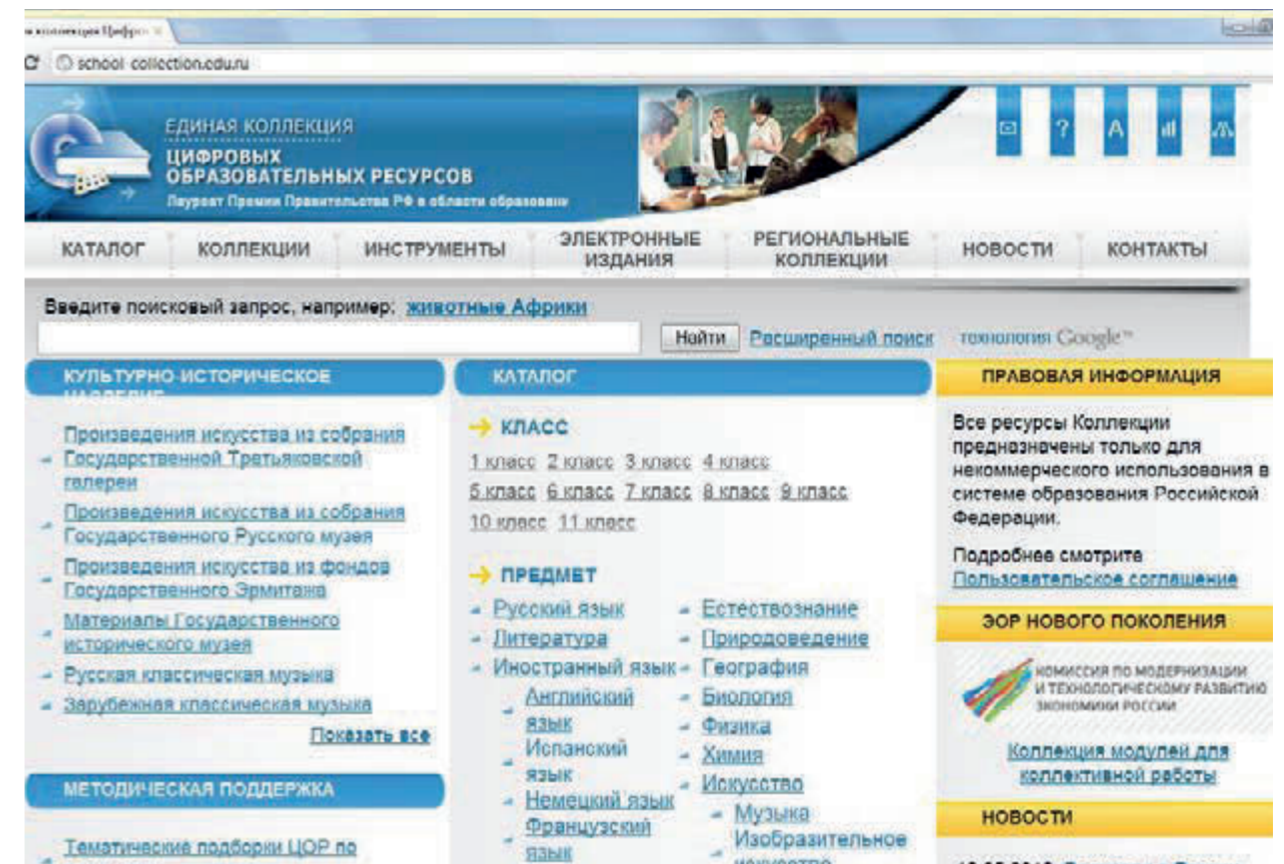


Figure 9. Start Page of the Integrated Collection

"Informika" data centre includes more than 110,000 digital educational resources almost in all school disciplines.

The digital electronic resources in the Integrated Collection are indexed on the basis of the standard developed by "Informika", which supports integration with other components of the Federal System of Informational Educational Resources. The formal description of digital electronic resources (metadata), sufficient for search, selection and identification of main characteristics digital electronic resources, as well as their purpose and use, is completed on the basis of SCORM 1.4, including the IEEE specification P 1484.12 (specification of metadata of educational objects LOM, *http://www.imsglobal.org/metadata/*) and added dictionaries and classifiers corresponding to the Russian educational system. As a technological tool for describing a metadata model, XML is being used.

All digital educational resources of the "Integrated Collection" are supported with licenses on the right of their usage in the educational process. To protect authors and related rights, the access to some resources is available on the territory of the Russian Federation only.

The Catalogue of digital electronic resources sets the frames for indexing and navigation in the Integrated Collection. The Collection follows the subject-thematic principle and consists of the following main sections:

- Collections: subject collections, thematic collections and the collection "Cultural and Historical Heritage". The resources of the latter (pieces of Russian and foreign classical music, collections of digital copies of Russian art masterpieces from the State Tretyakov Gallery, the State Russian Museum, and the State Hermitage) are of special interest to users.

Regional collections of digital electronic resources of the Integrated Collection are created in the following regions and cities of the Russian Federation:

- Republic of Karelia (http://sc.karelia.ru);
- Republic of Mari-El (http://schoolcollection.marsu.ru);
- Republic of Chuvashia (http://edu-tsor.edu.cap.ru);
- Krasnoyarsk Krai (http://collection.cross-edu.ru);
- Khabarovsk Krai (http://cor.edu.27.ru);
- Ivanovo Region (http://school-collection.iv-edu.ru);
- Novosibirsk Region (http://school-collection.edu54.ru);
- Tver Region (http://sc.tverobr.ru);
- Cheliabinsk Region (http://imc.rkc-74.ru);
- Yaroslavl' Region (http://collection.edu.yar.ru);
- Novosibirsk (http://sc.nios.ru);
- Reutov, Moscow Region (http://licey-reutov.ru).
- Cheliabinsk Region (http://imc.rkc-74.ru);
- Ivanovo Region (http://school-collection.iv-edu.ru);
- Khabarovsk Krai (http://cor.edu.27.ru);
- Krasnoyarsk Krai (http://collection.cross-edu.ru);
- Novosibirsk (http://sc.nios.ru);
- Novosibirsk Region (http://school-collection.edu54.ru);
- Republic of Chuvashia (http://edu-tsor.edu.cap.ru);
- Republic of Karelia (http://sc.karelia.ru);
- Republic of Mari-El (http://schoolcollection.marsu.ru);
- Reutov, Moscow Region (http://licey-reutov.ru);
- Tver Region (http://sc.tverobr.ru);
- Yaroslavl' Region (http://collection.edu.yar.ru).

- Tools: instruments of educational activity and organization of the educational process (educational mapping systems, time axes, classifiers, thematic virtual labs, simulators, etc.).

- Digital Publications: materials of the *Krugosvet* Encyclopedia (articles, collections of reference materials) and articles from the magazines *Quantum, Science and Life, Chemistry and Life,* and *School Library*.

- Resources for Teachers: various types of teaching materials as well as methodological recommendations on the use of collection resources developed by teachers and made available through the Integrated Collection for free and open use by all participants of the educational process.

An important line of development of the Integrated Collection is setting up and support to functioning of regional collections:

- sets of digital electronic resources as supplements to manuals to support regional component of the curriculum;

- regional thematic collections;

- resources developed by teachers and resource specialists in a region.

**The Federal Centre for Informational and Educational Resources** (FCIER — *http://fcior.edu.ru*) is one of the flagship projects of the Federal Targeted Programme for the Development of Education (2006-2010) aimed at creation of the informational and educational environment and infrastructure in the Russian Federation.
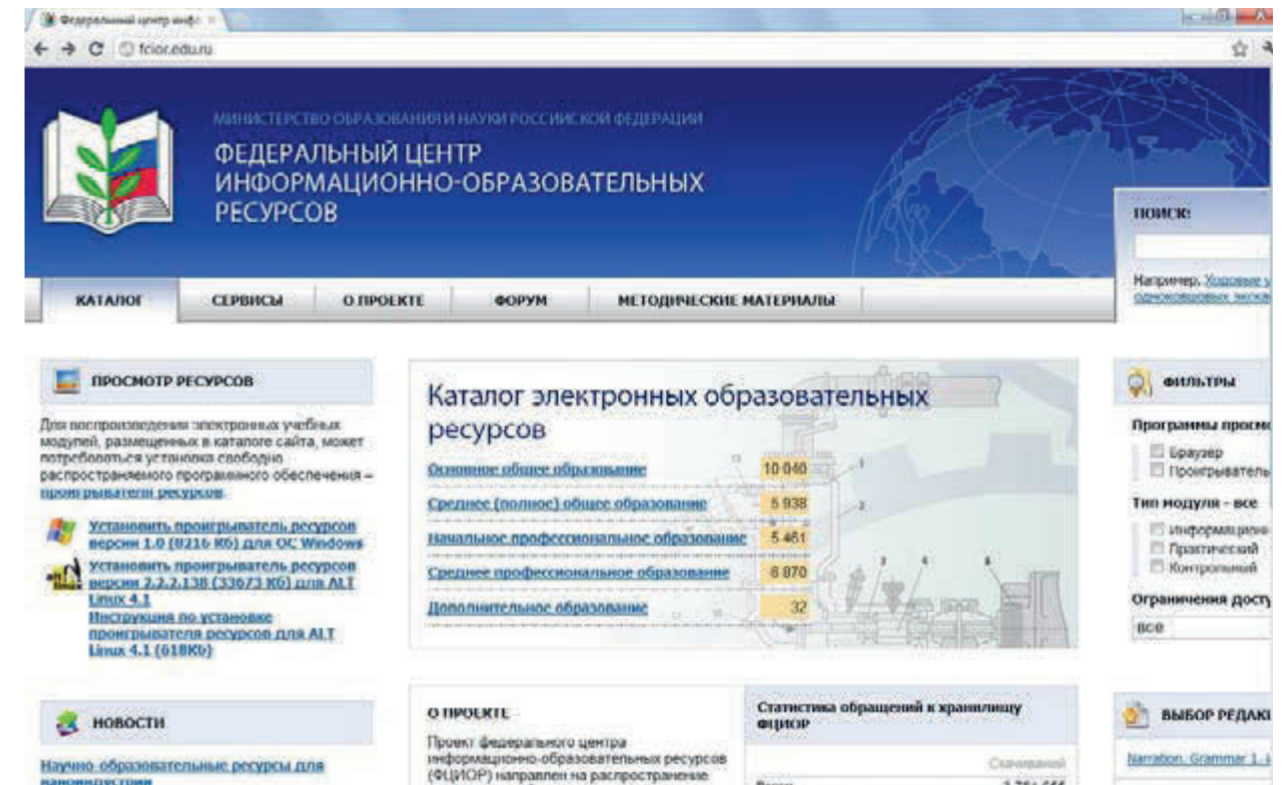


Figure 10. Start Page of the Portal of the Federal Centre for Informational and Educational Resources

The Centre portal catalogs digital educational resources by means of a uniform metadata model based on the LOM standard and provides open access to these resources. The Centre is expected to become a repository of diverse educational resources: computer teaching systems, computer manuals, virtual collective environments, educational video films, podcasts, audio tracks, etc.

The technological basis of FCIER is a modern software and hardware system providing safe storage of educational resources, no-failure reliable functioning of services and applications. The FCIER hardware system is built on IBM solutions and technologies; computing power of the Centre is supported by high-performance IBM servers. The efficient storage of various types of digital educational resources is supported by Open Source projects. The FCIER hardware architecture is completed on JavaServlets and Java Server Pages technologies and implementation of the projects of Apache Software Foundation (Tomcat, Lucene, Commons). As database management system for applied systems, MySQL is used. Applications are developed on Java 2 (Enterprise Edition) platform.

FCIER objectives:

- Collection and efficient storage of various types of digital electronic resources in the central data repository;

- Systematization and publication of digital electronic resources on FCIER portal;

- Multi-functional search and unified access to digital electronic resources stored in the central data repository of FCIER;

- Support to the use of new-generation digital electronic resources in the educational process (provision of tools, instructional materials, and consultations);

- Encouraging joint work on development and exploitation of digital electronic resources;

- Provision of access to services: Internet sites of schools, E-mail, Learning Trajectories;

- Support and provision of access to the uniform environment of distance education;

- Integration and exploitation of informationl and management systems to be transposed to the FCIER platform;

- Development of a network of FCIER regional offices.

A distinctive feature of the FCIER informational content is the fact that it contains resources that are especially developed purposely to be published in this FCIER and comply with a uniform concept and technological requirements. Another characteristic feature of these resources is their interactivity and other properties which distinguish them from the traditional text resources. Currently main content of FCIER repository is collections of digital educational modules developed in conformity with the concept of open educational modular multimedia systems.

The size of the installation file of EMS program components is about 8 megabytes; requirements to user PC hardware and software are equivalent to those required to support for working with office applications. The sizes of uploaded modules depends on their content and range from several to 10 megabits.

In 2009, in the course of works on information feed to FCIER, resources for primary and secondary vocational education database management system were developed and uploaded. Before that open educational resources for these levels of education (except for such general education disciplines as Mathematics, Physics, Electrical Engineering, Chemistry, Informatics, etc.) were almost non-existing in the Russian segment of the Internet. Nowadays, the catalogue of FCIER resources includes digital educational modules for such secondary vocational education disciplines as Nursing, Welding Engineering, Automation of Technological Processes and Production (for different industries), Maintenance of Computers and Computer Networks, Catering Technologies, etc.

Establishment of representative offices of FCIER in the regions will allow facilitating access of schools to the FCIER repository by means of localization of the regional traffic and shaping a federal interregional association of professional network communities of teachers and developers of digital electronic modules. These offices should also support collective development and testing of instructional materials on using digital electronic modules in the educational process.



Figure 11. FCIER Modules

To facilitate downloading of FCIER resources, regional representative offices  — "FCIER mirrors" — were established
in Krasnodar (http://krasnodar.fcior.edu.ru),
and Stavropol (http://stavrop.fcior.edu.ru),
in Saratov (http://srtv.fcior.edu.ru)
and Tomsk (http://tomsk.fcior.edu.ru).

The total traffic of four main portals on academic days in April  2012 was 150,000 visitors a day, while the number of pages viewed was from 300,000 to 500,000 per day. Links to federal educational portals are available at thousands of educational websites of Runet. Creation of the Federal System of Informational and Educational Resources was highly appraised by the federal government by awarding the Russian Federation Government Prize in education in 2008.

The FCIER platform is used not only to host the digital educational models repository, but also for setting the services recommended for educational institutions, including:

- school websites — a service enabling design and maintenance of websites of educational institution with the help of a website constructor;

- e-mail — service providing an educational institutions using the "school websites" service with an access to e-mail boxes;

- user support — a service oriented to solving problems encountered by users while using FCIER resources and services.

It is supposed that FCIER will develop as a repository of various educational resources — computer educational systems, computer manuals, virtual collective environments, educational video films, podcasts, audio tracks, etc.

One of the recent undertakings in this field is the project "Development of new-generation electronic educational Internet resources, including cultural and cognitive services, systems of distance general and professional education (e-learning), and for inclusive education" *(http://www.eor-np.ru)* that is implemented by the National Training Foundation under the request of the Commission at the President of the Russian Federation for Modernization and Technological Development of the Russian Economy.

# Knowledge Portals and Websites of Higher Schools and Universities

The development of the Internet infrastructure in Russia began in the 1990s with the creation of research and educational IP-networks in the leading universities and research institutes. In parallel to creation of the network infrastructure, websites of the Russian Internet segment have been filled with information content and the websites launched in higher education institutions played an important role in this process, especially at the initial stage. Official websites of higher education institutions, websites of their branches and departments, research groups and sites of thematic projects were emerging. Amongst the informational resources presented in these websites, special focus was made on scientific and educational resources — Internet versions of educational manuals and compendium of lecture courses in hyper-text format, digital versions of printed publications (in various formats — MS Word, PDF, PostScript, TeX, etc.), conference proceedings, Internet versions of scientific journals, online texts, etc. With the development of the content of the higher education segment of the Runet in the late 1990s — early 2000s, one could familiarize with its dynamics and the projects of leading universities in details due to the materials of the all-Russian research and methodological conferences **TELEMATICA** *(http://tm.ifmo.ru)* and conferences of representatives of research and educational networks **RELARN** *(http://www.relarn.ru/conf/)* web pages of which provide abstracts of reports for many years.

At present, almost all higher education institutions of Russia, both state institutions of higher professional education of various departmental systems and non-state higher education institutions, have official websites. The content density of the websites and the software and hardware approaches used for services provided to the visitors vary significantly. The simplest version is the website as an expanded informational leaflet, including general information on this very institution, its structure and

> Addresses of the websites of Russian higher education institutions can be easily found easily on the Internet in various indexes, the most complete of which are the "Enrollee" section on the federal portal "Russian Education" (http://www.edu.ru/abitur/) and the site "All Higher Education Institutions of Russia: Reference Book of Accredited Higher Education Institutions" (http://abitur.nica.ru). These databases enable search by institution name, city name, a type of higher education institution (university, academy, institute), organizational and legal form (state, non-state), by the field of study and diploma awarded.

> All-Russian and regional conferences on ICT in education (proceedings available):
>
> • Information Technologies in Education — Congress of Conferences on Information Technologies in Education within which four to six conferences are held every year in different regions of Russia (http://ito.edu.ru);
>
> • Telematica All-Russia Research and Methodological Conferences, St. Petersburg (http://tm.ifmo.ru);
>
> • RELARN conferences of Representatives of Research and Educational Networks (http://www.relarn.ru/conf/);
>
> • International Conference on the Use of New Technologies in Education, Troitsk (http://www.bytic.ru);
>
> • International Research Conference on Information Technologies in Education and Science (http://conference.informika.ru);
>
> • All-Russian Scientific and Practical Conference on Informatization of Education "XXI Century School" (http://conference.school.informika.ru);
>
> • Moscow International Exhibition and Conference on Electronic Education (http://www.elearnexpo.ru).

The catalogue of the portal "Single-Entry Window", whose index contains such categories as "Higher Education Institution Website" and "Website of Department of Higher Education Institution", contains information on the websites of more than 1,300 higher education institutions and about 2,500 websites of their departments. Descriptions of the websites specify which educational resources are available on the website. The thematic heading list provides filtered data about the websites of faculties and departments in a certain subject field. Though the catalogue does not provide descriptions for all existing websites of departments and subdivisions of higher education institutions, the websites of faculties and departments of dozens of large classical, technical and pedagogical universities are presented in full measure, as their content is regularly monitored by the editorial board of the "Single-Entry Window" portal.

leadership, a list of faculties and departments with their short description, training courses and specialties, main achievements and information for entrants about admission. In addition to this set of data that often remains static, there is a news wire in which reports on current events, advertisements on forthcoming events and other actual news are published. Such a situation is typical of many private higher education institutions, as well as for small state higher education institutions in the humanities, which have no special IT-departments and resources for the design and maintenance of a more complicated website.

At present, the official websites of many leading classic and technical universities are web portals that have well developed informational content, contain general information about the institution, its structure, training courses and research work, and offer a number of other informational services, including access to informational and educational resources.

In addition to the main website/web portal of a higher education institution, there are often websites of its structural parts: faculties, departments, research labs, educational centres, libraries, etc.

For instance, in the two largest universities, Lomonosov Moscow State University *(www.msu.ru)* and St. Petersburg State University *(www.spbu.ru),* all departments and institutes have separate websites that differ in their structure, design and content. In addition, these two universities host numerous websites of their departments, research and educational centres, research labs and specific research groups, thematic websites on specific research fields and websites of public organisations. The role and content of the websites of the departments of the universities are similar to the websites of other higher education institutions. They provide the following information: general information; lists of important events and activities; news and a list of links to the websites of subdivisions.

Examples of well developed informational portals of universities containing rich informational content and various services, are listed below (in alphabetical order):

- Chernyshevsky Saratov State University (*www.sgu.ru*);

- Kazan Federal University *(www.ksu.ru)*;

- Lobachevsky State University of Nizhny Novgorod (*www.unn.ru*);
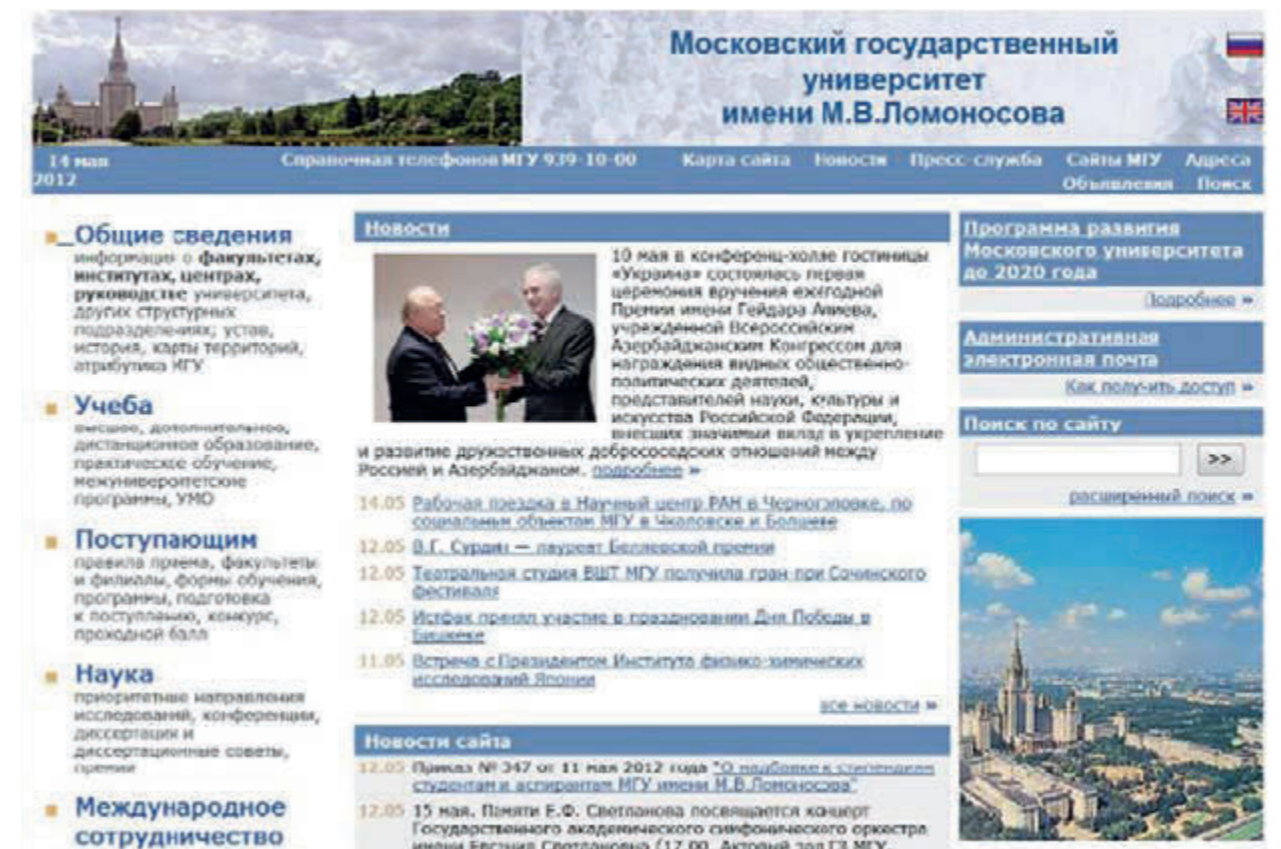
- Moscow Energy Institute (Technical University) (*www.mpei.ru*);



Figure 12. Start Page of the Portal of Moscow State University

- Moscow Physical Technical Institute (State University) (*www.mipt.ru*);

- Novosibirsk State University (*www.nsu.ru*);

- Petrozavodsk State University (*www.petrsu.ru*);

- Southern Federal University (*www.sfedu.ru*);

- St. Petersburg State University of Information technologies, Mechanics and Optics (*www.ifmo.ru*);

- State University — Higher School of Economics *(www.hse.ru);*

- Tambov State Technical University (*http://www.tstu.ru*);

- The-First-President-of-Russia Eltsin Federal University of Urals (*www.ustu.ru*);

- Tomsk Polytechnical University (*www.tpu.ru*);

- Tomsk State University (*www.tsu.ru*);

- Yaroslav-the-Wise State University of Novgorod (*www.novsu.ru*).

# Digital Libraries and Collections of Higher Education Institutions

The largest libraries of higher education institutions have digital catalogues accessible online. Digital libraries of general inter-school scale, with materials on various disciplines developed at faculties and departments of higher education institutions, can be divided into two groups according to the form of material presentation and information access technique. The first group includes collections organized as databases with digital catalogues and descriptions of materials that are equipped with tools enabling navigation, search and filtering resources by author name, year of publication, words in a title and/or description, subject field, etc.). The second group includes the collections presented in a website of an institution in the form of static webpages that contain lists of materials with references to full-text files.

> Educational and methodological materials on websites of university departments:
> - Historical Department, Kazan State University http://www.ksu.ru/f4/index.php?id=8;
> - History Department, Lomonosov Moscow State University http://www.hist.msu.ru/ER/;
> - History Department, Tomsk State University http://www.if.tsu.ru/textbook.htm;
> - Astronomy Chair, Mathematics and Mechanics Department, St. Petersburg State University http://www.astro.spbu.ru/astro/win/resources/;
> - Department of Natural Sciences, Novosibirsk State University http://fen.nsu.ru/fen.phtml?topic=meth;
> - Department of Informatics, Tomsk State University http://www.inf.tsu.ru/WebDesign/finf2.nsf/structurl/library;
> - Department of Molecular and Biological Physics, Moscow Physical-Technical Institute http://bio.fizteh.ru/student/files/;
> - Department of Sociology, St. Petersburg State University http://www.soc.pu.ru/materials/;
> - Physics Department, Irkutsk State University http://www.physdep.isu.ru/method/;
> - Physics Department, St. Petersburg State University http://www.phys.spbu.ru/library/;
> - Chemistry Department, Altay State University http://www.chem.asu.ru/posob.html;
> - Chemistry Department, Samara State University http://chemfac.ssu.samara.ru/metod_lit.htm.

### Digital Libraries Organized as Databases with Navigation and Search Tools

| Higher Education Institution URL | Description |
|---|---|
| Tambov State Technical University *(http://www.tstu.ru/r.php?r=education.elib)* | More than 1,800 digital versions of educational and instructional materials developed by teachers and published by the Publishing Centre of the University — in PDF format. Materials are organized in thematic heading list (13 thematic sections) and type of publications (manual, instructional notes, lecture courses, monographs, exercises and tasks books, etc.). Search can be run by thematic section, publication type and year, author name, words in a title. |

| Higher Education Institution URL | Description |
|---|---|
| Irkutsk State University Transactions *(http://ellib.library.isu.ru)* | Full-text digital library created in the Research Library for informational support of the educational process and the system of distance education contains more than 500 manuals, educational and instructional publications and books. Search can be run in 16 thematic sections by the type of publication (manuals, educational and instructional texts, books and articles); department name; year of publication; context search in the fields "author", "title", "bibliographical description" |
| Ulyanovsk State Technical University *(http://venec.ulstu.ru/lib/)* | Full-text digital library created by the University Publishing House "Venets" contains more than 400 educational and instructional publications. Search can be run in the title, by author and department name and type of publication (manual, educational and instructional text, instructional notes, book, collection of lab works, and collection of research articles). Full-text digital versions are presented in PDF or DjVu formats. There is an alphabetical name index of authors with possibility to get a list of writings for the selected author. The number of visits to each resource is recorded |
| Volgograd State University *(http://sor.volsu.ru/library/)* | The digital library is an integral part of the informational server "South of Russia". The database contains more than 1,400 entries. However, for many publications only descriptions are available without access to full-texts. Full-text of publications are available in doc and PDF files |
| State Academy of Investment Bankers *(http://www.elib.gasis.ru)* | The library contains a bulk of materials organized in thematic sections. The search can be run by author name, title, year of publication, and keywords in summary. Full-text digital versions are available. There are full-text digital versions of publications presented for those published not only by the Academy but also by other higher education institutions and publishing houses (copyright clearance remains in question) |
| Elabuga State Pedagogical University *(http://www.egpu.ru/lib/elib/)* | It contains about 500 units of materials including 100 manuals. It is possible to select resources by type of publications and context in description of a resource |
| Ivanovo State Chemical Engineering University *(http://www.isuct.ru/testlib/)* | The collection contains about 300 educational and instructional materials of the University with a possibility to filter materials by faculty/department, type of material (manual, instructional notes, book, etc.), year of publication, and author. There is an option of keyword search |
| Moscow State Engineering University of Civil Aviation *(http://elibrary.mstuca.ru)* | The catalogue of the library provides information on more than 2,000 publications. They are manuals and instructional notes as well as curricula of various disciplines, texts of lectures, questions for exams and pretests, plans of seminars, tests, etc. There are options for search by specialty/training course, discipline, type of publication, author, and keywords |

| Higher Education Institution URL | Description |
|---|---|
| Lobachevsky State University of Nizhny Novgorod *(http://www.unn.ru/ e-library/aids.html; http://www.unn.ru/rus/ books/zhurnal.htm)* | The collection of educational and instructional materials developed within the innovative educational project (2006-2008) contains more than 100 manuals. Search can be run by section, author name and words in the title. The repository of digital publications of instructor's manuals contains digital versions of publications in doc, PDF and TeX formats. The number of resources is about 150 |
| Orenburg State University *(http:// artlib.osu.ru/site/ index.php?option=com_ trudi&Itemid=167)* | Section "Writings of the University Staff Members" on the website of the Research Library contains research, educational and methodological publications. One can run search for descriptions of all materials in the digital catalogue. However, not all full-text materials can be accessed by unauthorized users |
| Digital Library of the Republic of Karelia *(http://elibrary.karelia. ru)* | The collection developed in the State University of Petrozavodsk contains various materials, including educational and methodological publications; more than 100 items |
| Tula State University *(http://g.tsu.tula. ru:9080/IORManager/)* | Information and educational resources in the humanities (manuals, instructional instructions, programmes of courses, educational materials disciplines) developed by the University professors — more than 500 issues |
| State University of South Urals *(http:// lib.susu.ac.ru/Resursy/ Elektronnaja_biblioteka)* | The research library has a digital catalogue and full-text versions of abstracts and texts of dissertations, articles of university lecturers, collections of research works, educational and methodological publications. For publications printed in the 1980-90s and before, scanned versions are available. The digital catalogue section on educational and methodological publications contains more than 800 entries; most of them are available in full-text PDF format |
| Research Library of the Adygei State University *(http://agulib.adygnet. ru/resource.htm)* | The library consists of about 100 digital educational-methodological and scientific publications by members of the university staff. The materials are grouped into two sections: "Natural Sciences" and "Social Sciences and the Humanities" with further subdivisions |
| Gorny Altai State University *(http://e-lib.gasu.ru)* | Digital Library of the University contains the section "Books and Manuals" with a list of publications and references to the electronic files in PDF format or html-publications (more than 180 items). There are also conference proceedings, research reports and digital versions of periodicals published by the university |
| Bunin State University of Eletsk *(http://www.elsu. ru/edu/ump.html)* | The Curriculum Planning section includes the Educational and Instructional Manuals subdivision where one can find a list of materials by: authors, titles, abstracts (not for all materials), and a reference to zip-file or PDF-file with a digital version of the publication. There are more than 70 publications |

| Higher Education Institution URL | Description |
|---|---|
| Kamchatka State Technical University *(http://www. kamchatgtu.ru/student/ elizd/default.aspx)* | Digital versions of publications are presented as an archive of files (in PDF format) grouped by author names. There are more than 200 files |
| Moscow State University of Environmental Engineering *(http://www.msuee.ru/ html2/metodichki.html)* | The library includes are dozens of manuals and instructional notes developed in the university. Some of the publications can be downloaded as doc or PDF files or viewed as html-publications |
| Nevelsky Naval State University *(http://www.msun.ru/ edu/lit/)* | The Manuals and Educational and Instructional Materials section contains the list webpages of the university departments, each with listed manuals by: authors, titles, date of publications on the website, and a reference to PDF file. There are about 200 items |
| Samara State University *(http://media.ssu. samara.ru)* | The Media Centre website presents digital versions of manuals in PDF format, as well as their descriptions and demo versions of multimedia educational materials. Webpages containing lists of manuals are classified according to subjects. The search is powered by Yandex search engine. The number of resources exceeds 160 |
| St. Petersburg State Architectural and Construction University *(http://www.spbgasu. ru/main/index/ rus/?tid=633200353)* | The section "Integrated Digital Resource of Educational and Methodological Literature" contains the university publications: educational and instructional manuals, books and conference proceedings with links to PDF full-text files. The number of resources is about 100 |
| St. Petersburg State Technological University of Plant Polymers *(http://nizrp.narod.ru)* | The Digital Library at the website of Research Informational Centre contains a collection of digital versions of educational and instructor's manuals and instructional guidelines grouped by departments. The total number of resources is about 50 |
| St. Petersburg State University of Information Technologies, Mechanics and Optics *(http://books.ifmo.ru)* | The webpage "Publications" contains digital versions of publications prepared at the university since 1999. Publications are classified by years as lists (authors, titles) with references to PDF full-texts. The number of resources is about 500 |
| Southern Federal University *(http://open-edu.sfedu.ru)* | The "Educational and Instructional Materials" website is aimed at supporting the regional distance education system. The Publications section contains educational and instructional materials thematically grouped in 20 categories. There is an alphabetic index of authors. The webpage presents guidelnes for submission of materials and relations with authors of the resources. The total number of resources is above 1,100 |
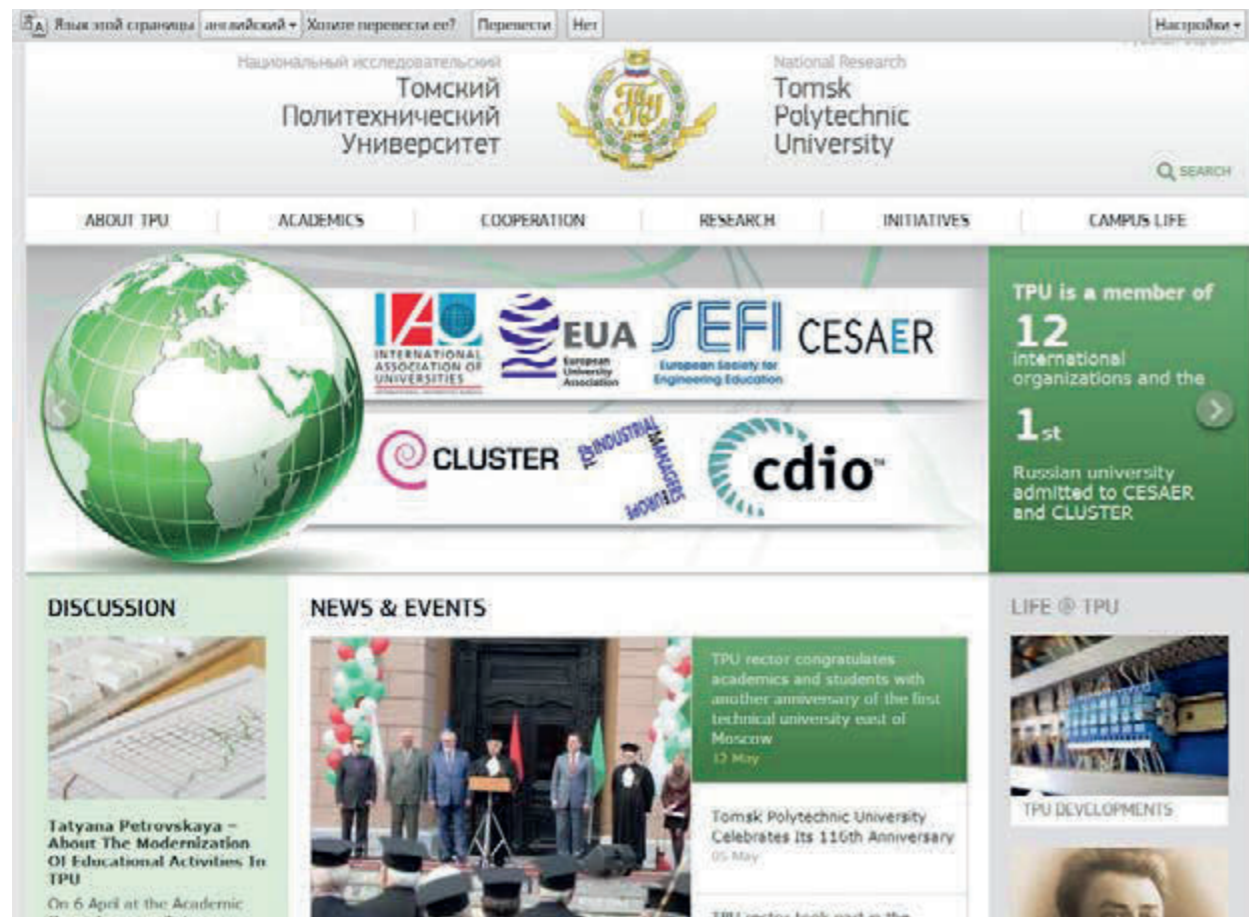
Figure 13. Start Page of the Portal of Tomsk Polytechnic University

### Digital Libraries with Open to Public Catalogues and Limited Access to Full–Texts

| Vladivostok University of Economy and Services | *www.abc.vvsu.ru* |
|---|---|
| North-Western State Technical University of Distant Education | *www.elib.nwpi.ru* |
| Tomsk State University of Control Systems and Radio Electronics | *www.portal.tusur.ru* |
| St. Petersburg State University of Aerospace Instrument-Making | *www.lib.aanet.ru* |
| Lomonosov Pomorsky State University | *www.lib.pomorsu.ru* |
| Ural State Technical University | *http://study.ustu.ru* |

Educational and methodological materials on the websites of university departments:

- Aviation and Space Heat Engineering Department, Moscow Aviation Institute http://www.k204.ru/uchebniki.htm;
- Automation of Technological Process Department, Angarsk State Technical Academy http://www.agta.ru/atp/93-uchebno-metodicheskiematerialy;
- Department for Security of Information Technologies , Taganrog Technological Institute of the Southern Federal University http://bit.tsure.ru/?q=ru/node/60;
- Accounting and Audit Department, St. Petersburg State Engineering and Economics University http://accounting.engec.ru/index.php?option=com_content&task=view&id=561;
- Department for Higher Mathematics, Moscow State Technical University of Civil Aviation http://vm.mstuca.ru/posobia/posobia.htm;
- Department for Higher Mathematics, Moscow Physical -Technical Institute http://math.fizteh.ru/study/literature.html;
- Department for Higher Mathematics, St Petersburg State University of Information Technologies, Mechanics and Optics http://mathdep.ifmo.ru/doku.php?id=library:biblioteka_kafedry;
- Department of Geology and Geodesy, Siberian State Industrial University http://sibsiu-geo.narod.ru/geology.html;
- Department for Information and Measurement Techniques, Moscow Power Engineering University http://iit1.mpei.ac.ru/pub.htm;
- Department of Cultural Studies and Social Communications, Tomsk Polytechnic University http://ctl.tpu.ru/umk.php;
- World Economy Chair, Economics and Management Department, St. Petersburg State Polytechnic University http://www.wecon.ru/quest.htm;
- Department for Optical-Electronic Devices and Systems, St. Petersburg State University of Information Technologies, Mechanics and Optics http://oeps.ifmo.ru/?a=lib;
- Department for General and Experimental Physics, Southern Ural State University http://www.phys.susu.ac.ru;
- Organic Chemistry Department, Novosibirsk State University http://orgchem.nsu.ru;
- Parallel Algorithms Chair, Mathematical Mechanical Department, St. Petersburg State University http://www.math.spbu.ru/parallel/;
- Department for Personal Computers and Networks, Moscow State University of Instrument Engineering and Informatics http://pilger.mgapi.ru/metods.htm;
- Department of Applied and Computer Optics, St. Petersburg State University of Information Technologies, Mechanics and Optics http://aco.ifmo.ru/student/library.html;
- Department of Applied Mathematics, International University in Moscow http://www.interun.ru/am_umm.html.

The Association of regional library consortia ARBICON (*www.arbicon.ru*) is a non-commercial partnership that unites a number of research and scientific-technical libraries of Russia's higher education institutions, federal and regional libraries and regional library corporative systems. The libraries of the consortium keep common rules in description and presentation of their informational resources on the Internet, enabling integration of resources of various library systems into a whole
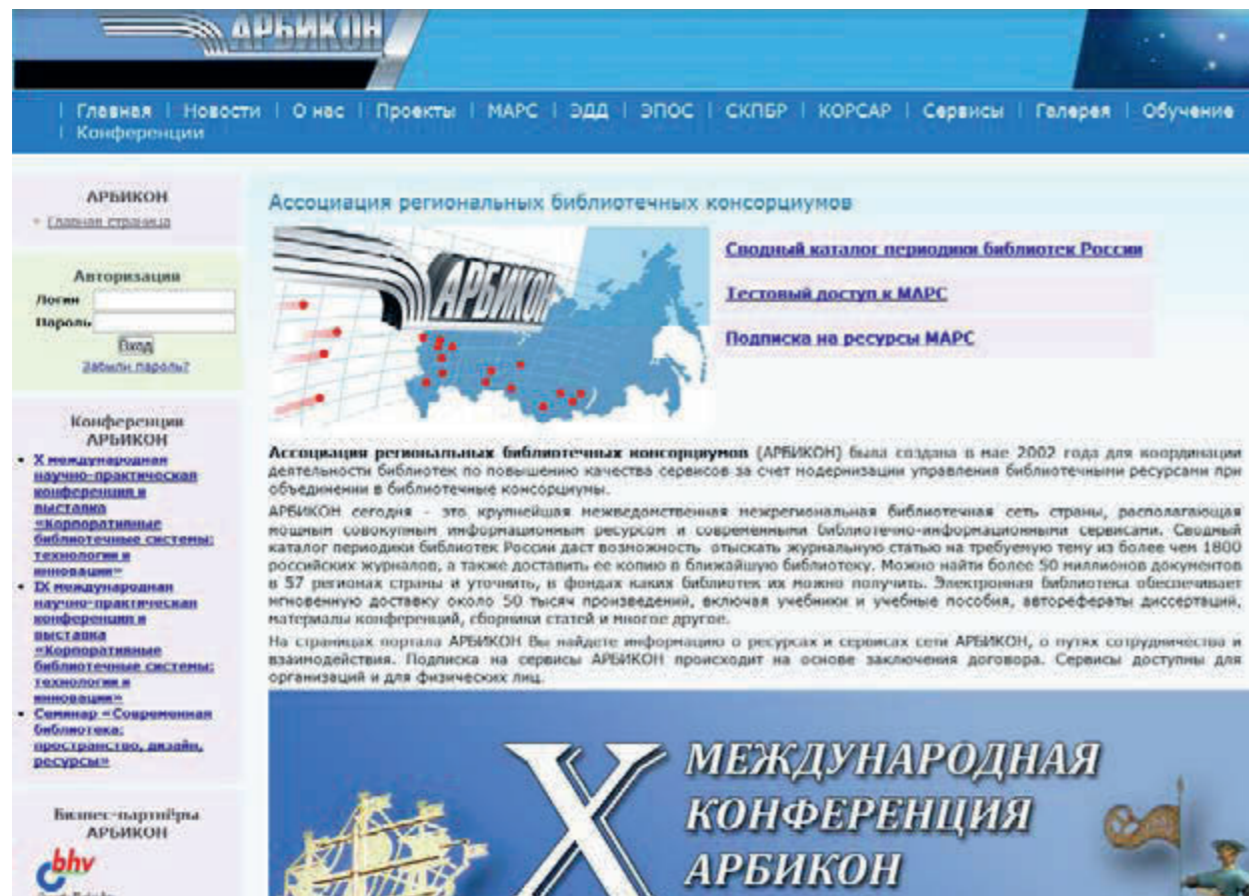
Figure 14. Web Portal of ARBICON

entity. Digital databases of organization-members of the association contain millions of bibliographical descriptions of library resources and dozens of thousands of digital versions of publications, including manuals, as well as educational and instructional materials published in higher education institutions. Moreover, most of the libraries provide access to full-text materials for both ARBICON organisations and non-members.

The fact that there is a considerable number of collections of educational and instructional materials that are structured non-uniformly and use different approaches to the description of resources and various methods of their presentation raises the issue of the necessity of their integration through the unification of their descriptions, the introduction of a unified system of indexation and provision of an interface for access to the resources with improved possibilities of context-attribute search. This task is being addressed in the digital library of the "Single-Entry Window" portal, whose main content source is databases of digital libraries of higher education institutions and collections of full-text materials in the websites of their departments.

# Educational Resources in Distance Education Systems

The distance education systems of higher education institutions designed for students of higher education institutions doing mixed / distance tuition studies or refresher courses in most cases provide access to their resources only to the registered users, i.e. they are not open educational resources. In some systems, a part of resources is open online. As a rule, users should be registered to pass tests, check results, obtain teachers' advice, and for assessment of learning outcomes. The open access is provided only to an informational component of training courses, i.e. one can study a certain topic independently using manuals of the distance education system. An example of such a system is the distance education server of St. Petersburg State University of Information Technologies, Mechanics and Optics (*http://cde.ifmo.ru*), which provides access to digital manuals with theoretical parts of courses.

- Department of Radio Physics and Nonlinear Dynamics, Saratov State University http://chaos.sgu.ru/kafedra/edu_work/edu_posobie.html;

- Department for Exploration Geophysics and Computer Systems, Gubkin State University of Oil and Gaz of Russia http://lserv.deg.gubkin.ru/mod/resource/view.php?id=1363;

- Telecommunication Systems Department, People's Friendship University of Russia http://www.telesys.pfu.edu.ru/studies/metod.html;

- Department of Structural Mechanics and Durability, Moscow Aviation Institute (Dept.603) http://www.mai6.ru/k603/index.php?o=04;

- Department for Theoretical Radio Engineering, Moscow Aviation Institute http://www.mai-trt.ru/?option=com_content&task=view&id=44&Itemid=49;

- Department of Theoretical Physics, Kazan State University http://www.ksu.ru/f6/k2/index.php?id=18;

- Department of Thermal Power Plants, Novosibirsk State Technical University http://tes.power.nstu.ru/index.php?id=22&relPath=Posob;

- Department of Physical and Colloid Chemistry, Southern Federal University http://www.physchem.chimfak.rsu.ru/Sources.html;

- Philosophy Department, Taganrog Technological Institute, Southern Federal University http://egf.tsure.ru/departments/history/ummfil/;

- Department for Environment and Industrial Safety, Baumann Moscow State Technical University http://www.mhts.ru/biblio/metodichki.asp;

- Experimental Physics Chair, Physical-and-Mechanical Department, St. Petersburg State Polytechnical University http://www.physics.spbstu.ru/library.shtml;

- Department for Power Supply of Railway Transport, Irkutsk State University of Communication Lines http://www.iriit.irk.ru/web-edu/~egt/lib.shtml;

- Department for Electrical Engineering and Precision Electromechanical Systems, St. Petersburg State University of Information Technologies, Mechanics and Optics http://ets.ifmo.ru/uchoba.html.

Figure 15. Open Digital Handbook for the Discipline "Numerical Methods in Optics" at the Website of the St.Petersburg University of Information Technologies, Mechanics and Optics



Figure16. INTUIT Start Page

An excellent example of an open system designed for distance education is the **Internet University of Information Technologies** (INTUIT, *www.intuit.ru*). With the support of the Open Systems Publishing House, one of the leading Russian publishers producing periodicals and books on information technologies, the project has been providing access to unique content since 2003. This project has no analogs in the Russian Internet, as the system of distance education is free providing access to open educational resources enabling users to pass through a cycle of connected courses and to obtain a certificate. As of May 2012, INTUIT made available more than 600 educational courses that belong to 30 thematic categories. The topics of INTUIT are expanding and, in addition to information and communication technologies, it was recently supplemented by new categories: "Mathematics", "Physics" and "Economy". A category "School" provides access to courses for schoolchildren.

A private-sponsored project **Educational Video Portal UniverTV.ru** *(http://univertv.ru)* was launched in 2009 to support distance education. The project objectives are to preserve cultural heritage, the traditions and high quality of Russian education; to introduce new forms of distance education available, to strengthen cultural links and to help Russian-speaking people abroad (especially in the former Soviet Union countries) in get access to education. The UniverTV.ru website is a software tool enabling saving, systematizing and transmitting research and educational content. The website provides the possibility of free access to all existing resources for private non-commercial usage.

Figure 17. Educational Video Portal Univertv.ru

The educational video web portal contains video lectures shot in leading Russian higher education institutions for the project, interesting foreign video materials translated into Russian, and links to educational video materials on the Internet, as well as video materials submitted by users to the web portal. Materials are grouped by subject with a total of 21 sections. The web portal includes the School section with video lessons of distinguished teachers on topics of the school programme and the best samples of teaching of complicated school education topics. There are webpages of lecturers and educational institutions involved in development of the informational content of the portal.

# Thematic Research and Educational Internet Projects

Apart from the higher education institutions' websites, an important source of open educational resources for higher professional education is the websites of research and education projects focused on certain subjects. These non-commercial Internet projects are implemented both by the initiative of enthusiasts and within the framework of commissioned and funded programmes and projects. Such websites are hosted by research institutions, higher education institutions (and their departments and branches), non-commercial organizations, commercial companies and physical entities. The projects can be explicitly educational; otherwise they contain educational resources as one of the project components.

Below we present the examples of projects that gained the recognition of the research and educational community and are among the most often visited. The examples are taken from various disciplines.

***ChemNet — Chemistry Science and Education in Russia*** (*http://www.chemnet.ru*) — is a large chemistry research and educational portal. The portal was launched by the Chemistry Department of Lomonosov Moscow State University in 1994 and is one of the oldest thematic portals. The following information is available: information on chemistry departments, higher education institutions and associations; chemical databases; electronic versions of chemistry journals; news, announcements of conferences, seminars, bids and competitions. Extensive digital library contains the materials for informational support of undergraduate and postgraduate training courses in chemistry for university departments, materials for enrollees and schoolchildren.

***Astronet — Russian Astronomical Network*** (*http://astronet.ru*) — is one of the largest resources of the Russian Internet in astronomy and allied disciplines. The objective of the project is to provide tools for scientific communication and dissemination of up-to-date research information among a broad community of interested people: researchers, teachers, engineers, under- and postgraduates and senior schoolchildren. The website contains an electronic library with handbooks, teaching materials, books, monographs, research and popular articles. The portal hosts a large collection of photos of celestial bodies.

***Informational Analytical Centre on Parallel Computing Parallel.ru*** (*http://www.parallel.ru*) is designed and supported by the staff of the Parallel Information Technologies Laboratory of the Computing Centre of Moscow State University. The website covers a wide range of issues related to parallel computing and super computers. The site contains various informational materials on high efficiency and parallel computing, including teaching materials.

The website ***Mathematical Modelling in Natural Sciences*** (*http://mathmod.aspu.ru*) is maintained by the Joint Laboratory on Mathematical Modelling and Information Technologies in Science and Education of the Institute of Mathematical Problems of Biology (Russian Academy of Science) and Astrakhan State University. The website contains electronic versions of manuals (in PDF format) and interactive virtual laboratory practical training sessions.

Figure 18. Thematic Geological Portal of Moscow State University

The portal of the **Research and Educational Internet Resource on Numerical Analysis** of the Computing Centre of Moscow State University *(http://num-anal.srcc.msu.ru)* contains materials on numerical analysis, including a package of computing programmes (Numerical Analysis Library) and various educational and instructional materials developed by the staff members of the Automation of Programme Computing Complexes Laboratory.

**Everything About Geology** *(http://geo.web.ru)* is a non-official portal of the Geology Department of Moscow State University. The website contains abundant information on various fields of geology and related subjects. The project is implemented with the support of the Russian Foundation for Fundamental Research. The website provides abstracts and full-text versions of books, biographies of researchers, texts of graduation papers, dissertations, books, lecture courses, research articles and reviews, abstracts and illustrative materials. There is a students' support section in which teaching materials are grouped by disciplines and training courses.

**Nanometer Project: Nanotechnological Community** *(http://www.nanometer.ru)*. The project dedicated to nanotechnologies contains information on recent achievements in this field and acts as a virtual platform for communications of the nanotechnological community of Russia. The website includes information on research groups and their works, as well as an electronic library of research, educational and popular materials.

**Philolog.ru Project** *(http://www.philolog.ru)* is being implemented by the Russian Literature Chair of Petrozavodsk State University. The website includes scientific editions of the texts of Russian classics that are used in university and in school education. The digital library presents the books published in the Philology Department of Petrozavodsk State University, an educational and instructional complex of the Russian Literature Chair and conference proceedings.



Figure 19. Website of Baikal Research Centre

**Baikal Research Centre** (http://lake.baikal.ru). The website of the project is being implemented jointly by Irkusk State University and Buryatia State University with participation of several institutes of the Siberian Branch of the Russian Academy of Science and the UNESCO Chair for Water Resources of Irkutsk State University. The website contains curricula of training courses and an electronic library of educational and research materials on biology, geography, geology, geochemistry and environment science.

**ECSOCENTRE — Centre of Economic Sociology** (http://www.ecsoc.ru) is a project run by the National Research University "Higher School of Economics" and designed for esperts and students in Economic Sociology. The website of the project presents materials on economic sociology, including Russian and foreign curricula; analytical surveys; information on educational and research centres; bibliography of books and articles; links to Internet resources and information about conferences.

**Nuclear Physics in Internet** (http://nuclphys.sinp.msu.ru) is a joint project of the General Nuclear Physics Chair and the Research Institute of Nuclear Physics of Moscow State University. The website objective is support to education in Nuclear and Particle Physics. Primarily, the materials are designed for students of Physics Departments of state universities who study this subject as a part of general physics courses. There are lecture materials, materials for seminars (tasks with detailed solutions to the problems and materials for seminars), digital versions of manuals, instructional materials of special courses and reference materials.

Projects providing access to open educational resources are implemented not only by educational institutions but also by research institutes.

**Russian Cultural Studies Network Community** (http://base.spbric.org) is an Internet project of the St. Petersburg Branch of the Russian Institute of Cultural Studies, which provides a forum for virtual communications and exchange of opinions among researchers dealing with cultural studies. Amongst the materials published by community members on their personal webpages, there are manuals and instructional notes on cultural studies and associated topics.

**Theory of Organizational Systems Control** (http://www.mtas.ru) is a website designed by the Institute for Control Science of the Russian Academy of Science. The site covers the topics of the control theory related to the mechanisms of functioning of organizational systems. Through the website experts in the theory and practice of organizational system management (researchers, teachers, undergraduate and postgraduate students, practitioners, executives and managers) can get access to resources on the theory and exchange ideas and study results. The website contains a large digital library which includes full-text versions of books, manuals, collections of works, articles and reports on the theory of organizational systems control.

The following examples illustrate educational initiatives of the commercial IT companies:

**Microsoft Training Courses Library** (http://www.microsoft.com/Rus/Msdnaa/Curricula/) is addressed to teachers, undergraduate and postgraduate students and tutor involved in teaching and studying

advanced information technologies. The library contains the teaching courses designed in universities and educational centres, which use Microsoft technologies in their educational process. These materials can be used both for independent learning and for development and introduction of new courses under the Microsoft Curriculum License Agreement.

**Exponenta.ru Educational Mathematical Website** (http://exponenta.ru) is supported by AXOFT company. The main goal of the project is to create an integrated space for those who use mathematical packages in their educational and research activity, as well as to facilitate the shaping of Russian-speaking community of mathematical software users. Special sections of the website deal with mathematical software packages (Matlab, Mathematica, Mathcad, Maple and Statistica). The website contains theoretical data on higher mathematics, practical recommendations and approaches to solving of a broad spectrum of mathematical problems, descriptions of popular mathematical packages and other materials. There are examples of solutions to typical problem higher mathematics problems. The section "Methodology" contains instructional aids focused on the usage of mathematical packages in the educational process. The website also includes a range of problems solved using mathematical packages, as well as a collection of useful links and information on competitions among teachers and students.

Some interesting large-scale projects are being implemented on a proactive basis by creative teams and individual enthusiasts.

**ALKHIMIC** (http://www.alhimik.ru) is an author's educational project for chemistry teachers and schoolchildren and students learning chemistry. The website provides curricula of chemistry courses for secondary and higher education, instructional ideas, annotations of new books, Internet-class (introductory chemistry course), electronic manuals in nonorganic chemistry, chemistry reference book and methodological articles.

Financial Science portal **Mirkin.ru** (http://www.mirkin.ru) enables access to numerous writings of finance and stock market experts. The digital library on Financial Accounting provides a variety of full-text publications (books, manuals, dissertations, graduation papers, articles and other materials) in PDF format.

Russian Philological Web Portal **Philology.ru** (http://www.philology.ru) was created as a non-commercial private initiative aimed at the dissemination of philological knowledge. The central section of the portal is a library of philological texts (books, articles, instructional notes) with two major subsections: Linguistics and Literary Studies.

In the abovementioned examples the educational content is major or important part of the project. The number of such fairly large thematic projects, those created and supported by groups of professionals in a certain subject area, is not high: there are dozens of them.

In case of a broader interpretation of the term "educational resource", not only manuals, instructional notes and materials purposefully prepared for the educational process are considered as educational

resources but also other informational materials (scientific, reference, illustrative, and other materials) which can be used by lecturers for preparation of their teaching courses, or by students during their individual thorough studying of a certain subject, as well as for writing reviews and term and graduation papers. In this case, the number of websites that are sources of open educational resources for higher professional education will considerably increase. For instance, websites with digital versions of scientific-research, methodological and popular magazines can be attributed to this category. If all the subject fields are considered, the number of relevant websites may be estimated as hundreds or even thousands. An effective search of such websites can be done through the catalogue of Internet resources at "Single-Entry Window" by selecting a target subject field and a type of resource (for instance, research and education projects, full-text periodicals, or thematic sets of resources) in the headings list.

# Regional Educational Portals

Educational resources developed in a certain region of Russia can be accessed through the regional educational web portals that serve as 'entry points' or those belonging to education authorities of the subjects of the Russian Federation and those cities whose educational portals have special sections on educational resources.

At present, almost all regional bodies of the Russian Federation have official websites. In most regions of Russia, the education authorities have the status of a ministry, an administration, a department or a committee within the executive bodies of the subjects of the Russian Federation. Each of them has their own well-developed websites. In some regions, the activity of the educational authorities is presented as one of the sections within the regional information and educational portals. Only in some rare cases information on the regional of education system and its managing bodies is presented as a webpage of the official websites of such institutions (a website of the government or regional administration of a subject of the Russian Federation).

Regional webpages in the Russian General Education Portal section "Education in Regions" (http://region.edu.ru) comprises information on the education authorities; geography, culture and history of a certain region; references to official web sites of the education authorities and educational resources in each region. Web portals of regional collections contain the "Regional Resources" section. Its content differs depending on a certain server: from zero to hundreds and thousands of resources (for instance, there are more than 3,000 resources in the collection of Chelyabinsk Region and more than 4,500 resources in the collection of the Republic of Karelia).



Figure 20. Educational Portal of Karelia

Often the official website of the education authority is a regional information and educational web portal. It presents both data on the education authority structure and activity, plenty of information on the regional educational system, its institutions, programmes and projects in progress, events and activities, educational resources, etc.

Complete and actual information about the websites of the educational authorities in the regions of Russia and about regional information and educational web portals presented in the Single-Entry Window, which provides a set of references to federal and regional educational web portals and websites of the educational authorities in the regions of the Russian Federation. This information can be obtained using advanced search options in the catalogue of Internet-resources of a certain region selecting the resource type: "Educational Websites/ Education Authorities". Along with the list the websites of the regional education authorities of subjects of the Russian Federation, the search can yield the list of websites of municipal education authorities.

Some regional educational portals provide hosting for websites of educational institutions (secondary schools, centres of additional education for children, other branch organizations) and educational projects.

> Regional educational portals or websites of education authorities usually include the following sections:
> - Information about the education governing body: its structure, management, phone book, a work plan, and subordinate institutions.
> - The educational system of the region. The municipal education authorities. Information about the educational institutions of various levels of education.
> - Educational legislation, regulatory support.
> - Regional education programmes and projects, implementation of federal programmes and projects in the region, analyses and reports.
> - Conferences, seminars and other capacity-building and experience communication activities.
> - Contests and competitions for students and teachers: information on upcoming events and results of completed bids and competitions.
> - Information support for the Uniform State Exam.
> - Methodological support for teachers: instructional manuals, regional collection of educational resources, collections of links to educational web resources, etc.
> - Interactive services: virtual reception-area of the heads of educational authorities, forums, consultations with executives, leading teachers and educators.

The list below refers to regional informational systems in the education sphere that are created well-advanced from the point of view of technology and content. The examples demonstrate different approaches to realization of such informational systems:

- Website of the Ministry of Education of the Republic of Buryatia (*http://www.edu03.ru*);
- Website of the Ministry of Education of the Republic of Karelia (*http://minedu.karelia.ru*) and Educational Portal of Karelia (*http://edu.karelia.ru*);
- Educational Portal of the Republic of Komi (*http://www.komiedu.ru*);
- Website of the Ministry of Education and Science (*http://mon.tatar.ru*) and Educational Portal of the Republic of Tatarstan (*http://www.edurt.ru*); both are available in the Russian and the Tartar languages;
- Website of the Department of Education and Science of the Krasnodar Region (*http://www.edukuban.ru*);

- Website of the Ministry of Education and Science of the Krasnoyarsk Region (*http://www.krao.ru*);
- Website of the Ministry of Education of the Khabarovsk Region (*http://minobr.khb.ru*) and Educational portal "Paydeiya": Khabarovsk regional information-educational network (*http://abc.edu-net.khb.ru*);
- Website of the Department of Education of Ivanovo Region (*http://www.iv-edu.ru*) and Ivanovo Regional Educational Portal (*http://www.ivipk.ru*);
- Website of the Ministry of Education of Irkutsk Region (*http://www.38edu.ru*);
- Website of the Department of Education of Novosibirsk Region (*http://www.edunso.ru*) and web portal Novosibirsk Open Educational Network (*http://www.websib.ru*);
- Web Portal "System of Education" of Omsk Region (*http://www.omskedu.ru*);
- Website of the Ministry of Education of Orenburg Region (*http://www.minobr.orb.ru*) and Regional Web Portal of the educational community of Orenburg Region (*http://www.orenport.ru*);
- Regional Information-and-Educational Portal of the Ministry of Education of Saratov Region (*http://edu.seun.ru*);
- Website of the Ministry of General and Professional Education of Sverdlovsk Region (*http://www.minobraz.ru*) and Web Portal "Education of Urals" (*http://www.uraledu.ru*);
- Website of the Department of Education of Yaroslavl Region (*http://www.depedu.yar.ru*).

## Regional Internet Collections

The resources presented in the regional collections are very different in their content, quality and methodological value. A significant part of the resources is teaching and instructional materials and publications of teachers. Some collections include not only "local resources" but also links to Internet-resources with descriptions.

Some regional collections are structured using a catalogue of resources systematized on the basis of federal educational portals; they provide also search options:

- Catalogue of resources and the digital library of the Educational Portal of the Ministry of Education and Science, the Republic of Tatarstan (*http://edurt.ru/res/*);
- Catalogue of educational resources of the Educational Portal of the Republic of Karelia (*http://edu.karelia.ru/portal/page/portal/edu_0/main/CATALOGUE1*);
- Educational and instructional resources of the Regional Information-and-Educational Portal of Saratov Region (*http://edu.seun.ru/main/modules.php?name=8edu_resources&op=rub*);
- Digital library of the educational community of Orenburg Region (*http://www.orenport.ru/?doc=39*).

In recent years, the Internet resources designed for preparation for the Uniform State Exam and its organization has become very topical; they are created both for schoolchildren and teachers. The key resources on this topic are the official informational portal of the Uniform State Exam (http://www.ege.edu.ru) and the site of the Federal Institute of Pedagogical Measurements (http://www.fipi.ru). At the same time, in many regions of Russia, special regional sites devoted to the Uniform State Exam, or corresponding sections on the websites of regional Centres on control and evaluation of the quality of education, were created according to the task set by the education authorities. Regional sites containing data on the Uniform State Exam:

• The Republic of Karelia — http://ege.karelia.ru;

• Stavropol Region — http://ege.stavedu.ru;

• Belgorod region — http://www.ege32.ru;

• Vologda Region — http://ege.edu35.ru;

• Voronezh Region — http://ege.vrn.ru;

• Ivanovo Region — http://www.ivege.ru;

• Kaluga Region — http://ege.kaluga.ru;

• Murmansk Region — http://www.ege.moipkro.ru.

The majority of the regional collections are presented as a simple linear list of resources grouped in topics corresponding to school subjects:

• Bank of Pedagogical Experience and materials on creative projects on the website of Yaroslavl Centre of Telecommunications and Informational Systems in Education (*http://www.edu.yar.ru/russian/projects/*);

• Methodological Bank of the Mordovian Republican Educational Portal (*http://www.edurm.ru/index.php?option=com_content&view=section&id=14&Itemid=46*);

• Methodological informational system of the North: a collection of materials for teachers on the website of the Murmansk Municipal Methodological Centre of Information Technologies (*http://www.gmcit.murmansk.ru*);

• Methodological library of the Educational Portal of Leningrad Region (*http://portal.loiro.ru/articles/*);

• Methodological collection of the Kostroma Educational Portal (*http://kostroma.edu.ru/method/*);

• Methodological materials of the Omsk Educational Portal (*http://omsk.edu.ru/_metodics/subjects/*);

• Methodological collection of the Astrakhan Regional Distance Learning Centre (*http://arcdo.astripk.ru*);

• Methodological collection of the website of the Education Development Institute of Ivanovo Region (*http://www.ivipk.ru/rcdo/depository.aspx*);

• Topical collections of the Portal of the Novosibirsk Open Educational Network (*http://www.websib.ru*);

• Section "Distance Support" of the website of the Education Development Institute, Yaroslavl Region (*http://www.iro.yar.ru/dist.htm*);

• Collection of methodological materials of the Novgorod Education Development Institute (*http://method.rcde.nov.ru*).

# Open Internet Projects for General Education

Initiative projects aimed at dissemination of educational resources for secondary schools deserve special attention. The examples given below were selected with account of their ranking in well known ratings of visits, "citation index" of Yandex.ru, as well as links provided in the section "Editors Recommend" of the Single-Entry Window (*http://window.edu.ru/window/recommended*) and in the catalogues "Educational Resources of Internet for General and Secondary Education" (*http://katalog.iot.ru*).

***Festival of Pedagogical Ideas "Open Lesson"*** *(http://festival.1september.ru)* is organized by the "Pervoe Sentyabrya" Publishing House and is aimed at the popularization of pedagogical experience of teachers, administrators, kindergarten teachers, psychologists, etc. The festival is held annually since 2003/2004. Materials are made available online as soon as they are obtained and prepared. When the Festival is over, the materials are put together in a set of final materials of the Festival, including books — collections of abstracts of all articles and DVDs with full-text versions of all the materials. The Festival has more than 30 sections, including Teaching of Subjects (17 sections), Teaching in Primary School, School Administration, Working with Parents, Working with Preschoolers, Class Management, Sport in School and the Health of Children, Correctional Pedagogy, School Psychological Aid, etc. Authors' rights for the materials belong to participants of the Festival; the organizational committee



Figure 21. Website of the Festival of Pedagogical Ideas "Open Lesson"

provides only a space for their publications. As of May 2012, more than 145,000 articles were published on the website, the majority of which were instructional materials created by teachers. A total visit rate to all Internet projects of the Pervoe Sentyabrya Publishing House on weekdays during a school year is 100,000-150,000 visitors per day.

**Internet-projects of Prosveshchenie Publishing House** (*http://www.prosv.ru*). The Prosveshchenie publishing house is a leading centre publishing educational literature for secondary schools. It set up several websites with instructional resources designed mainly for school teachers. Information on all Internet-projects is presented in the official website of the Prosveshchenie Publishing House. The Methodological Assistance section contains: full texts of instructional materials for manuals published by the Publishing House; presentations for teaching-and-instructional sets; materials for lessons elaborated by winners and participants of the Teacher-to-Teacher competition. Some websites were developed for information and methodological support of a number of teaching-and-instructional sets (Prospects, the School of Russia, Subject Areas, English in Spotlight, etc.).

**BINOM Publishing House. Knowledge Lab, Methodological Service Website** (*http://metodist.lbz.ru*). The website contains the materials for training-and-instructional sets of the publishing house; online workshops conducted by authors of school manuals on Informatics, Mathematics, Physics, Chemistry and Biology. There is Internet-telecommunications service *www.binom.vidicor.ru* designed jointly with Ural Federal University (Vidicor Centre) and some regional methodological services; a collection of video lectures; the Knowledge Lab Internet newspaper; and the public Internet reference book of educational resources for schoolchildren and parents (*www.digital-edu.ru*).

The initiative project **Teachers' Portal** (*http://www.uchportal.ru*) is a web portal for uploading presentations, lessons, practical works, lab exercises and test works, tests, plans of lessons for various subjects of the secondary school curriculum, materials for out-of-school activities, class meetings, demo versions of tasks of the Uniform State Exam and other materials for general education.

The **Primary School** project (*http://www.nachalka.inf*) is developed and presented online in open-access form for teachers of primary schools by Cyril and Methodius media company. The aim of the project is to provide media support to junior schoolchildren in basic subjects of their curriculum: Mathematics, Russian Language, Literature, and Environment.

The **Nachalka** project (*http://www.nachalka.com*) is designed for the development and teaching of children. The project combines elements of the social network and proactive collections of materials for the primary school. All materials of the website — articles, films, games, training programmes, fairy tales and tests are developed by the participants themselves.

**Elements of Big Science** (*http://www.elementy.ru*), a scientific-popular project focused on fundamental science, is developed with an active support of the Dynasty Fund of Dmitry Zimin. It comprises news of science, scientific blogs, a calendar of events (conferences, seminars, symposia, competitions, contests and lectures), a library of popular articles by famous scientists, and the Book Club section (reviews and

chapters of recently published scientific-popular books). The website includes the Internet version of the encyclopedia "Nature of Science — 200 Rules of the World".

**University Avenue** website is maintained within the framework of the school web portal of Tomsk State University (*http://shkola.tsu.ru*) by the Institute of Distance Education of Tomsk State University. The website supports open profile-based distance education to schools: Correspondence Physical-Mathematical School (Physics, Mathematics, Informatics), Young Chemist, Young Biologist, and Young Manager correspondence schools, as well as the School of Young Journalist. The websites of each of these correspondence schools comprise instructional materials, manuals, materials for seminars and practical studies, video lectures, tests and tasks for self-control.

Mathematical Education Portal **Math.ru** (*http://www.math.ru*) is the project founded by the Department of Mathematical Sciences of the Russian Academy of Sciences and the Moscow Centre of Continuous Mathematical Education. The main component of the web portal is a digital library with a vast collection of digital versions of books and magazines, which have been very popular for many years among school teachers of Math, heads of subject groups and schoolchildren. However recently some of these have become bibliographic rarities, unavailable for many readers. There library contains electronic versions of about 500 rare books. The portal also contains: video lectures for schoolchildren delivered by famous mathematicians; materials in the history of Math; a database of instructional materials and summaries of lesson plans and curricula by topics, articles related to mathematical education; information on forthcoming conferences and seminars which could be of interest to Mathematics teachers.
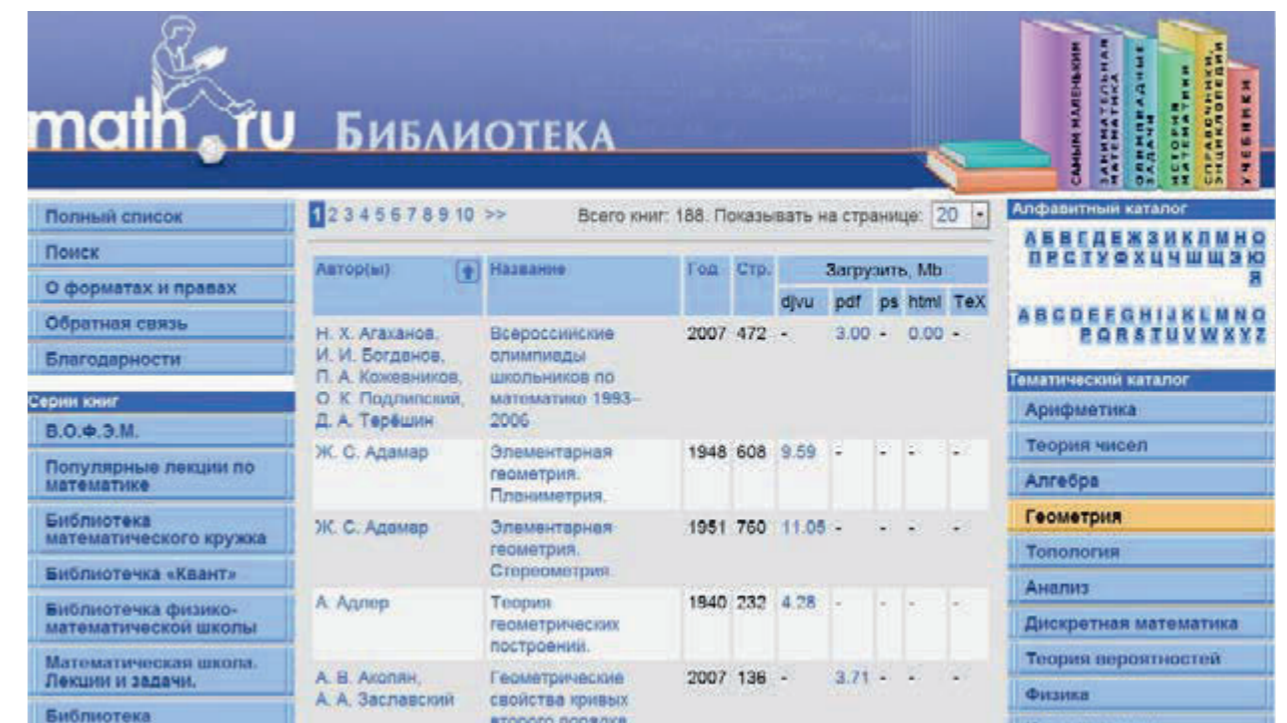


Figure 22. Digital Library of the Portal Math.ru

## Popular Internet Resources for Secondary Education

| Biology and Ecology | |
|---|---|
| Website for Teachers "I am going to a Biology lesson" | http://bio.1september.ru/urok/ |
| Botany Server of Moscow State University | http://www.herba.msu.ru |
| "Open Biology" | http://www.biology.ru |
| Ecological Centre "Ecosystem": Ecological Education and Studying the Nature of Russia | http://www.ecosystema.ru |
| **Geography** | |
| Virtual Methodological Community of Geography Teachers | http://www.geoclass.ru |
| Methodological Geography Lab of the Moscow Institute of Open Education | http://geo.metodist.ru |
| Website for Teachers "I am going to a Geography lesson" | http://geo.1september.ru/urok/ |
| The Planet of Earth: scientific-educational project | http://www.myplanet-earth.com |
| **History and Social Science** | |
| Teaching Knowledge Community and the Contemporary History of Russia in Secondary School | http://history.standart.edu.ru |
| World History: Integrated Research and Educational Space | http://www.worldhist.ru |
| Website for Teachers "I am going to a History lesson" | http://his.1september.ru/urok/ |
| Lectures in History for Inquisitive Children | http://www.lectures.edu.ru |
| Digital Manual "Ancient History" | http://www.ancienthistory.spb.ru |
| **Informatics and Information and Communication Technologies** | |
| Internet University of Information Technologies. School Courses | http://www.intuit.ru/catalog/school/ |
| Informatics and Information Technologies: Informatics Lab of the Moscow Institute of Open Education | http://iit.metodist.ru |
| Methodological Materials Bank for Teachers in Informatics | http://metod-kopilka.ru |
| Contests in Informatics | http://www.olympiads.ru |
| Teachers' Informatics Portal Klyaksa.net | http://www.klyaksa.net |
| School University: Education in Informatics and ICT | http://www.itdrom.com |
| Demonstration Models of Computer, or Computer for Beginners | http://educomp.org.ru |

| Mathematics | |
|---|---|
| Moscow Centre of Continuous Mathematical Education | http://www.mccme.ru |
| Internet Project "Tasks" | http://www.problems.ru |
| Open Bank of Tasks for the Uniform State Exam in Math | http://www.mathege.ru |
| Open College: Math | http://www.mathematics.ru |
| Educational Mathematics Website Exponenta.ru | http://www.exponenta.ru |
| Teaching Centre "Resolventa": Manuals in Math for Schoolchildren and Students | http://www.resolventa.ru |
| **Russian Language and Literature** | |
| Website for Teachers "I am going to a Literature lesson" | http://lit.1september.ru/urok/ |
| Website for Teachers "I am going to a Russian lesson" | http://rus.1september.ru/urok/ |
| Reference and Informational Webportal Gramota.ru | http://www.gramota.ru |
| Culture of Writting | http://www.gramma.ru |
| **Physics** | |
| Open College: Physics | http://www.physics.ru |
| Information-Educational Community for Teachers, Schoolchildren and Parents FIZIKA.RU | http://www.fizika.ru/ |
| Correspondence Physics-Mathematics School of the Tomsk State University | http://ido.tsu.ru/schools/physmat/ |
| Nanotechnologies in School: Teaching the Basics of Nanotechnologies | http://nanoschool-edu.ulsu.ru |
| Physics for Students and Schoolchildren | http://www.vargin.mephi.ru |
| **Chemistry** | |
| Website for Teachers "I am going to a Chemistry lesson" | http://him.1september.ru/urok/ |
| Correspondence School "Young Chemist" of the Tomsk State University | http://ido.tsu.ru/schools/chem/ |
| Open College: Chemistry | http://www.chemistry.ru |
| Educational Project ALKHIMIK | http://www.alhimik.ru |
| Organic Chemistry: Digital Manual | http://www.chemistry.ssu.samara.ru |

**Effective Work of the Teacher** web portal *(www.e-teaching.ru)*, also known as "Info Teacher: Information technologies in the teacher's work", is developed within the Programme on increasing the effectiveness of applying information and communication technologies in higher professional education institutions with the support of Microsoft. The web portal includes the following sections: School Teachers, Higher Education Teachers, Communication, and History of Success. For higher education institution teachers, the web portal offers an introduction course Guide for Teachers in the World of Contemporary ICT; basic courses Effective Preparation for Learning and Teaching using Microsoft Office 2007 Tools; Giving Lessons using ICT Tools; Planning and Teaching Control with the help of ICT; Usage of ICT in Teacher's Research Work; video lessons on various topics.

All-Russian Open Online Competitions

- Competition "Teaching-methodological support — Digital educational resources in contemporary school" (www.ict.edu.ru/eor2008/)

- Competitions of the Yaroslavl Centre of Tele-communications and Information Technologies in Education (http://www.edu.yar.ru)

- Competitions "Digital School" of the BINOM. Knowledge Lab Publishing House (http://metodist.lbz.ru)

# Network Communities of Teachers

The online social network communities are an important tool for informational support for the integration of new technologies in education (using electronic educational resources), development of new methods of teaching, exchange of advanced experiences and ideas within professional communities.

| Community Website | Description |
|---|---|
| Project "Open Class: Network Educational Communities" *http://www.openclass.ru* | Implemented since 2008 by the National Foundation of Education. Weekday traffic reaches 25,000-35,000 visitors; the daily number of browsed pages exceeds 100,000 |
| Web portal "Innovative Teachers Network" *http://www.it-n.ru* | Set up with the support of Microsoft to give teachers a possibility to exchange innovative experience inside and outside the country. The web portal was opened in early 2006 in the framework of the Microsoft project "Teachers Academy"; it is a part of the Global Network of Innovative Teachers *(http://partnersinlearningnetwork.com)* |
| Project "Pedsovet.org. All-Russian Internet Teachers' Council" *http://pedsovet.or* | Established as a result of 10-year long All-Russian August Pedagogic Council via the Internet. Informational resources are regularly updated. The web portal is designed for the discussion of a wide range of issues in the field of education |
| Community "Social Education" *http://wiki.iot.ru* | This social-pedagogical network community was established in the framework of the project "Creation and Development of Social-Pedagogical Communities on the Internet that Focuses on Teaching and Bringing Up Schoolchildren of Senior Classes". The project was fulfilled together with the National Training Foundation and "Informika" |
| Teachers' community of the programme Intel "Education for Future" *http://www.iteach.ru* | "Education for the Future" is an international programme of professional development of teachers designed by Intel. The programme has been working in Russia since 2002. The Russian programme involves more than 600,000 school teachers and students of pedagogical institutes. In 2009, the programme involved 125 teaching centres (pedagogical universities and colleges, institutes of advanced learning of educators, educational centres) in 80 regions of Russia |
| Project "KM-Viki" *http://wiki.km-school.ru* | The open educational network project is designed for 24-hour support for schools using the content-based information-educational system "KM-School" *(http://www.km-school.ru)*. The web portal brings together school directors and chief managers, teachers, librarians, students of pedagogical institutes, regional administrators of secondary education, tutors and trainers of the "KM-School" |

| Community Website | Description |
|---|---|
| Community "InfoCo" *http://www.infoco.ru* | A community of teachers working with the LMS Moodle and other information technologies. The website was created in 2007 as a venue for the annual Internet conference 'Information Technologies in Science and Education". Teachers and other stakeholders can exchange their experience and ideas here and coordinate their efforts to integrate information technologies in education |
| Open pedagogical community InterNika *http://internika.org* | Developed within the web portal "School University" *(http://www.itdrom.com)* by the Educational Centre School University and the non-state educational institution Open Youth University (Tomsk), the website is designed as a professional network of teachers who use teaching courses of the Integrated Educational Programme School University and actively use advanced information technologies |
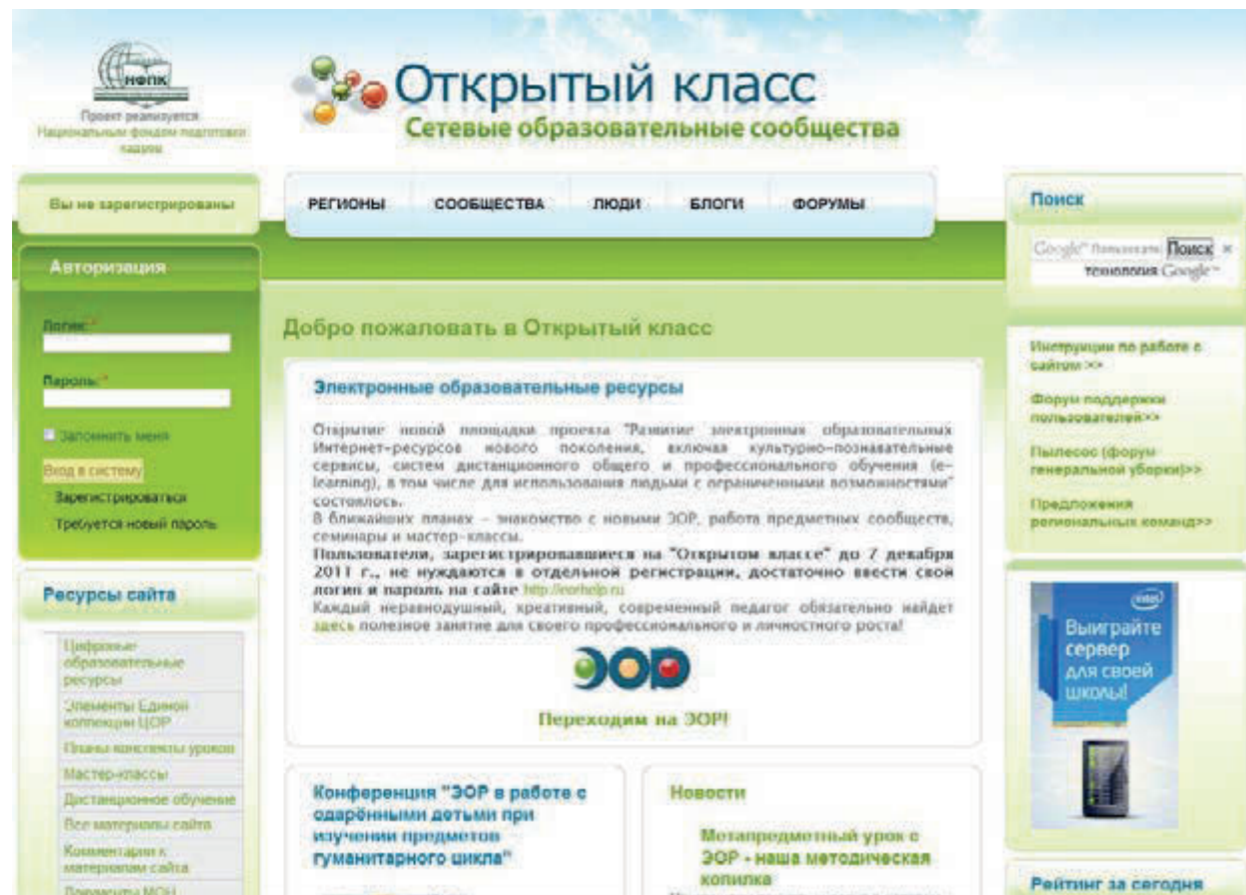


Figure 23. Networked Educational Community "Open Class"

# Conclusions

The purpose and content of open educational resources for professional education (undergraduate and postgraduate education, professional development and retraining) differ considerably from those designed for general (secondary) education.

For professional education, the information component, which can be presented in a simple text-graphic form (e.g. electronic version of a publication), is of particular significance. In this case, of special interest are the selection of materials for a training course, the approach to its presentation, instructional guidelines, assignments for individual work of students, etc. Wide range of majors and specialties of professional education, availability of numerous academic disciplines and different scientific and pedagogical schools, emergence of new scientific trends and promising developments make distribution and exchange of pedagogical experience through opening educational materials and courseware very topical. At the same time, information technologies and the Internet do not significantly change the nature of studying a discipline, but rather a means of storage, retrieval and delivery of traditional educational and methodological materials. Certainly, the use of such digital educational resources as virtual laboratory works, programmes for computer simulation, interactive electronic training manuals, audio and video lectures, computer demonstrations and online tests is very important, especially for distance learning. These types of resources are developed upon the initiative of educators and universities and within the framework of funded projects. But currently, most of the open educational resources for professional education are still nothing but digital versions of publications prepared by many universities.

In school education, the situation is radically different. A simple conversion of school textbooks (texts and illustrations) into electronic format does not change the methodology or improve the quality of teaching in secondary schools. Free Internet access to the contents of school textbooks and instructional manuals would certainly be useful for teachers and students in terms of speed of obtaining the information and cost saving, but it seems very unlikely that publishing houses might grant this opportunity in the near future. The main mission of ICTs and electronic educational resources at school is to change the nature of the educational process and improve its effectiveness, both in terms of teaching techniques in class and self-study of students. Electronic educational resources that employ the opportunities of multimedia and are interactive surpass traditional textbooks in both information and didactic aspects. However, high-quality interactive and multimedia resources can be produced only by professional teams that engage resource teachers and IT experts. Development of this type of open educational resources has been the goal of large-scale national projects implemented in recent years at the request of the Ministry of Education and Science of the Russian Federation and funded as government orders.

Main sources of resources for higher professional education, extended education and professional development are the official websites of universities and their structural units (faculties, departments, educational and scientific centres, research and development centres and libraries). Most of the resources

are electronic versions of educational and methodological publications (pdf- and doc-files) developed in universities: tutorials, lectures, task- and workbooks, guidelines for laboratory works, practical studies and degree paper planning, work programmes of academic disciplines. Texts and presentations for lectures, test and exam questions, bibliographic references to academic courses, various work materials and fragments of courses together with the electronic versions of publications are widely presented on the websites of faculties and departments. There are web sites of scientific and educational projects, professional communities, personal websites of scientists and educators that contain open educational resources for different subject areas, but large online projects of this kind are very few.

In view of the fact that tens of thousands of resources are scattered on hundreds (or even thousands) of websites, an important role in organizing access to these resources and providing search options by subject, type of resource, keywords, etc. is played by directories and integrated collections. The largest catalogue of educational resources in the Russian Internet is the portal "Single-Entry Window to Educational Resources," and the electronic library of "Single-Entry Window" that contain more than twenty thousand educational and methodological publications available in open access or submitted by universities and individual contributors.

Open educational resources for primary and secondary professional education in the Russian segment of the Internet had been practically nonexistent until the first electronic educational modules for primary and secondary professional education were developed in 2009 under state order and published on the portal of the Federal Centre for Informational Educational Resources. Numerous websites of colleges, technical and vocational schools usually provide information about the institutions and educational programmes offered only.

Resources for secondary school disciplines developed by teachers and resource teachers are available on the Russian Internet in large collections (regional educational portals, websites, thematic educational projects, online educational communities, etc.), as well as on teachers' personal websites. It is noteworthy that the number of personal websites of school teachers reaches thousands and considerably exceeds the number of sites of university staff, though the quality of the former is quite low and their practical significance does not consist in the value of the resources, but rather in the promotion of professional development and use of ICT by teachers. The main role of teaching and methodological materials circulated within pedagogical social networks and other educational projects is an exchange of experience in the use of existing open educational resources: there are lesson plans and extra-curricular educational activities offered using electronic educational resources, homework assignments for students, methodological advice for teachers, etc.

The main sources of high-quality open educational resources for school education in Russia are the Integrated Collection of Digital Educational Resources and the Federal Center for Informational Educational Resources. These portals contain resources developed by professional producers of electronic educational resources in collaboration with resource teachers; they were tested for compliance with educational standards and programmes of school disciplines. It is very important that the issues of copyright for these resources have been cleared, and free use of all resources in the educational system of Russia is absolutely legal.

Thus far, creation and opening electronic educational resources has not been encouraged in most universities, this kind of activity is not encouraged and not taken into account when assessing teachers' performance. In most cases, electronic resources designed for distance learning systems are not open and are freely used by students and teachers of the university only, or intended to support tuition-based educational activities of universities. It should be noted that publishing the electronic versions of publications prepared by university teachers on websites of universities, faculties and departments in open access does not require additional efforts and funds, since at the stage of prepress preparation of publications their electronic versions are already available and can be easily presented as PDF- or doc-files. However, in some cases the policy of a university bans opening of university publications in the Internet; in other cases, universities do not prohibit this activity, but they do not organize and encourage it either — authors can do this on their own discretion.

The level of salaries of teaching staff at most Russian universities also does not stimulate the development of open educational resources, since the teachers are not encouraged to implement any activities beyond the prescribed formal plan. Many teachers are not only reluctant to publish their learning and teaching materials online, they also have no interest in the available network resources for their disciplines and do not advice their students to use open educational resources that can help in studying an academic course.

As far as open educational resources for secondary education are concerned, the amount and very high quality of resources available on the portals of the Federal Centre and The Integrated Collection could contribute to considerable modification of the approaches to teaching and studying some school subjects and to Russia's advancement in the ranking among leading countries in use of ICT in schools. The availability of ICT equipment, Internet access and the level of ICT literacy of school teachers are no longer major obstacles. A more significant problem today is the lack of motivation of many teachers to mastering and practical application of new teaching methods, based on the active use of electronic educational resources. Another serious problem is inadequate development of new teaching methods in the "ICT-integrated environment" that substantially changes the traditional class system. Considerable efforts are currently focused on solving this problem, including the development of new educational standards and new textbooks for elementary and secondary education that would take into account the availability of new-generation open electronic educational resources.

Considerable attention is paid to the issues of open educational resources within federal and regional programmes and projects related to informatization of education. Significant budgets are allocated to support the development and implementation of electronic educational resources for schools, their approbation and development of application methodologies. The number of teachers, who are interested in the use of information technologies and the Internet in their professional activities, increases, computer literacy and ICT competency of teachers enhance. The programmes of leading universities, in particular those that were granted the status of federal universities and national research universities, include many projects related to ICT integration into educational process and development of educational resources, not only for the university, but for the whole Russian system of education. Therefore, the prospects for the development of the Russian segment of the Internet in regard to open educational resources in general are very favorable.

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# Educational Portals and Open Educational Resources in the Russian Federation

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