



## UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION

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### EDITORIAL



Dear readers,

This issue begins with the preface of the Assistant Director-General of UNESCO for Education Mr John Daniel to the Medium-Term Strategy for 2002–2007 of the UNESCO Institute for Information Technologies in Education. The first IITE Medium-Term Strategy comprises the information concerning several current trends in the world and education, IITE's mission, its contribution to

UNESCO's Medium-Term Strategy, and the main directions of the IITE programme activities.

It is worth mentioning that the elaboration and implementation of the first IITE Medium-Term Strategy coincides with the global spread of information and communication technologies (ICTs) in education. UNESCO devotes its full attention to this process, striving to help developing countries to overcome the key problems of the digital divide. Moreover, this objective is a prime strategic challenge throughout UNESCO activities in the years 2002–2007. The main goal of IITE Medium-Term Strategy is to bring a valuable contribution to the endeavours of the Organization.

The issue contains some abstracts from IITE Medium-Term Strategy, which reflect the main directions of the Institute's activities. The full text of this document is available on IITE web site: [www.iite-unesco.org/iite/publications](http://www.iite-unesco.org/iite/publications).

In accordance with its Medium-Term Strategy, IITE intends to contribute to the implementation of UNESCO's functions, namely, to act as a catalyst for international cooperation, a laboratory of ideas, a clearing house, a learning organization, a capacity-builder in UNESCO Member States. This issue illustrates the current activities of the Institute oriented toward these goals.

In the article *IITE Training Activities on ECDL*, Irina Obukhova overviews the IITE experience in the field, which is a part of the IITE training activities. Dissemination of the available knowledge and best practices on ICT application in education among UNESCO Member States is one of the objectives of the IITE training strategy. The article describes how the strategy is realized in the Russian Federation with the ECDL programme – one of the internationally recognized computer skills certification programme – as an example.

Leonid Kalinichenko gives the comprehensive analysis and anticipated evolution of current digital libraries in education (DLE) technologies. It should be noted that this direction in fact is one of the strategic goals of UNESCO. This sphere is headily developed in many countries all over the world, and represents a real laboratory of ideas for our Institute as stated above. IITE could not stay aside and began to develop the project aimed at DLE as part of the programme area *Forming an Information Environment for Education*. IITE aims at highlighting new concepts developed in this sphere, and it is a reason why the analytical survey on this theme was prepared. In it several DLE projects were studied to identify typical DLE features, characterize the current state of DLE technologies, clarify social and organizational issues of DLE development, predict the DLE impact on education as well as advanced DLE frameworks and methodologies in

#### IITE ONLINE NEWS

- **27–28 June 2003 (IITE, Moscow):** 5th session of IITE Governing Board
- The World Summit on the Information Society (WSIS), arranged by the International Telecommunication Union (ITU), in close cooperation with other UN Agencies, will be held on 10–12 December 2003 in Geneva, Switzerland. Several UNESCO side events will be organized within WSIS framework. On behalf of UNESCO

Education Sector IITE is responsible for the preparation of the round table *Education and Knowledge Societies*.

- In 2003 IITE published the analytical survey *Digital Libraries in Education*. The analytical survey *Information and Communication Technologies in Technical and Vocational Education and Training* and set of training materials for educators *Internet in Education* are being published now.

order to foresee further evolution and applications of DLE technologies.

Azat Khannanov reports on the development of the IITE project *Internet in Education*. Its current stage is aimed at capacity-building in Member States in the

form of training activities. The authors' group, consisting of the representatives from five countries, elaborated a set of teaching/learning materials *Internet in Education. Support Materials for Educators*. Three parts of the *Materials* – analytical survey, materials for discussion and practical course on

Internet technologies, designed especially for users in the educational sphere – cover different aspects of the theme. They help the readers learn more about the state-of-the-art and prospects of Internet usage in education as well as acquire additional practical skills.

I hope that the materials enclosed in the issue will help you solve the problems you face in practice of ICT usage to upgrade the systems of education in your countries.

Vladimir Kinelev  
Director of IITE

## IITE MEDIUM-TERM STRATEGY FOR 2002–2007

### Preface to IITE Medium-Term Strategy by Assistant Director-General of UNESCO for Education

Mr John Daniel

Dear Colleagues,

I am pleased to enclose herewith the Medium-Term Strategy for 2002–2007 of the UNESCO Institute for Information Technologies in Education (IITE), which mission is to strengthen the national capacities of UNESCO Member States for applying ICTs in education.

This document has been prepared by IITE as an input to the UNESCO Medium-Term Strategy 2002–2007 *Contributing to peace and human development in an era of globalization through education, the sciences,*

*culture and communication*. At present, there are certain considerable disparities in the development of the world communities, which exclude entire groups and countries from the potential benefits of digital opportunities in networked knowledge societies. Thus, according to the UNESCO Medium-Term Strategy 2002–2007, bridging the digital divide between developing and developed countries and within countries will become a prime strategic challenge throughout UNESCO's activities.

Striving to make its utmost in attaining the strategic objectives

of the UNESCO Medium-Term Strategy 2002–2007, and in compliance with its mission, IITE will consolidate the efforts around the UNESCO strategic sub-objectives: *Identifying new trends in educational development and promoting policy dialogue* and *Harnessing information and communication technologies for education*. To that end, acting in accordance with its Statutes the Institute will pursue, in its programme activities during 2002–2007, the following strategic objective: *reinforcing national potential in ICT application for the development of education*.

At UNESCO, we try to foster the application of new information and communication technologies in education at all levels, and we hope this document will help UNESCO Member States benefit from IITE's activities to modernize countries' educational systems on the basis of information and communication technologies perceived as a key to such modernization.

Yours sincerely,  
John Daniel



## IITE: MAIN AREAS OF THE PROGRAMME ACTIVITIES

### Extract from IITE Medium-Term Strategy

IITE's Medium-Term Strategy for 2002–2007 comprises information concerning several current trends in the world and education, IITE's mission, its contribution to UNESCO's Medium-Term Strategy, and the main directions of the IITE's programme activities.

The elaboration and implementation of the first IITE Medium-Term Strategy coincides with the global spread of information and communication technologies in education. UNESCO devotes its full attention to this process, striving to help developing countries to

overcome the key problems of the digital divide. This objective is a prime strategic challenge throughout UNESCO activities in the years 2002–2007. Thus, the main goal of IITE's Medium-Term Strategy is to bring a valuable contribution to these endeavours of the Organization.

Acting in accordance with its Statutes and proceeding from the UNESCO strategic objectives and sub-objectives, IITE will pursue, in its programme activities during 2002–2007, the following *strategic objective: reinforcing national*

*potential in ICT application for the development of education*. For implementation of this strategic objective, IITE will concentrate its resources on attaining real results and focus its efforts on the activities where it has a comparative advantage and gained experience. During the Medium-Term period, IITE will carry out its activities in four *main programme areas*:

- Supporting National Capacity-Building for ICT Application in Educational Systems;
- Forming an Information Environment for Education;

- Improving the Quality of Education through ICT Usage;
- Promoting ICT Usage in Education for Learning to Live Together.

The realization of the IITE strategic objective will be led in three correlated *programme activities' domains*, namely: research and project development, training and clearing house activities.

In accordance with its Medium-Term Strategy, IITE will strive to make its contribution to the imple-

mentation of UNESCO's functions as a whole, namely, to act as:

- a catalyst for international cooperation;
- a laboratory of ideas;
- a clearing house;
- a learning organization;

• a capacity-builder in Member States.

To perform these functions in the frames of its rather limited financial resources the Institute will continue to fulfil its programme activities using a long-term

approach to the development of each main programme area. In compliance with such approach within the framework of all main programme areas, IITE's activities will be realized in several stages, each of which will be aimed at, on the one hand, the ultimate

achievements regarded as the Institute's contributions to the functions of UNESCO as a whole; and on the other hand, aimed at creating the basis for the subsequent stage of the main programme area development to be fulfilled.

## Main Programme Areas

Pursuing its mission and striving to attain the IITE's Medium-Term strategic objective, namely, reinforcing national potential in ICT application for the development of education, IITE will fix its activities in the following *main programme areas* and corresponding *themes*:

Programme Areas	Themes
Supporting National Capacity Building for ICT Application in Educational Systems	ICTs in Technical and Vocational Education and Training ICT Usage for the Development of General Education Application of ICTs for Improvement of Teacher Education ICTs in Special Education
Forming an Information Environment for Education	Information Environment for Education: Design and Usage ICTs in Distance Education Digital Libraries for Education Internet in Education Multimedia in Education
Improving the Quality of Education through ICT Usage	Ethical, Psychological and Societal Problems of the Application of ICTs in Education Indicators of ICT Application in Education
Promoting ICT Usage in Education for Learning to Live Together	ICTs in History Education ICTs in Teaching/Learning Foreign Languages Education, Art and ICTs: Integration for the Development of One's Personality

Being flexible and wide-ranging, each of the programme areas might be modified and expanded during the Medium-Term period by adding new themes following the requests of UNESCO Member States and in conformity with available resources. Each theme will be put into action through a series of consequent result-based projects, which number and scope might also vary.

### Research and project development

In the Medium-Term period, research on ICT application in education will be regarded as the central IITE activity, laying down the foundation for further project development, elaboration of training and methodological materials, carrying out training activities, processing as a core element of the clearing house, assistance to UNESCO Member States in policy formula-

tion, implementation of national pilot projects and supplying them with information in the field.

The IITE research activities will result in recommendations, position papers, analytical and statistical surveys, information materials and reviews, final reports and collected materials of the various meetings to be disseminated in UNESCO Member States.

### Training activities

In accordance with IITE's strategic approach, training objectives, namely, training and retraining of educational personnel in the application of new information and communication technologies in education, will be a top priority of the Institute's activities in 2002–2007. It will allow for the achievement of the multiplicative effect in the efforts of the Institute to disseminate the available knowl-

edge and best practices on ICT application in education as much as possible among the UNESCO Member States.

The *main target groups* of the IITE training activities will be the following:

- policy- and decision-makers in the educational sphere, heads of national and regional educational systems;
- heads of pre- and in-service teacher training institutions, trainers of trainers for ICTs in education;
- teachers, ICT school coordinators and other educational personnel.

For these purposes, the Institute will complete the elaboration of IITE's own educational programme as a set of guidelines, which consists of a basic course, specialized training courses of a

modular character, and sets of support training materials, with the purpose of facilitating the training and retraining of educational personnel in a specific subject area.

### Clearing house activities

Like research and training, the clearing house will be one of the main domains of the IITE's activities. On the basis of the Institute's research and studies, IITE will continue the preparation of the analytical surveys, training, methodological and information materials on ICT usage in education as well as IITE Newsletter in electronic and printed forms and their dissemination in all UNESCO Member States and international organizations acting in the field of its competence.

Striving to facilitate access to IITE's information resources for the educational personnel from

UNESCO Member States, the Institute will continue to develop the IITE information system – WWW Portal, consisting of a web site, Information System on Information Technologies in Education (ISITE) database, and online training tools.

As a result, the IITE information system activity will become not only a means for information dissemination, but simultaneously, it will implement the functions of information, analytical, organizational, training and communication support of the Institute's

activity in two other areas of activities: research and training. Achieving these goals IITE information system – currently developed as a complex of high technology instruments – will gradually move in the direction of a more flexible and end-user oriented

system at the service of changeable real demands of the UNESCO Member States' educational community. In this way, the shift from the "data-technology" to a pedagogically useful knowledge-sharing approach will be made.

## IITE TRAINING ACTIVITIES ON ECDL



Testing on ECDL

The World Declaration on Education for All (EFA) and the Dakar Framework for Action (2000) call for a learning environment, in which everyone would have a chance to acquire a basis for life-long learning and involvement in the life of society. Innovative use of new information and communication technologies (ICTs) and media can contribute to overcoming the limits of formal and non-formal education and help empower disadvantaged groups to participate in development to the full. ICTs more and more become an integral part of educational strategies, providing for greater flexibility in learning situations, promoting increased interactivity for learners and connectivity between people and learning resources in different parts of the world.

The European Computer Driving License (ECDL) is an international

ally recognized computer skills certification programme spanning over more than sixty national operators and making it possible to obtain ECDL certificate in 140 countries. Also known as the International Computer Driving License (ICDL) for countries outside Europe, the programme enjoys phenomenal worldwide recognition and growth. Its main goal is to meet the needs of governments, leading corporations, institutions and individuals providing a globally recognized and trusted standard of information technologies (IT) skills competency, and to raise the level of knowledge about IT as well as increase the competence in using personal computers and common computer applications for all. In the field of education the ECDL programme, particularly in Europe, has been evaluated and approved by many Governments as a policy framework to master information and communication technologies at schools. The programme has been adopted to train school students for future activities in the Information Technology Society.

The right to knowledge and information for sustainable development supported by appropriate communities, technologies and information facilities as well as communication is one of UNESCO's priorities. In compliance with this statement dissemination, promotion and evolution of ECDL as a globally accepted IT skills certification programme that trains people to take part in the Information Society, answer the goal of UNESCO's priorities.

Highly estimating the testing system developed by the ECDL Foundation to assess one's computer skills, and taking into account that the aims of the Foundation are consistent with the UNESCO objectives in ICT development and use, the UNESCO Institute for Information Technologies in Education (IITE) signed a contract to establish the Authorized Testing Centre on the ICDL/ECDL programme on the IITE basis. The Institute has started to realize the activity in the form of a pilot project in the Russian Federation. Institute for Development of Additional Professional Education of the Ministry of Education of the Russian Federation together with IITE are now testing the staff of the leading educational institutions in the Russian Federation.

Experts in the field of ICTs and representatives of higher education institutions from several regions of the Russian Federation attended the training seminars, which were held at IITE on 2–6 December 2002 and 4–7 February 2003. The seminars highlighted the standards and requirements of the ECDL programme and offered an opportunity for the participants to test their computer skills. At the end of the training seminars the participants completed the questionnaire, and their answers revealed that the programme and the testing process were received favorably by those who underwent tests. The participants successfully completed seven modules of the ECDL certification and were awarded with the international license.

Accounting for the interest expressed by the participants in ECDL programme, and acting as a clearing house on ICTs in education, IITE continued the work on the IITE Testing Centre network in order to facilitate institutions and individuals with a globally recognized and trusted standard of IT skills competency. Institute for Development of Additional Professional Education of the Ministry of Education of the Russian Federation and IITE intend to set up over 20 testing centres in different regions of the country, and in the near future to organize a large inflow of test-takers.

In 2000 IITE signed the agreement on joint activity with Moscow Department of Education. In the framework of this agreement the pilot group of the personnel from different Moscow region educational departments was tested on ECDL programme on 17 and 18 February 2003. The participants successfully completed seven modules. IITE and Moscow Department of Education will undertake the next step and introduce the



UNDP staff is awarded with international certificates



experience to test the staff of educational subdivisions of Moscow Department of Education, including principals of secondary and vocational schools.

Apart from that, Russian office of United Nation Development Programme (UNDP) organization addressed IITE to test their staff on ICDL programme, and first inter-

national certificates were handed over to UNDP administrative employees. Furthermore, IITE plans to cooperate on the programme with other international

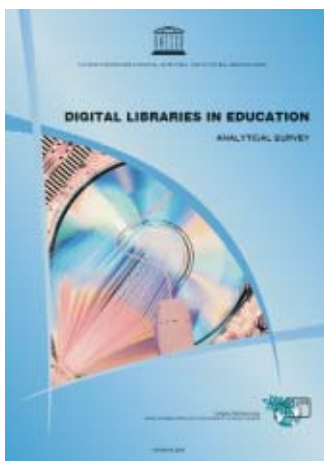
organizations in the Russian Federation.

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## DIGITAL LIBRARIES IN EDUCATION

### Review of the analytical survey



One of the strategic goals of UNESCO is to foster new forms of networking of teacher-training institutions and teachers with digital libraries. Interest in it is growing in many countries all over the world; the number of works and projects on this theme is increasing headily. The UNESCO Institute for Information Technologies in Education (IITE) could not stay aside and launched the project aimed at Digital Libraries in Education (DLEs) as part of the programme area *Forming an Information Environment for Education*. In 2002 in the frame of this project the analytical survey *Digital Libraries in Education* was prepared.

The survey is the result of the collective efforts, discussions and information provided by the working group of the researchers from Germany, Greece, India, Italy, Russian Federation, and USA.

It reflects the achievements of joint work with several US groups: the NSDL (National Science Digital Library) Policy Committee, UCAR (University Corporation for Atmospheric Research, Boulder, Colorado), SDSC (San Diego Supercomputer Center,

University of California, San Diego), and the University of Michigan; and contains the excerpts of the information materials prepared by the experts from Germany, Greece, India and Italy for the IITE expert meeting *Digital Libraries in Education: State-of-the-Art Report* held in June 2001.

The detailed analysis and anticipated evolution of current DLE technologies presented in the survey forms a base for planning the forthcoming phases of IITE project for DLE development. Several DLE projects were studied to identify typical DLE features, characterize the current state of DLE technologies, clarify social and organizational issues of DLE development, predict the DLE impact on education as well as advanced DLE frameworks and methodologies in order to foresee further evolution of DLE technologies and applications.

The survey starts with a general discussion over the role of digital libraries as an integral part of the rapidly changing educational environment. A wide range of interpretations of the digital library concept is presented. The survey treats digital library in education (DLE) as a repository of educational resources with services. The definitions and interactions of Managed Learning Environment (MLE) and Virtual Learning Environment (VLE) are presented under the "Integrated Learning Environment". The related pedagogic models for VLE are considered in this connection. The survey lists the quality criteria of digital library within the learning environment. Perspectives of incorporation of VLE and digital library into the learning process are discussed based on the example of

the recently accepted JISC<sup>1</sup>/NSF<sup>2</sup> project proposal for DLE in Human Geography, GIS and Earth Observation. The survey briefly outlines the works on standardization of educational metadata. To study the DLE technologies, several American projects (NSDL<sup>3</sup>, DLESE<sup>4</sup>, CITIDEL<sup>5</sup> and NDLTD<sup>6</sup>) as well as some European projects (DNER<sup>7</sup>, Scholnet and Cyclades) were selected to demonstrate the state-of-the-art and planned evolution of the technologies. In order to show the anticipated evolution of DLE frameworks from the current ones based on the conventional library metaphor to more knowledge-based systems, the survey presents the information on several advanced frameworks and methodologies related to DLE. The discussion covers the issues of instructional courses development based on the pre-existing learning objects, works on the extended information content of digital library in education and research with specialized educational data resources (including real-time data), use of advanced infrastructures (Cyberinfrastructure and Data Grid) as a possible ground for future DLEs, researches on knowledge-based approaches for DLE frameworks (navigation and search interface for NSDL based on science literacy benchmarks and a course of physical geography in the ADEPT<sup>8</sup> concept-based architecture).

The survey leads to the following conclusions:

1) Digital libraries have become a core ingredient, a collective memory of the educational environments of today and for future. Hybrid libraries have already become widely used components in many universities around the world. In certain countries (USA, UK, Germany) a national digital library for education in science, engineering, and technology is being developed as an important component of the national educational infrastructure. While the development of a DLE is a continuous process of information collection, classification, conceptualization and usage, it is paralleled by rapid technological advancements. Together, these two developments lead to the evolution of DLE frameworks and methodologies.

The elaboration of national DLEs requires the involvement of various groups of the society. Besides educators and learners, the community includes members of professional societies, information providers, researchers, and representatives of industries. Interrelationship of the interests of the community members should be addressed, in order to work out a reasonable strategy leading to DLE sustainable development and gradual evolution. The process forms a wide community around the DLE, providing for information development, governance, collection and use in education. Large DLEs must function as non-profit organizations. Experience from NSDL as a national project is

<sup>1</sup> Joint Information Systems Committee, UK

<sup>2</sup> National Science Foundation, USA

<sup>3</sup> National Science Digital Library

<sup>4</sup> Digital Library for Earth System Education

<sup>5</sup> Computer and Information Technology Interactive Digital Education Library

<sup>6</sup> Networked Digital Library of Theses and Dissertations

<sup>7</sup> Distributed National Electronic Resource

<sup>8</sup> Alexandria Digital Earth Prototype

expected to show how such challenges can be met.

2) Building the sustainable and scalable communities where best education-oriented practices and information are shared (national and global communities, domain- or discourse-oriented communities) requires specific attention and organizational measures during DLE development and evolution.

If DLEs are to succeed, there must be a serious social change, at least, in two important aspects: community building and development of a sharing culture. In particular, the change should enable educators working with researchers and professional societies, educators who are willing to share education resources as well as their time (through such activities as the development of reusable instruction modules, mentoring, reviewing, and advising). Educators must feel empowered to reuse resources with community support, if required.

3) DLEs in science include not only textual and multimedia information, but real-time data – the results of measurements provided by specialized organizations nationally or globally. DLEs also give the access to expensive scientific instruments (e.g. electronic microscopes and telescopes) and specific services. Such possibilities create efficient conditions to involve learners in research at the early stages of their education.

4) DLEs must facilitate various services, such as cataloguing, archiving, selective dissemination of courseware and other instructional materials developed internationally, annotation, evaluation, cross-lingual search and retrieval, personalization, recommendation, instructor support, and copyright management.

5) A gap exists between technological and informational possibilities of current DLEs and the available systematic reports of teachers and learners on the actual experience

of their usage. During the work on the survey, a few success stories have been collected at the University of Michigan, USA, showing how “collective memories” can be beneficially applied in a classroom. Analysis and evaluation of the real practice of DLE use require specific attention from DLE governance bodies and respective funding organizations. Systematic evaluations are still needed to estimate the effectiveness of new models of learning environments and new DLE-incorporating pedagogical methods (e.g. being student-centric, enabling group work on real world problems, customization of educational programs for different students, interaction of learners with the required subject domain, curriculum-based access to learning objects, course design with reuse of existing educational modules, etc.).

6) Existing DLE architectures, technologies and methodologies have not yet become mature. DLE frameworks start simply, being metadata-based and organized according to the metaphor of a conventional library. With time and experience, these frameworks are expected to evolve into more knowledge-based systems using conceptual definition of subjects, curricula, and ontologies introduced (in parallel with the metadata layer) for the subject definitions in various areas of teaching.

According to the framework based on the metaphor of a conventional library, a DLE as a collective memory can be considered a container extending the conventional library (cataloguing) practice. In this case the granularity of the memory is at the level of “information entities” – electronic versions of books, journal articles, images, and videos. Metadata schemas support retrieval focused on information entities (as in the conventional tradition of bibliographic cards), not on subject structuring and the respective granularity of retrieved items. Such an approach looks reasonable at least because of the large

heritage of traditional information entities and the significant difficulty in getting an access to proper information items by content.

On the other hand, analysis of DLEs, specifically the ones for different branches of science, shows that information in such libraries (acting as collective memories) should be differently structured. Textbooks and courses are no longer good information entities. “Bibliographic cards” do not suit for information search. Educational domains in different branches of science should be properly structured. More suitable entities can be concept spaces, theories, models, hypotheses, experimental results and measurements, curricula, and educational modules. Scientists have spent centuries to reach well-defined structures, concepts and theories in various branches of science. These definitions cannot be used following the conventional library metaphor; they are more suitable as a guiding principle for information structuring and search in DLEs.

For this reason, gradual DLE evolution from the current framework based on the metaphor of a conventional library to a more knowledge-based organization is expected. With time and experience, these frameworks will be upgraded with conceptual definitions (ontologies) of subject domains and curricula along with the conventional metadata so that information resources can be registered in accordance with the proper subject definition and granularity. This trend will also lead to a higher level of coherency of the information collected in a specific subject domain, by contrast to metadata use, where the collected materials are more diverse though less relevant to the subject.

There is a discussion that DLEs need to be constructed to facilitate

an access by a human and a computer, i.e. there must be semantic and supportive cross-resource and cross-domain searching and harvesting. To allow for best dissemination practices, the reusability of resources and harvesting at semantic levels beyond OAI<sup>9</sup>, current research, such as the work related to the semantic Web (e.g. DAML<sup>10</sup>/OIL<sup>11</sup> and OWL<sup>12</sup>) should not be overlooked.

Several directions of research and development surveyed in this report indicate that such evolution has already started.

7) The subject of Digital Libraries for Education is too broad to be covered exhaustively in one survey. Through consideration of several carefully chosen projects, this survey attempts to concentrate on advanced topics, to analyse the current state of the technology, and to foresee the probable directions of its forthcoming evolution. The report could not consider every educational discipline, mostly concentrating on education in natural sciences and engineering. Thus the specificity of DLEs for many other disciplines needs to be investigated further. Geographically, the report is based on information produced mainly in the USA and Europe. For completeness, the DLE development programs in the rest of the world need additional serious analysis. Even collecting the information about the state-of-the-art in different countries is difficult because of the insufficient level of information available and the diversity of the presentation languages.

8) Several important issues were not sufficiently revealed in this survey and require separate discussion:

- Sustainability and economic issues are crucial for DLE development: What are the visions here? What are the approaches?

<sup>9</sup> Open Archives Initiative

<sup>10</sup> DARPA Agent Markup Language

<sup>11</sup> Ontology Inference Layer

<sup>12</sup> Ontology Web Language

What can governments and private companies or organizations fund? What will result from volunteer efforts undertaken in connection with educational institutions, or in connection with professional societies? How can the numeric dominance of students be leveraged to have their efforts lead to benefits (through sharing of theses, dissertations, technical reports, portfolios, etc.)?

- Preserving the national language as well as a cultural and historical identity in the education and globalization of DLEs: for example, is a move toward an international DLE reasonable? Or is it better to have national DLEs that somehow interoperate? If so, who would help guide and ensure interoperability? The argument that each nation needs a DLE is not well justified. Can every nation afford one? Why not have regional DLEs? Why not have DLEs for language

groups? Are differences in languages really so important that we must have different DLEs if content is in different languages? What about countries like India where many languages are spoken? What of the fact that teaching of mathematics is less tied to natural language because the language of mathematics is used?

9) A main conclusion of the survey is that to provide a competitive education, different countries should establish their own DLEs (e.g. as a national DLE, collaboratively with other DLEs, or as a regional DLE). They cannot passively wait till suitable global digital educational content is formed. The digital content of DLEs remains dependent on the language (or language groups) used by the educational community in each country, as well as cultural and national traditions in education. A significant amount of time is required to form

the national community around DLEs, collect the DLE content, and educate specialists to develop, maintain, and govern DLE.

On the other hand, a DLE is distinguished from other ICTs applicable to education (e.g. multimedia, distance learning) by several important features:

- To establish a DLE (after technology is installed as software components), serious efforts are required to collect (harvest, integrate, gather, register) the digital resources, and to maintain and continuously extend them. If the digital content is not completely borrowed from another DLE, this process requires specific organizational efforts and investments. It is not a task that can be done by an individual (the way an educator can individually establish and use multimedia technology while preparing courses). Governance,

maintenance, and a community must be arranged around the DLE to make it sustainable.

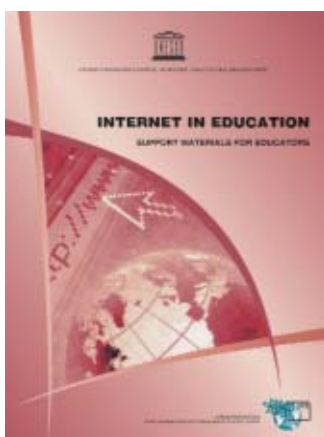
- To make a DLE useful, additional efforts are required to provide for preserving the proper quality of the digital content. This is not an individual effort either. Various organizations in society must be involved in the process of creating digital content of the required quality.
- To make information in digital form widely available requires supporting the rights of access and use, including copyright, preservation of the integrity of the document, licensing, and payment for use.
- In DLEs with digital content a wide set of interrelated services require administration and development.

**Leonid Kalinichenko**

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## INTERNET IN EDUCATION: NEW STAGE OF THE PROJECT DEVELOPMENT

### Review of the support materials for educators



The Internet swiftly entered the life of the humankind in the 20th century. It took us less than ten years to comprehend the fact of its spreading all over the world, including the developing countries. It has become not only the hugest information resource, but – what is even more important – also the most rapid means of communication. People from different countries have got an opportunity to communicate with each other in quite a short time. They have a

chance to become aware of what is common for nations that can unite them and what is different, what peculiarities of culture should be taken into account to get mutual understanding.

Moreover, people in different countries, not only in the cultural and scientific centres, have got a chance to get education in famous universities. Disabled children, invalids can learn at schools, colleges and universities by distance. Those who study at schools, universities, colleges can enhance their knowledge using the educational literature, encyclopaedia, references, dictionaries, databases, which have free access, participating in distance education courses, in collaborative projects with students from other schools, universities as well as other countries, discussing different problems with them.

So, the opportunities, which the Internet can offer to the people in

the sphere of education, are really unique. But we should keep in mind one simple idea that the Internet was not invented especially for education. Is there any basis for sceptical and pessimistic evaluations concerning the use of the Internet in education? What can one say about the state-of-the-art and the tendencies in this sphere? What are the main problems and dangers facing national educational systems, directors of particular educational institutions, teachers and learners on the way to Internet technologies? Finally, where can the information about progressive experience of overcoming difficulties in this sphere be found?

To find the answers to these and other questions, the UNESCO Institute for Information Technologies in Education (IITE) acting within the framework of the Major Programme IV (29 C/5), in 1999 initiated the project

*Internet in Education* to investigate main aspects of Internet usage in education.

In the course of the project IITE closely collaborated with CI (Communication and Information) UNESCO Sector, UNESCO Cairo Office (Egypt), International Federation for Information Processing (IFIP), The Advisory Unit: Computers in Education (United Kingdom), Charles University (Czech Republic), Technological Horizons in Education (T.H.E., USA), Centre of Informational and Analytical Provision of Distance Education System (CIAN, Russian Federation), University of New Mexico, Organizational Learning & Instructional Technologies Program, College of Education, Albuquerque (USA), International Centre for Scientific Computing at the Czech Technical University in Prague (Czech Republic), Republican Scientific-Methodical Centre

of Informatization in Education (Kazakhstan), National Institute for Higher Education (Belarus State University), Computer Analytical Centre of the Ministry of Education of Belarus, Institute for Applied System Analysis of the Ministry of Education Ukraine, UNESCO Training Centre San Sebastián (Spain), Russian Academy of Education (Russian Federation).

One of the project goals was to review the state-of-the-art, needs and perspectives. For this purpose, assuming the UNESCO's function of a clearing house, IITE compiled the analytical survey *Experience of Internet Usage in Education*, which examined about 90 works of the leading researchers and teachers from different countries.

In-depth characteristics of Internet usage in education were presented in the survey:

- typologies of Internet applications in education;
- descriptions of Internet technologies used in education;
- statistical data of particular Internet applications distributed according to social and age groupings in different countries;
- achievements of Internet usage in education, systematized according to various types of educational activity. Simultaneously the corresponding problems in teaching/learning were considered as well as those in organization and management of educational institutions and educational systems at different levels.

Based on the analysis of the needs of UNESCO Member States and serving as a catalyst for international cooperation, IITE together

with Education Sector, Sector of Communication and Information organized a meeting of experts and a workshop. The National Commission for UNESCO of Belarus invited IITE to hold the meeting in Minsk (Belarus) from 1 to 4 March 2000 and suggested Belarus State University National Institute for Higher Education and the Computer Analytical Centre of the Ministry of Education of Belarus as base organizations for holding the meeting. Participants from nine countries (Belarus, Czech Republic, Egypt, Germany, Kazakhstan, Russian Federation, Ukraine, United Kingdom and USA), as well as from the Council for Cooperation in the Field of Education of the CIS (Commonwealth of Independent States) Countries and the IFIP WG 3.6 took part in the meeting and workshop in Minsk. Given the great interest called by this event, a considerable number of Belarus specialists in education and information technologies as well as representatives of mass media attended the meeting and workshop. At the end of its work the meeting adopted the Recommendations on the discussed issues addressed to IITE. The participants expressed their desire to participate in the project by taking part in this development, expertise, approbation and application of results.

At the current stage of the project, the UNESCO's function "to be a learning organization" is brought to the forefront. IITE activities aim at capacity-building in Member States where the Institute is getting involved in training activities. The object is to prepare and test a set of teaching/learning materials for IITE training programme, related to Internet usage in education. The participants in

the project organized an authors' group to elaborate the support materials for educators *Internet in Education*. Among the members of an international team who contributed to the preparation of the support materials are Mike Aston (United Kingdom), Sylvia Charp (USA), Azat Khannanov (IITE), Zdena Lustigova (Czech Republic), Juan Ignacio Martinez de Morentin (Spain), Marina Moiseeva (Russian Federation), Juan María Ferreras Orbegozo (Spain), Evgenia Polat (Russian Federation).

The analytical survey mentioned above makes up Part I of the support materials. The reader is given a chance to get familiar with the positive aspects that the Internet provides for the sphere of education and the problems, which arise. Special attention is drawn to the problems, which authors consider especially significant for the education systems' decision-makers and for those who organize teaching and learning process. The analytical materials of the first part cover the situation in the USA, European countries, some countries of Africa and Asia.

Part II can be considered the materials for discussion. It can be useful when one needs to ponder on the problem, to argue about different views, to formulate one's position. It concerns different aspects of the problem – the changes in cultures of different nations inspired by the spreading of computer technologies in different spheres of life of the mankind; the authors' philosophical interpretation of those changes; the pedagogical and, to some extent, psychological basis of the problem and the effectiveness of integration of

Internet technologies in education, including distance education.

Materials of this Part are addressed to:

- educators, showing them the possibilities of Internet usage in different educational situations;
- teachers, offering them an opportunity to favour their permanent training process, guiding them on the possibilities of the Internet in their educational task.

Each of the four units of this Part and sub-units are preceded by a preamble where the main points of the sub-unit are formulated and sometimes some of the points are debated. It helps readers form their own position.

Part III is quite autonomous. It is a practical course on Internet technologies, designed especially for users in the educational sphere. It can be helpful for those who have not yet mastered these technologies but are ready and eager to do so.

In the Appendix to the support materials a comprehensive list of references to Internet resources in education can be found.

The support materials present a source for educators who must be aware of the situation with the problem of Internet usage in education; and for teachers and tutors who conduct teaching and learning process widely using the Internet either in the conventional education or in the distance form.

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