

UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION

PROCEEDINGS OF THE
UNESCO INTERNATIONAL SUB-REGIONAL SEMINAR

**THE USE OF DISTANCE EDUCATION AND
INFORMATION AND COMMUNICATION TECHNOLOGIES
IN TEACHER EDUCATION:
TRENDS, POLICY AND STRATEGY CONSIDERATIONS**

21-23 NOVEMBER 2002, KIEV, UKRAINE

UNESCO

Coordinator: Mariana Patru

Chair and Editor: Paul Resta, The University of Texas at Austin (USA)

Contributors and Participants:

For further information, please contact:

Jonathan Anderson, Australia
Simion Caisin, Moldova
Miroslava Cernochova, Czech Republic
Valentina Dagiene, Lithuania
Petru Gaugash, Moldova
Vladimir Gritsenko, Ukraine
Iveta Gultniece, Latvia
Jevgeni Koshelev, Estonia
Svetlana Kudrjajtseva, Ukraine
Andrea Kulakov, Macedonia
Ratimir Kvaternik, Croatia
Gabor Laszlo, Hungary
Radoslav Milosevic-Atos, Serbia and Montenegro

Anca Nedelcu, Romania
Mariana Patru, UNESCO
Hilary Perraton, United Kingdom
Stanislav Sinor, Czech Republic
Danijela Scepanovic, Serbia and Montenegro
Alexey Semenov, Russian Federation
Vladimir Sharov, Ukraine
Dimitar Georgiev Tsvetkov, Bulgaria
Marina Tsvetkova, Russian Federation
Vyacheslav Valuisky, Ukraine
Ivana Zlatanovic, Serbia and Montenegro
Natalia Zarudna, Ukraine

Mariana Patru
Division of Higher Education
UNESCO
7, place de Fontenoy
75352 Paris 07 SP, France
Phone: 33-1-45 68 08 07
Fax: 33-1-45 68 56 26
E-mail: m.patru@unesco.org

The authors are responsible for the choice and presentation of facts contained in this publication and for the opinions therein which are not necessarily those of UNESCO and do not commit the Organization. The designations employed and the presentation of the material throughout this publication do not imply the expression of any opinion whatsoever on the part of UNESCO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

© Division of Higher Education
UNESCO 2003

ISBN 966-8002-72-5

FOREWORD

In the knowledge society, issues related to education and training are of the highest priority because they determine a society's potential to prepare its members for the challenges of the modern world. Along with many other countries, Ukraine participates in the UNESCO programme "Education for All", which strives to provide equal and ubiquitous access to educational resources and improve the training of teachers and instructional staff. In this respect, the establishment of the UNESCO Chair in "New Information Technologies in Education for All" is an important step towards consolidating efforts and fostering innovation in teacher training.

One of most critical challenges of the knowledge society is to promote the creation and widespread use of modern information and communication technologies for learning, education, and training. They can be instruments of innovation, a driving force for progress in educational transformations, and a gateway to education for all. The UNESCO Chair's primary objectives are to support the creation of innovative intelligent technologies for learning and training; to focus on educational tools that facilitate new pedagogies; to offer techniques for the development of interoperable and reusable learning resources; and to provide efficient and targeted teacher training in ICTs and distance education.

It was an honour for the newly established UNESCO Chair to co-host the UNESCO International Sub-Regional Seminar on the "Use of Distance Education and Information and Communication Technologies (ICTs) in Teacher Education: Trends, Policy and Strategy Considerations", which provided a forum for opinions, experience and best practices. The Seminar highlighted strategies for incorporating ICTs into the educational process related to cultural background, traditions, and infrastructure, and the problems commonly encountered. It also paved a way for further collaboration among the participants.

The UNESCO Chair will continue to promote the sharing of experience and best practices by developing and strengthening links with UNESCO Chairs and other educational bodies to establish a partnership network for collecting and disseminating exemplary models and strategies in distance learning and ICT use in teacher education.

VLADIMIR GRITSENKO
UNESCO Chair
"New Information Technologies in Education for All"

FOREWORD

As noted in *UNESCO World Education Report: Teaching in a Changing World*, information and communication technology (ICT) has transformed all aspects of global society, including business, industry, science, engineering, medicine, agriculture, and medicine. These technologies also have the power to transform the nature of education, where and how learning takes place, and the roles of students and teachers in the learning process (UNESCO World Report, 1998). To make this happen, however, requires that teacher education institutions and policy makers take a leadership role in harnessing the power of ICT to help transform education, or be left behind in the swirl of rapid technological change. In response to this need, UNESCO has developed a number of resources to help ministries of education and teacher education institutions infuse ICT into teacher education including, *Information and Communication Technologies in Teacher Education: A Planning Guide* that describes essential conditions and provides a framework and models for integrating ICT in teacher education.

World-wide, there is growing recognition among policy-makers and educators that the educational system that was designed to prepare students for an agrarian or industrial-based economy will not provide them with the skill and knowledge they will need to succeed in the 21st century knowledge-based global economy and society. The UNESCO 1998 World Report notes that the new technologies challenge conventional conceptions of both teaching and learning methods. To meet these challenges schools must embrace the new technologies and appropriate the new ICT tools for learning. They must also move toward transforming the traditional paradigm of learning (UNESCO World Report, 1998. p. 19).

As part of its leadership role, *UNESCO convened the International Sub-Regional Seminar on the Use of Distance Education and Information and Communication Technologies in Teacher Education: Trends, Policy and Strategy Considerations* in Kiev, Ukraine from November 21 to 23, 2002. The purpose of the seminar was to provide a unique opportunity for policy-makers, teacher educators, and technology experts to come together to analyze ongoing trends, policy issues, national strategies, and best practices in infusing ICT into teacher education. The discussions and recommendations that emerged from the Seminar help frame the needs, challenges, and opportunities for the use of distance education and ICT in Teacher Education. The papers presented by the participants provide a rich array of creative efforts, national strategies, and best practices in integrating ICT and distance education into teacher preparation and professional development programs. It is hoped that these ideas may help other countries facing similar challenges in the application and integration of information and communication technologies into both pre-service and in-service teacher education programs.

PAUL E. RESTA
Editor and Seminar Chair

PREFACE

Improving the quality of education and implementing successful ICT-enabled teacher education programmes are central to UNESCO's policies on training teachers, teacher educators, and other educational personnel.

This book contains the *Proceedings* of the UNESCO International Sub-Regional Seminar on "The Use of Distance Education and Information and Communication Technologies (ICTs) in Teacher Education: Trends, Policy and Strategy Considerations", organized by the Teacher Education Section, Division of Higher Education, in Kiev, Ukraine, from 21-23 November 2002. The Seminar was organized in close cooperation with the UNESCO Chair in New Information Technologies in Education for All, based at the International Research and Training Centre for Information Technologies and Systems (IRTC).

The Seminar was aimed at decision-makers, senior planners, and teacher educators responsible for the implementation and supervision of activities related to the application of ICTs and distance education in teacher training programmes in Central and Eastern European countries. The Seminar presented an overview of the national and regional policies and strategies promoting the use of new technologies in teacher education in these countries; highlighted key developments, innovative pedagogical approaches, methods, and good practice in this area; and encouraged sub-regional co-operation and knowledge sharing.

UNESCO would like to extend its sincere thanks and gratitude to all moderators and participants in the meeting, particularly to Professor Paul Resta (USA), Chair of the Seminar and Editor of this publication, Professor Jonathan Anderson (Australia), Dr Hilary Perraton (UK), Dr Alexey Semenov (Russian Federation) and Dr Vladimir Gritsenko (Ukraine), UNESCO Chair and Director of the International Research and Training Centre for Information Technologies and Systems for their essential role in making this UNESCO event successful. A word of special thanks also goes to the National Commission of Ukraine for UNESCO for their support in the organization of the Seminar.

MARIANA PATRU
Division of Higher Education, UNESCO
Coordinator of the Seminar

CONTENTS

EXECUTIVE SUMMARY	7
RECOMMENDATIONS OF THE SEMINAR	16
ANNEX 1	19
ANNEX 2	24
ANNEX 3	25
ANNEX 4	29
ANNEX 5	36

EXECUTIVE SUMMARY

AIMS OF THE SEMINAR

In line with its mission to assist Member States in reinforcing national capacity building and international co-operation in the use of information and communication technologies (ICTs) and distance education in teacher education, UNESCO convened an International Sub-Regional Seminar on *The Use of Distance Education and Information and Communication Technologies in Teacher Education: Trends, Policy and Strategy Considerations*. The Seminar, hosted by the International Research and Training Centre UNESCO for Information Technologies and Systems (IRTC) based in Kiev, was organized in co-operation with the Ministry of Education and Science of Ukraine and the National Commission of Ukraine for UNESCO, and was held in Kiev, Ukraine, from 21 to 23 November 2002.

The Seminar was designed to provide an opportunity for policy makers, senior planners, high-level experts and teacher educators from 14 countries in the sub-region to analyze ongoing trends and policy issues, and exchange experience and good practice on the impact of new technologies on the teaching profession.

The meeting focused on issues related to the application and integration of ICTs and distance education into teacher training programmes (both at pre- and in-service level), more specifically on:

- ICTs and teacher education: global and sub-regional context and framework;
- modeling ICT development at the school level;
- teacher education curriculum planning and development: approaches, strategies and models for integrating distance education and ICTs into teaching/learning;
- national/regional policies and strategies in using distance education and ICTs in teacher education;
- managing innovation and change: introduction of distance education and ICTs in professional development programmes for teachers and teacher educators;
- good practice guidelines/models on the use of distance education and ICTs in teacher education.

OPENING CEREMONY

The Seminar opened on 21 November 2002 in Kiev with three welcoming speeches. The first speech was delivered by Ms Natalia Zarudna, Deputy State Secretary of the Ministry for Foreign Affairs, Vice President of the National Commission of Ukraine for UNESCO, who greeted the participants on behalf of the Ukrainian government. The second speech on videotape was given by Mr John Daniel, Assistant Director-General for Education of UNESCO, who welcomed the participants on behalf of UNESCO. The third speech was delivered by Dr Vladimir Gritsenko, Director of the International Research and Training Centre (IRTC) and UNESCO Chair in “New information Technologies in Education for All”, based at the IRTC. All three speeches are reproduced in Annex 1. Greetings were also sent by Academician Boris Paton, President of the National Academy of Sciences of Ukraine, and Dr Vasyl Kremen, Minister of Education and Science of Ukraine.

The opening ceremony ended with the nomination of Dr Paul Resta, USA, as Chair of the Seminar, and of Dr Jonathan Anderson, Australia, as Chair of the Drafting Group.

OPENING PLENARY SESSION

According to the Agenda (see Annex 2), **Ms Mariana Patru**, Programme Specialist in the Higher Education Division of UNESCO, opened the plenary session with a short presentation of the main aims and outcomes of the Seminar, dwelling on UNESCO's strategy in the field of teacher training using ICTs and distance education; she then gave an overview of UNESCO's major initiatives in the field of teacher training using distance education and ICTs over the past ten years, stressing the importance of several activities undertaken as a result of recommendations of several international conferences convened by the Organization, such as the Second International Congress on Education and Informatics (Moscow, July 1996); the World Conference on Higher Education (Paris, October 1998), the World Education Forum (Dakar, April, 2000). Ms Patru briefly introduced, first, the documents developed by UNESCO, which served as basic documents for discussion and sharing of good practice at the Seminar, and, second, the four high-level experts invited to moderate the three panels.

The plenary session continued with the presentation of four keynote papers aimed at: (i) exploring the current global and regional trends and pedagogical issues in the application of new information and communication technologies; (ii) analyzing the impact of new technologies on social, economic and cultural development in general; and (iii) examining policy and strategy issues related to the role of ICTs and distance education in widening the access of millions of young people and adults to education and in recruiting and training greater numbers of teachers and other educational personnel.

The first presentation, entitled "ICTs in Teacher Education: Challenges and Opportunities", was made by **Dr Paul Resta**, Director, Learning Technology Center, University of Texas at Austin (USA). In his address, Dr Resta outlined global challenges for ICTs in teacher education: rapid increase in technology capabilities; exponential growth in knowledge; critical need for basic skills and growing demands for high levels of education; rapidly changing and evasive future; and the changing paradigms of teaching and learning. In order to meet these challenges, teacher education needs to use ICTs as the new tools for learning to prepare students to be successful in a knowledge-based society. There are also new opportunities to support the successful infusion of ICTs in teacher education, such as taking advantage of new and emerging technologies that may provide more powerful and cost-effective tools for learning; the use of distance learning as part of a strategy to prepare new teachers or to update skills of the existing teaching force; access to open educational resources from universities such as the UNESCO Open Educational Resources Project; sharing of expertise and resources such as online degree programmes, courses and educational resources; private sector support partnerships providing equipment, training and/or expertise; and opportunities for developing

new pedagogies based on the growing knowledge of how people learn in different cultural and linguistic environments.

The second keynote paper on "Barriers and Strategies for Integrating ICTs and Distance Education into Teacher Education" was presented by **Dr Jonathan Anderson**, School of Education, Flinders University, Australia. In drawing a comparison between the diversity of the Asia and the Pacific Region, where his country is situated, and that of Central and Eastern Europe, the speaker stressed the way in which geographic and demographic factors can affect access to ICTs. Referring to five research and development projects in which he had been involved over recent years, the following barriers to implementing ICTs were most frequently reported: (i) physical barriers like remoteness and an unreliable electricity supply; (ii) scarcity of funds; (iii) lack of staff development; (iv) insufficient and inappropriate software; (v) and the speed of technological development. Based on a concrete example (Jamaica), he illustrated how a given country may respond to such major challenges. Key elements of success in this project were the active involvement of the Jamaica Computer Society, the support of the business community, and bi-partisan political support. Dr Anderson then referred extensively to a UNESCO publication (in press) "ICTs in Education: A Curriculum for Schools and Programme of Teacher Development", in the development of which he had played a leading role, highlighting two models in this document that can help to identify where countries and education systems are positioned with regard to the introduction of ICTs. Mention was also made of two further UNESCO projects (on CD-ROM).

The third presentation, entitled "Strategies for In-service Teacher Development", was made by **Dr Alexey Semenov**, Institute of Open Education, Moscow, Russian Federation. The speaker stressed that a more general context was needed for discussing the major theme of the Seminar. In order to design a curriculum for teachers, a level of ICT implementation in schools should be taken into account, which is characterized by five stages: Awareness, Literacy, Application, Using, and Transformation. These levels can be reached subsequently, or "leap-frogged". Another issue to bear in mind was the set of goals underpinning the introduction of ICTs in schools and indicators of success, the two being directly connected. He considered the following statements: Computers vs. ICTs (cameras, sensors); Computer Labs vs. ICT environment (library, teachers' room); Hardware vs. Access (after-hours, open doors), outlining that students should be involved in higher order activities and project-based learning. The training of teachers should be based on the same features: it should be connected with the teacher's life and interests (teacher's family and students), reflect the process of learning (the teacher can videotape the learning sessions), design and project future process of teaching and learning in schools. The speaker illustrated his statements with several models of teacher development. These models were drawn from the UNESCO publication, "Information and Communication Technologies in Teacher Education: A Planning Guide", which he had co-edited with Dr Resta.

The opening plenary session ended with the fourth keynote speech given by **Dr Hilary Perraton**, Senior Research Fellow, International Research Foundation for Open Learning (IRFOL), UK. The speaker distinguished between two issues of the Seminar: the first, the use of open and distance learning for the education and training of teachers generally; and, second, strategies to raise the skills of teachers in relation to information and communication technologies. His presentation was devoted to the first issue, based on a research project carried out by IRFOL on behalf of UNESCO. Two UNESCO publications reported on the project: *Teacher Education Guidelines: Using Open and Distance Learning* and *Teacher Education through Distance Learning*. The first gives practical guidance on options in open and distance learning while the second describes ten case studies on which the guidelines were based. These publications provide useful information about varied uses of open and distance learning, which usually combine teaching done at a distance with face-to-face support for teachers. Four main points were stressed. First, teacher education is not simple and needs to serve a range of different purposes, to take place in differing locations, with different phasing, and with differing content. Teachers are expected to do a variety of different things which might include fostering the personal development of their students, the transmission of culture, ensuring that education meets workforce and economic needs, giving learners the capacities they would need as adults, helping the process of social transformation and other purposes. The second, as shown in the UNESCO/IRFOL case studies, open and distance learning has been successfully used for teacher education. It could have advantages in terms of cost and make it possible to offer education and training to teachers without their having to leave the classroom. The third, the case studies identified a set of major policy issues to be considered in developing open and distance learning for teachers. Integration between conventional and distance-learning approaches is a crucial point. These two approaches need to be used in a complementary way without competition between them. Finally, it is necessary to think about the role of international cooperation, where we can usefully learn from each other, and international competition that could work against the interest of national education systems. The General Agreement on Trade in Services (GATS) could bring secondary and tertiary education to international, commercial competition. Individual countries have an immediate and urgent opportunity to decide their position on these issues before the GATS conference in March 2003.

The Seminar Timetable is in Annex 3, while a List of Participants is in Annex 4.

PANEL DISCUSSION 1:

Teacher Education curriculum planning and development: approaches, strategies and models for integrating distance education and ICTs into teaching.

The Panel was moderated by **Dr Hilary Perraton**, UK. The following presentations were considered on this topic:

Mr Jevgeni Koshelev, Centre of Educational Technologies, Pedagogical University, Tallinn, Estonia: "ICT in Education: Course for Pedagogical University Students".

Dr Marina Tsvetkova, Ministry of Education, Russia: "Triangle of Information Space of a Resource-Centre (basic school)".

Mr Andrea Kulakov, Centre for Open and Distance Education at the Faculty of Electrical Engineering, Skopje, Republic of Macedonia: "Experience from Incorporating ICTs into Education".

Dr Vyacheslav Valuisky, National Technical University of Ukraine "Kiev Polytechnic Institute", Ukraine: "Distance Learning under Ukrainian Distance Learning Center Support".

Dr. Valentina Dagiene, Institute of Mathematics and Informatics, Vilnius, Lithuania: "Teacher Training in Using ICT: A Lithuanian case".

The discussions in Panel 1 focused on teacher education curriculum planning and development. The changing goals of education are closely connected with changes in society. In this respect, special attention was paid to *strategies to change teacher education programmes* at different levels: national, governmental and institutional. Some *alternative models of teacher education and training* were proposed.

Participants in Panel 1 devoted particular attention to *changing teachers' roles*. There was unanimous agreement that these changes and the development of staff qualifications are extremely important for successful ICT implementation in education. This could be achieved by providing conditions for all teachers, school librarians, and ICT coordinators to acquire sufficient ICT literacy skills; to develop an effective and flexible system of in-service teacher training and lifelong learning; and to develop a multi-level system of incentives for all teachers who effectively apply ICTs in education.

The issues of *localization of global resources and importance of cultural and language issues in ICT-based education* were also addressed. Participants pointed out that the vast majority of accessible information on the Internet is in English. There is a need to make these resources adapted to specific country contexts.

The problem of *educational and technical standards* for learning resources was discussed. In this respect the ICT Literacy Standard for Educators, approved by the National Curricula of the Lithuanian General Education Programme, deserved special attention. The Standard establishes the requirements for pre-service and in-service teacher training curricula for all levels. The Standard should be a part of teachers' certification requirements, particularly for those teachers seeking a higher certification category.

Arising from these discussions, several areas for suggested action by UNESCO were suggested. The first area relates to the need for methodological materials and guidelines to help teachers effectively use ICTs in schools with the purpose of enhancing the learning process. In this respect, participants encouraged UNESCO to continue the development of quality teacher training resources such as those provided at this Seminar. A second concern was a lack of standards in education at different levels, which is seen as a barrier to ICT implementation in teacher education, and again UNESCO was encouraged to take a coordinating role. The third area where UNESCO might lend support is in the development of educational software in a variety of national languages.

PANEL DISCUSSION 2:

National / regional policies and strategies in using distance education and ICTs in teacher education.

The Panel was moderated by **Dr Alexey Semenov**, Russian Federation. The following presentations were made at this panel:

Dr Dimitar Tsvetkov, Ministry of Education and Science, Bulgaria: "The Essence of Distance Education and Its Development in Bulgaria".

Dr Petru Gaugash, State University, Moldova: "E-learning in Educational Management".

Mr Radoslav Milosevic-Atos, Principal, Secondary Art School, Serbia and Montenegro: "Strategy of Implementation of ICTs in the Education System of Montenegro: Ideas for Today and Tomorrow".

Ms Anca Nedelcu, Ministry of Education and Research, Romania: "The ICT-Aided Education System Government Programme".

Discussions in Panel 2 focused on *open and distance learning* in the context of *present challenges* and *opportunities*. In some presentations, key concepts were examined, current global and regional trends outlined, and policy and strategy considerations suggested. Other presentations focused on changes to take place in *management strategies* at educational institutions level, and on the *integration of ICTs into school curricula*.

The panel presentations showed there were great differences between the countries in the Sub-Region, as well as a number of similarities. A lack of infrastructure and professional competence in open and distance learning remain important barriers. Nevertheless, the newer forms of educational delivery brought about by ICTs have come to stay, and many countries are looking at open and distance learning as a major strategy for expanding access, for improving quality, and ensuring cost-effectiveness. Focus should be given to making substantial changes, especially in the creation of new types of schools that answer the emerging challenges of the knowledge society and the needs of children, including those with special needs.

PANEL DISCUSSION 3:

Managing innovation and change: introduction of ICTs and distance education in professional development programmes for teachers and teacher educators.

The Panel was moderated by **Dr Jonathan Anderson**, Australia. The following presentations were made at this panel:

Ms Iveta Gultniece, State University, Latvia: "Latvian Education Informatization System (LIIS) Project".

Dr Miroslava Cernochova, Charles University, Czech Republic: "Two Models How to Develop Student Teacher On-line Teaching Skills".

Dr Ratimir Kvaternik, Ministry of Education and Science, Croatia: "In-service Teacher Training for the Application of ICTs in Croatian Schools".

Ms Ivana Zlatanovic and **Ms Daniela Stepanovic**, Ministry of Education and Sports, Serbia and Montenegro: "Managing Innovation and Change: Introduction of ICTs and Distance Education in Professional Development Programmes for Teachers and Teacher Educators."

Dr Svetlana Kudrjartseva, IRTC, Ukraine: "Introduction of ICTs and Distance Education in Programmes for Teachers and Teacher Educators."

The presentations in Panel 3 consisted of *case studies* from Member States of *innovative practices in the use and application of ICTs* in schools and departments of teacher education in universities. One case study where the aim was to introduce ICTs throughout the whole education system, including education content, management, information services, training, and infrastructure, illustrated a well-known change model in which began with the creation of the necessary conditions for success. Other case studies pointed to the essential role of leaders in managing change. All the case studies showed, in different ways, that the introduction of an innovation in programmes for teachers or teacher educators starts with dissatisfaction with the current state of doing things and a resolve to change, which in turn requires a deep commitment from all who are involved in the planned changes together with a strong belief and enthusiasm for the changes.

Discussions in Panel 3 reflected on the usefulness of the various ways to manage innovation and change presented in the case studies. Panelists agreed it would be very beneficial if the case studies, augmented by other experiences from Member States, were available for access on the Web.

INFORMATION SESSION:

Meeting with leading Ukrainian specialists and heads of selected higher education and teacher training institutions.

The meeting with leading Ukrainian specialists from various universities and teacher training institutions focused on issues related to the application and integration of ICTs and distance education into teachers' development programmes.

The meeting began with a welcome address by **Ms Mariana Patru**. She greeted the Ukrainian educators on behalf of UNESCO and stressed the importance of UNESCO's initiatives for increasing the number of teachers and raising the quality of their training and retraining using the new technologies. She highlighted the aims of the Seminar, describing how teacher educators from 14 countries in the Sub-Region gathered together to analyze ongoing trends and policy issues and exchange experience and good practice on the impact of new technologies in the teaching profession.

Seminar Chair **Dr Paul Resta** made a presentation on the central challenges of implementing ICTs in education, focusing specifically on increasing the quality of education in education institutions and the opportunities for ICTs in teacher education. The world needs better teachers and more teachers. Thus, one of the ways to strengthen the teaching profession is to use distance education.

Dr Hilary Perraton presented some leading trends in teachers' development in and through ICTs. He focused on the need for teachers to appropriately perceive ICTs as teaching tools. Pre-service and in-service teachers should be involved in ongoing training and retraining to become critically aware of the ways in which ICTs can support their professional needs.

Dr Jonathan Anderson spoke about two UNESCO projects that provide resources for teacher educators. The first of these is a collection of web resources, and the second is a database of teaching ideas. Both are available on CD-ROM. In a trial of these resources, teachers and teacher educators reported that the materials help overcome a scarcity of information in book and journal form in their countries.

The introduction by **Dr Alexey Semenov** was devoted to regional policies in using distance learning and ICTs in schools. He noted that new technologies and methods should not be introduced into old educational systems or rigid organizations without taking advantage of new more flexible opportunities. Other changes to consider are revolutionizing ways of organizing schools, replacing class-structure

with information-rich environments including Internet and entire local and global environments.

Dr Vladimir Gritsenko briefly described the main directions of scientific and educational activity of the International Research and Training Centre for Information Technologies and Systems. Information was presented about the work of the Centre and its significance for ICT research and development.

The importance of ICTs and distance education in an information society was emphasized. Lifelong learning is a crucial factor in implementing the global information model of Ukraine. Further pedagogical training is needed to answer the many questions about teachers' use of ICTs for design and development in their telematic-based instructional programmes. Teachers must become ICT-proficient educators who know how to use modern technologies to achieve educational reforms.

The problem of pedagogical training in the use of ICTs is common across countries of Central and Eastern Europe. Therefore the strong co-operation and experience and good practice exchange should be provided by the leading educational organizations in the countries of the Sub-Region. Principles of co-operation have been proposed, and a network of educational centres should provide effective international collaboration.

CLOSING PLENARY SESSION:

Presentation of panel reports.

The closing plenary session started with the presentation of the three panel reports. The moderators summarized the major points discussed in each panel and in presentations made by individual participants.

All reports were considered in terms of the key purposes of the Seminar. Key ideas were outlined. Participants recognized the twin needs for more research in ICTs for education and the encouragement of international co-operation and sharing of research findings. The Seminar was judged both fruitful and productive.

The participants discussed the draft Proceedings report submitted to them and made several suggestions to incorporate into the final version. They decided that their recommendations, made during the three-day Seminar, for strengthening international co-operation in the Sub-Region for ICTs and distance education use in teacher education, would be attached to the Proceedings.

In discussing the principal results of the Seminar, participants emphasized the fruitful outcomes and the collaborative spirit that characterized the debate at this UNESCO meeting.

RECOMMENDATIONS OF THE SEMINAR

1. The Sub-Regional Seminar on *"The Use of Distance Education and Information and Communication Technologies in Teacher Education: Trends, Policy and Strategy Considerations"* was judged both fruitful and productive. Despite differences in size, economic situations, educational systems, and equipment supply, the participating Member States share much in their vision of the future of ICTs in education and of perspectives of distance learning. It is recommended that the practice of organizing sub-regional seminars continue.
2. The participants expressed interest in and appreciation of the documents prepared by UNESCO for the meeting. It is recommended that the practice continue, and that electronic versions of the documents, including the Proceedings, be available via the Internet.
3. During the Seminar, participants reported on numerous programmes related to ICT training. Several case studies were devoted to the identification of target groups, their needs, and approaches for stepwise extension of teacher training programmes. An international framework for an exchange of experience, best practices, models, and educational standards would facilitate national efforts in this area. As a catalyst for international guidelines with a long-term perspective, an international meeting on educational standards in distance learning and ICTs for education, in co-operation with UNESCO, may be an appropriate forum to provide input for creating guidelines and models of good practice for national educational bodies. It would also be valuable to collect brief descriptions of the most widely accepted standards and evaluations to facilitate adaptation for local needs.
4. Discussion of teacher-training curricula and their implementation demonstrated that there are many similarities in learning content recommended. The point was made that not only should teachers be trained, but also principals, administrators, librarians, and other staff. Therefore, exemplary international modular curricula with clearly defined prerequisites and learning objectives for each module would greatly help accelerate processes of technology-enriched learning in the partner states. The purpose is to share experiences and assist in establishing adequate training programmes that meet local needs.
5. Many participants expressed the view that the ultimate goal of teacher training is to reach a stage where creative and innovative application of technologies will take place. To assist teacher educators in this, there is a need for co-operation between teachers as subject experts, and instructional designers and pro-

grammers who add technical experience and a vision of the potential of new technologies. Although this co-operation takes place locally, it would be valuable to share best practices of innovative and creative use of technologies and to ensure access of all interested parties to demonstrations and descriptions of the results of innovative practices and projects.

6. In many Member States, steps have been taken to define minimal requirements of teacher proficiency in ICTs along the lines of the European Computer Driving License (ECDL). These approaches reflect local realities and needs, but put more emphasis on the pedagogical dimension of technology use. International collaboration in this field would be valuable for the mutual recognition of teachers' qualifications and competence, as well as for setting international benchmarks in this area.
7. The participants discussed the transformation of educational systems and the role of ICTs in the process. It was noted that educational reforms are taking place in parallel with other social and economic processes, and thus have cultural and national specificity. However, certain guidelines and milestones may be identified in collaboration in the form of recommendations and case studies to facilitate setting achievable goals. In the context of a global community, open education, and accessibility for all, it is important to create an international framework for co-operation between Member States and educational institutions, as well as nationwide vision and leadership.
8. Significant interest was expressed in UNESCO's initiative in establishing an ICTs in Teacher Education Portal as a gateway to accessing internationally valuable documents, learning resources, and best practices. More efforts from Member States are necessary to facilitate the structuring, description, and collection of these materials. It is recommended that co-operation between national education portals and cross-referencing of educational portal networks be encouraged.
9. The value of access to various resources for education, including learning content, specific software, research studies, reports, curricula, and other sources presented in different languages, especially for multi-language Member States, was continually stressed. The participants encourage development and use of open source software and open educational resources that may be adapted to other cultural and pedagogical contexts. As an approach to ensuring access to materials in national languages, and as a way to facilitate searches across different repositories, the use of standard metadata for description is encouraged. It is recommended that an extension of information infrastructure for learning resources exchange be considered.

- 10.** The International Research and Training Centre for Information Technologies and Systems has proposed initiating an international project to develop a multilingual electronic handbook on ICTs in education as an Internet reference source for all involved in decision making, planning, design, creation, and use of ICTs in education. They suggest that an international editorial board be established to determine the structure of content and to invite guest editors for specific topics. Materials for inclusion may be translated and added to a core version with the voluntary participation of Member States on an ongoing basis. An online version will allow for reduced publication times, timely updates as innovations arise, and easy access for all.
- 11.** The important role of indicators and evaluation mechanisms for innovations and transformation processes was noted. It is recommended that information from UNESCO's Institute for Statistics related to ICT use in education in different countries and regions, and other regional or nationwide statistical data and qualitative information, be made available to Member States in the Sub-Region. Participants welcome initiatives in developing evaluation mechanisms and encourage input and co-operation in this field, and to this end invite UNESCO to share exemplary models and mechanisms of evaluation.
- 12.** The participants recognize the need for more research in ICTs in education and encourage international co-operation and sharing of research findings. One direction for these research studies may be the creation of intelligent learning technologies based on pedagogical and didactic principles.
- 13.** Taking account of certain similarities and specificities of countries in transition, which may be related to cultural background, pedagogical traditions, political, or economic situation, it is recommended that a focal point in this Sub-Region be established. The role of the focal point would be to collect and disseminate information, exemplary models and good practice in distance learning, and the use of ICTs in education, in close collaboration with representatives from the countries in the Sub-Region. The UNESCO Chair in "New Information Technologies for Education for All", based at the IRTC, expressed its readiness to act as focal point, in close co-operation with the institutions represented at the Seminar.

ANNEX 1

Address by Natalia Zarudna

National Commission of Ukraine for UNESCO

Deputy State Secretary of the Ministry for Foreign Affairs of Ukraine,
Vice President of the National Commission of Ukraine for UNESCO

Dear Ladies and Gentlemen,

It is my pleasure to welcome you on behalf of the National Commission of Ukraine for UNESCO and the Ministry for Foreign Affairs at the opening of this UNESCO International Sub-Regional Seminar on "Use of ICTs and Distance Education in Teacher Education: Trends, Policy and Strategy Considerations".

I am certain that the exchange of ideas and information by experts participating in the Seminar will represent a step forward in disseminating new technological achievements and best innovative experiences, and in developing new educational methods and methodologies.

Dear Seminar participants,

Ukraine views the introduction of modern information technologies and the broadening of possibilities for use of intellectual resources of society as priority components of social and economic development and its integration into the European region.

We can be proud of Ukraine's rich experience in research and development of information and communication technologies. The efforts of our scientists led to creation of the first electronic computer in continental Europe. The famous scientific school of Academician Glushkov is widely known the world over.

We positively encourage the rapid development of a national telecommunications infrastructure. The activity index of the Ukrainian Internet community grew almost twenty times in the past two years.

The Ukrainian authorities are expanding their Internet representation. A web portal of the government has become an important step towards establishing an E-government in Ukraine. The informational network of higher educational institutions is actively growing. The Memorandum on Accession of Ukraine to Pan-European Network GEANT was recently signed during the presidential visit to Austria early this month.

Such an element of political culture as Internet interaction of authorities and people is just entering Ukrainian political life. Nevertheless, even the first steps have shown that it is in demand; this interaction organically embeds itself into the general context of democratic reforms.

Of course, it is too early to speak about an information society in Ukraine as a *fait accompli*. In order to utilize the advantages of an open information society, one need

not only be a member of information network; a modern infrastructure and means of communication are needed as well. These factors continue to restrain many Ukrainian scientists and educators in their progress towards building on the achievements of humankind.

Dear friends,

The development of new information and communication technologies profoundly changes all aspects of modern life, including education.

Recently, we have experienced not only the expansion of markets for educational services, but their considerable modernization as well. Evolution of our educational system is underway: from a classical university to a virtual one; from lectures to computerized educational programs; from a library of books to a global electronic library.

A new informational environment laid a sound foundation to the development of modern distance education. Today, education by means of new technologies that remove the barrier of distance makes possible a universal humanistic form of education. It is based on the use of a broad spectrum of new information and telecommunication technologies that enable a free selection of subjects by students.

Nowadays the idea of distance education is not something new for Ukraine. Recently, our leading educational establishments have developed a concept of new education in general, and have introduced new courses and curricula that utilize modern computer technologies.

However, we should not forget that professional training of teachers plays an important role in the whole process. Highly qualified teachers can assist students in developing their individual abilities and creativity to the fullest potential.

Therefore, the topicality of issues to be discussed during this Seminar is clearly evident.

I am pleased to notice the active position of UNESCO in supporting new ideas and approaches in education. Active co-operation with the Ukrainian higher educational establishments testifies to this. In September 2002, for instance, a representative of the department of information society of UNESCO visited Kiev to discuss implementation of the "Regional Academy for Advanced Network Administration and Design", an academic project coordinated by UNDP/UNESCO, that was initiated at Taras Shevchenko National University. In October 2002, a meeting and workshop of the IITE Focal Points in the CIS countries on the UNESCO cross-cutting project "Higher Education Open and Distance Learning Knowledge Base for Decision-Makers" was held at the KPI National Technical University in Kiev.

I have no doubts that this UNESCO Seminar will be held at a high level and will bring forward many new ideas.

I wish everyone fruitful work, successful deliberations and a pleasant stay in the Ukrainian capital.

Thank you.

Address by John Daniel

Assistant Director-General for Education, UNESCO

Distinguished Guests, Ladies and Gentlemen,

It is a pleasure for me to use this distance technology to bring greetings to the distinguished members of the Government of Ukraine, of the National Commission and of teacher training institutions and to welcome you on behalf of UNESCO to this very important meeting on the use of information and communication technologies (ICTs) in teacher training.

This is a highly important topic for two reasons at least:

- The first is that the world faces a dramatic shortage of teachers in the coming years and also needs to significantly retrain the millions of teachers around the world who are already working in their profession;
- The second reason is that there are tremendous expectations around the world that ICTs can in some way help in this task of recruiting and training teachers.

It is hard to make an exact prediction of the number of teachers that are needed but in the recent report that UNESCO has brought out on progress towards *Education for All* they estimate that in the next ten years the world will need somewhere between 10 million and 35 million new teachers. That is an enormous number of people and those needs are being felt all over the world. So the topic of this Seminar is extremely important.

UNESCO's role in the world is to be five things:

- it is to be a *laboratory of ideas* where we try out new approaches to things;
- it is to be a *standard-setter* where we try and determine what is good practice, what are the best ways of doing things and then to spread that practice around the world;
- it is to be a *clearing house* where we try and inform ourselves about the new things which are going on and share that knowledge around the world as a help to innovation;
- it is to be a *capacity builder*, that is to say to help countries develop the capacities necessary to train the people necessary for these tasks and this of course is very much what you are involved in at the moment;
- and finally we are enjoined to be a *catalyst for international co-operation* and many of our most successful meetings are meetings where people

from different countries, different regions, and different backgrounds come together to work on common problems, and often come up with better solutions because they are working together than they would if they stayed in their own national or institutional environments.

My final comment to you is that it seems to me that there are two reasons why the use of ICTs is particularly important in the training and the retraining of teachers.

First is that it seems to me this is a particularly promising application simply because, by the nature of the way teachers are trained, it is easier to bring them together in groups in environments which are relatively rich in ICTs; much easier than trying to get ICTs into all the schools at once because one can bring teachers together for retraining in centres and of course one can concentrate on getting good technology into the teacher-training institutions.

The second reason is perhaps even more important and that is if we hope one day to use ICTs in a significant manner in the schools themselves for children, it will be a hopeless task unless the teachers themselves are not only comfortable with the new technologies but can use them effectively for teaching various subjects and for educating the children. Many countries have already had the experience of trying to introduce new technologies without first training the teachers; the whole thing is a flop and very soon the technology is put aside in a cupboard and forgotten.

I know that in your region you have a long history of operating through distance education. It was a very strong tradition in the former Soviet Union. And that is a helpful place to start because all we are doing with the new technologies is building on some of the approaches that have been found to work in the past when using the techniques of distance education alongside more conventional techniques to create a rich learning environment for these trainee teachers.

So I wish you well in this Seminar. I am delighted that UNESCO is playing a full role and I hope that this will help you all to go away and to make use of the wonderful technologies of the modern world in order to fulfill this vital function of producing and retraining a teaching force that can help the world achieve a high quality of education for all people.

Have a good Seminar.

Address by Vladimir Gritsenko

Director of the International Research and Training Centre for Information Technologies and Systems,
UNESCO Chair in "New Information Technologies for Education for All"

Welcome to the opening of the UNESCO International Seminar devoted to the use of information and communication technologies in education.

I would like to stress that UNESCO has demonstrated once more how effectively it can use the intellectual potential of the international community: how teacher-training problems can be addressed in an international arena and what an important role e-technologies may play.

The preparation of this Seminar has highlighted the role of these problems in the participating Member States. We recognize the unique role of teachers in a knowledge-based society. Knowledge, information, and information resources with the support of ICTs can become the engine to transform scientific and social progress. Most intellectual processes, and among them learning, are being modified and are acquiring a new form in the emerging knowledge society.

We are all witnesses to a new information environment evolving, when limits to acquiring knowledge will disappear, and when the principle "education without borders" will triumph. In such an environment the role of the teacher is unique. It is therefore imperative that teachers possess modern skills such as familiarity and ease with the use of ICTs in the classroom.

Ukraine has made its own contribution to solving these problems. The first continental computer was created in the monastery in Feofanija, not far from here. We celebrate 100 years since its constructor Lebedev was born and 50 years since it was created. The process of informatization of education in Ukraine is coordinated by The National Academy of Science of Ukraine and The Ministry of Science and Education of Ukraine. The most important tasks of the government in this field are represented in the National Programme of Informatization in Ukraine. We cooperate closely with UNESCO, UNDP, and with leading Universities in Europe and throughout the world.

The International Centre of Distance Technologies was recently created in the IRTC. It pools the forces of different organizations around the world in creating and using distance education technologies. Our Centre's fundamental aim is to apply a sound scientific and methodological platform to the use of educational technologies, on the basis of the methods and means of telematics (the theory of dialog, and the theory of computer didactics). We have a research focus on ICTs in learning, and implement practical programmes in training teachers and informatizing educational institutions in Ukraine.

We have a lot of work ahead of us. But we are sure that the issues that will be discussed at this Seminar during the next few days will be of critical importance in identifying trends, analyzing strategies, and providing policy directions for the use of e-technologies and the training of teachers.

ANNEX 2

AGENDA

1. Opening of the Seminar

2. Adoption of the Agenda

3. Plenary sessions: Main presentations by keynote speakers on chosen topics, followed by presentations and discussions in three commissions with the following general orientations: learners; teachers; technologies; social, economic and cultural issues; educational policies; international co-operation.

4. Panel sessions:

Panel I: Teacher education curriculum planning and development: approaches, strategies and models for integrating distance education and ICTs into teaching;

Panel II: National/regional policies and strategies in using distance education and ICTs in teacher education;

Panel III: Managing innovation and change: introduction of ICTs and distance education in professional development programmes for teachers and teacher educators.

5. Discussions:

Discussions on topic 1: exchange of experience and good practice

Discussions on topic 2: exchange of experience and good practice

Discussions on topic 3: exchange of experience and good practice

6. Information session: meeting with Ukrainian leading specialists and heads of select higher education and teacher-training institutions

7. Plenary session: Adoption of recommendations aimed at strengthening international co-operation in the Sub-Region in the area of ICTs and distance education in teacher education

8. Closure of the Seminar

ANNEX 3

TIMETABLE

21 November , Thursday

9:30-10:15

Opening Ceremony

Addresses by:

Ms Natalia Zarudna, Deputy State Secretary of the Ministry for Foreign Affairs of Ukraine, Vice President of the National Commission of Ukraine for UNESCO, Ukraine

Mr John Daniel, Assistant Director-General for Education, UNESCO, (videotaped)

Dr Vladimir Gritsenko, Director, International Research and Training Centre for Information Technologies and Systems; UNESCO Chair in "New Information Technologies in Education for All"

10:15-11:15

Plenary session: ICT and teacher education: global/sub-regional context and framework

Ms Mariana Patru, *Dr Evgueni Khvilon*, "UNESCO's Initiatives in ICTs and Open and Distance Learning in Teacher Education"

Keynote speaker: *Professor Paul Resta*, USA: "ICTs in Teacher Education: Challenges and Opportunities"

11:15-11:30

Coffee-break

11:30-13:30

Plenary session (continued)

Keynote speakers:

Dr Jonathan Anderson, Australia: "Barriers and Strategies for Integrating ICTs and Distance Education into Teacher Education"

Dr Alexey Semenov, Russian Federation: "Strategies for In-Service Teacher Development"

Dr Hilary Perraton, United Kingdom, "Role of Distance Education and ICTs in Teacher Education"

13:30-14:30 *Lunch*

14:30-15:45 **Panel discussion 1: Teacher education curriculum planning and development: approaches, strategies and models for integrating distance education and ICTs into teaching**

Introduction by moderator: *Dr H. Perraton*, UK

Speakers:

Mr Jevgeni Koshelev, Estonia: "ICT in Education: Programme for Pedagogical University Students"

Dr Marina Tsvetkova, Russian Federation: "Triangle of Information Space of the Resource-Centre (basic school)"

15:45-16:00 *Coffee-break*

16:00-17:30 **Panel discussion 1** (continued)

Speakers:

Dr Vyacheslav Valuisky, Ukraine: "Distance Learning under Ukrainian Distance Learning Centre (UDLC) Support"

Mr Andrea Kulakov, Macedonia: "Experience from Incorporating ICTs in Education"

Dr Valentina Dagiene, Lithuania, "Teacher Training in using ICTs: A Lithuanian Case"

17:30 - 18:30 Discussion on topic 1: exchange of experience and good practice

19:00 Reception

22 November, Friday

9:30-11:15 **Panel discussion 2: National/regional policies and strategies in using distance education and ICTs in teacher education**

Introduction by moderator: *Professor A. Semenov*, Russian Federation

Speakers:

Dr Dimitar Tsvetkov, Bulgaria: "The Essence of Distance Education and its Development in Bulgaria"

Prof. Petru Gaugash, Moldova: "E-learning in Educational Management"

11:15-11:30 *Coffee-break*

11:30-13:30 Panel discussion 2 (continued)

Speakers:

Ms Anca Nedelcu, Romania: "The Use of Information and Communication Technologies and Distance Education in Teacher Education: Trends, Policy and Strategy Considerations"

Mr Milosevic-Atos, Serbia and Montenegro: "Strategy of Implementation of ICTs in the Education System of Montenegro Ideas for Today and Tomorrow"

13:30-14:30 *Lunch*

14:30-15:00 *Mr Vladimir Sharov*, Intel Kiev: "Teach to the Future Program"

15:00-15:45 Discussion on topic 2: exchange of experience and good practice

15:45-16:00 *Coffee-break*

16:00-17:30 **Panel discussion 3: Managing innovation and change: introduction of ICTs and distance education in professional development programmes for teachers and teacher educators**

Introduction by moderator: *Professor J. Anderson*, Australia

Speakers:

Ms Iveta Gultniece, Latvia: "Latvian Education Informatization System (LIIS) Project"

Ms Miroslava Cernochova, Czech Republic: "Two Models How to Develop Student Teacher Online Teaching Skills"

Dr Ratimir Kyaternik, Croatia: "In-service Teacher Training for Application of ICTs in Croatian Schools"

Ms Ivana Zlatanovic, *Ms Daniela Stepanovic*, Serbia and Montenegro: "Managing Innovation and Change: Introduction of ICTs and Distance Education in Professional Development Programmes for Teachers and Teacher Educators"

Dr Svetlana Kudrjvtseva, Ukraine: "Introduction of ICTs and Distance Education in Programmes for Teachers and Teacher Educators."

17:30 - 18:30 Discussion on topic 3: exchange of experience and good practice

23 November, Saturday

11:00 - 13:30 **Information session:** meeting with leading Ukrainian specialists and heads of select higher education and teacher training institutions

13:30-14:30 *Lunch*

14:30-16:30 *Social Activity*

17:00-18:30 **Plenary session: presentation of panel reports**

Adoption of recommendations aimed at strengthening international co-operation in the sub-region in the area of ICTs and distance education in teacher education

Closing of the Seminar

ANNEX 4

LIST OF PARTICIPANTS

I. Moderators:

Dr Jonathan Anderson

Professor of Education
Flinders University
GPO Box 2100 Adelaide
South Australia 5001
Australia
Tel.: 61-8-8201-2291
Fax: 61-8-8201-3184
Email: Jonathan.Anderson@flinders.edu.au

Dr Hilary Perraton

Senior Research Fellow
International Research Foundation for Open Learning (IRFOL)
Michael Young Centre
Purbeck Road
Cambridge CB2 2 PG
United Kingdom
Tel.: 44-1223-401020 (switchboard); 401024 (direct line)
Fax: 44-11223-401026
Email: hperraton@irfol.ac.uk

Dr Paul Resta

Ruth Knight Milikan Centennial Professorship
Director, Learning Technology Center
The University of Texas at Austin
USA
Tel.: 1-512-471-4014
Fax: 1-512-471.4655
Email: resta@mail.utexas.edu; resta@teachnet.edb.utexas.edu

Dr Alexey Semenov

Rector
Moscow Institute of Open Education
6, Aviatziony Lane
Moscow 125067
Russian Federation
Tel.: 7-095-915-62-96
Fax: 7-095-915-69-63
Email: alsemenov@mtu-net.ru

II. Participants from Member States:**Dr Alexander Prokhorov**

Belarussian Pedagogical University
 18, Sovetskaya St.
 220809 Minsk
 Belarus
 Tel/fax.: 375-172-26-40-24

Dr Dimitar Georgiev Tsvetkov

Director
 Information Technology Department
 Ministry of Education and Science
 2A Knyaz Dondoukov Blvd.
 Sofia 1000
 Bulgaria
 Tel.: 359-2-9217555
 Fax: 359-2-9809390
 Email: d.tzvetkov@minedu.government.bg

Dr Ratimir Kvaternik

Assistant Minister
 Ministry of Education and Science
 Vramceva 2A
 Zagreb
 Croatia
 Tel.: 385-1-4818-842
 Email: ratimir.kvaternik@zg.hinet.hr; ratimir.kvaternic@mips.hr

Dr Miroslava Cernochova

Department of Information Technology
 Faculty of Education
 Charles University
 M. Rettigove 4
 116 39 Praha 1
 Czech Republic
 Tel.: 42-2-21900240
 Email: miroslava.cernochova@pedf.cuni.cz

Mr Jevgeni Koshelev

Centre of Educational Technology
 Tallinn Pedagogical University
 Tallinn
 Estonia
 Tel.: 372-6345-288; 372-052-06138 (mobile)
 Email: jevgeni@tpu.ee

Mr Gabor Laszlo

PhD Student
Budapest University of Technology and Economics
Faculty of Economics and Social Sciences
Department of Information Management
Budapest
Hungary
Tel.: 36-30-4747170 (mobile)
Email: laszlog@mail.datanet.hu

Ms Iveta Gultniece

Senior Lecturer
Department of Computer Science
University of Latvia, Raina blvd. 19
LV-1050 Riga
Latvia
Tel.: 371-9632699
Fax: 371-7034513
Email: igultniece@liis.lv

Professor Valentina Dagiene

Head of Informatics Methodology Department
Institute of Mathematics and Informatics
Akademijos, 4
Vilnius, LT-2600
Lithuania
Tel.: 370-698-05448 (mobile); 370-5-2109732 (work)
Fax : 370-5-2729209
Email: dagiene@ktl.mii.lt

Mr Andrea Kulakov

Centre for Open and Distance Education
Faculty of Electrical Engineering
Skopje
Republic of Macedonia
Tel.: 389-2-399-157; 374-215 (home)
Fax: 389-2-364-262
Email: kulak@etf.ukim.edu.mk

Dr Petru Gaugash

Vice-Rector
Moldova State University
60, Str. A. Mateevici
MD-2009 Chisinau
Republic of Moldova
Tel.: 3732-577801/577407
Fax: 3732-244248
Email: gaugash@usm.md

Dr Simion Caisin

Director
Continuing Education Institute
139, Str. Decebol
MD-2060 Chisinau
Republic of Moldova
Tel.: 3732-240180
Fax: 3732-240437
Email: caisin@usm.md

Ms Anca Nedelcu

Head of Department
General Directorate for Continuing Education
Ministry of Education and Research
28-30 General Berthelot St.
Sector 1
Bucharest
Romania
Tel.: 40-21-315-74-30/381; 40-21-744301584 (mobile)
Email: ancab@men.edu.ro

Dr Marina Tsvetkova

Senior Specialist in Informatics
Ministry of Education
Russia
Email: mtsv@metodist.ru

Dr Vyacheslav Valuisky

Vice-Director
Ukrainian Distance Learning Center, National Technical University of Ukraine
"Kiev Polytechnic Institute"
Ministry of Education and Science
Kiev
Ukraine
Email: yv@udec.ntu-kpi.kiev.ua

Ms Natalia Zarudna

Deputy State Secretary of the Ministry for Foreign Affairs
Vice President of the National Commission of Ukraine for UNESCO
Mikhailivska St. 1
01018, Kiev
Ukraine
Tel.: 380-44-212-8233

Mr Radoslav Milosevic-Atos

Principal
Petar Lubarda Secondary Art School
Bul. Crnogorskhin heroja 95, pf 165
81250 Cetinje
Serbia and Montenegro
Tel.: 381-86-33-600
Email: atos@cg.yu

Ms Ivana Zlatanovic

Head of Department
Department for Educational Assessment
Sector for Education Development and International Co-operation in Education
Ministry of Education and Sports
Nemanjina st. 22-26
11000 Belgrade
Serbia and Montenegro
Tel/fax: 381-11-3616 382
Email: ivana.zlatanovic@uzzpro.sr.gov.yu

Ms Danijela Scepanovic

Executive Officer
Department for Development
Sector for Education Development and International Co-operation in Education
Ministry of Education and Sports
Nemanjina st. 22-26
11000 Belgrade
Serbia and Montenegro
Tel.: 381-11-3616 293
Fax: 381-11-3616 270
Email: nela@uzzpro.sr.gov.yu

III. UNESCO

Ms Mariana Patru

UNESCO Coordinator of the Meeting
Programme Specialist
Division of Higher Education
Education Sector
UNESCO
7 Place de Fontenoy
75732 Paris
France
Tel.: 33-1-45 68 08 07
Fax: 33-1-45 68 56 25
Email: m.patru@unesco.org

Dr Evgueni Khvilon

UNESCO Consultant
Division of Higher Education
Education Sector
UNESCO
7 Place de Fontenoy
75732 Paris
France
Tel.: 33-1-45 68 08 07
Fax: 33-1-45 68 56 25
Email: eakhvilon@aha.ru

IV. Local Organizing Committee

Dr Vladimir Gritsenko

Director

International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680

Ukraine

Tel.: 380-44-266-2549

Fax: 380-44-266-1570

Email: vig@dlab.kiev.ua

Dr Svetlana Kudrjajtseva

Head of Department

International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680

Ukraine

Tel.: 380-44-266-4315

Fax: 380-44-266-1570

Email: sveta@dlab.kiev.ua

Dr Olexandr Rodionov

Scientific Secretary

International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680

Ukraine

Tel.: 380-44-266-3019

Fax: 380-44-266-1570

Email: ra@irtc.uran.net.ua

Dr Valery Valakh

Deputy Director

International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680

Ukraine

Tel.: 380-44-266-0039

Fax: 380-44-266-1570

Dr Valentyna Kolos

Senior researcher
International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680
Ukraine
Tel.: 380-44-266-3009
Fax: 380-44-266-1570
Email: valya@dlab.kiev.ua

Dr Alla Manako

Senior researcher
International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680 Ukraine
Tel.: 380-44-266-6311
Fax: 380-44-266-1570
Email: alla@dlab.kiev.ua

Dr Kateryna Synytsya

Senior researcher
International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680 Ukraine
Tel.: 380-44-266-6311
Fax: 380-44-266-1570
Email: kathy@dlab.kiev.ua

Dr Olena Verenich

Researcher
International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680 Ukraine
Tel.: 380-44-266-3009
Fax: 380-44-266-1570
Email: lana@dlab.kiev.ua

Tatyana Kameneva

Researcher
International Research and Training Centre
for Information Technologies and Systems
03680, Prospekt Akademika Glushkova 40
Kiev-680 Ukraine
Tel.: 380-44-266-3009
Fax: 380-44-266-1570
Email: tanya@dlab.kiev.ua

ANNEX 5

SUPPORTING DOCUMENTS

THE ESSENCE OF DISTANCE EDUCATION AND ITS DEVELOPMENT IN BULGARIA

Dimitar Georgiev Tsvetkov, Bulgaria

Abstract. How distance education is widely understood is discussed. A definition of distance education reflecting more accurately the essence of this new educational mode is proposed. The most important elements of distance education, its relationship to the application of contemporary educational technologies, and so-called “open learning” are examined. The positive Bulgarian experience with distance education and Bulgaria’s existing infrastructure are described.

Conventional Education and Open Education

The terms conventional education and open education are used to describe two different types of organization and control of the learning process. Conventional education is characterized as the “face to face” interaction of lecturer and student. Students are in classrooms at a fixed place most of the time. The local and enclosed nature of conventional education creates a lot of problems and reflects on its quality and accessibility.

Open education provides new opportunities for learning, teaching, and implementation of educational resources. The process of learning is focused on the needs of individual students. Open learning will allow every individual to study whatever, whenever, and however one wants.

Elements of Distance Learning

Researchers in the field identify four main aspects to the definition for Distance Learning:

- The respective educational institutions control the learning course or program;
- Lecturer and student are physically separated (distanced) during most of the learning process;
- Physical separation is overcome by use of different kind of media;
- There should be at least two different types of communication between lecturer and students.

In general, distance learning is a combination of forms, methods of control, and means of education, in which different (by type and function) and various (by place, by time, by manner of use) human, material, and informational resources are used. The organization and control of Distance learning requires close and ongoing communication and interaction between student and trainer. This is why the application of ICT is a main characteristic of distance learning.

Distance learning is based on different resources such as:

- Human (students, teachers, consultants, administrators etc.);
- Equipment; and
- Informational (text, video, audio records).

Distance learning is one of the most frequently used forms of open learning, because it accommodates:

- Changing needs of the job market (adaptability);
- Various types of potential learners (accessibility);
- Contemporary methods of learning and teaching (innovative);
- New ICT (technology);
- Distributed educational resources (decentralization); and
- Integration of media and ideas (complexity).

Users of DE are learners whose lives (place of residence, marital status, jobs, disabilities, etc.) do not allow them to choose the traditional forms of education; learners who need training or retraining without leaving their home and work; specialists who need continuous professional education; people who wish to be life-long learners (foreign languages, new technologies, hobby, etc); and suspended or interrupted students from traditional education, among many others.

The centre of the distance educational process is not the teacher, but the student. Students are motivated to determine for themselves what they will learn—the what (course and content), when and where (time and place for studying), and how (pace, study methods, resources) of their education. In DE, students have a new role—they can not stay passive consumers of knowledge any longer, they have to answer questions and solve problems in the process of obtaining new knowledge; to learn through completing tasks and using many types of learning resources; to present purposefully and share their ideas and opinions; to communicate with other learners and share experiences; and to organize, self-assess, and control their work in the process of education.

The students taking one course and supported by one teacher are organized in an administrative *group*.

The role of the *teacher* in the learning process is also changed: from a source of information to a tutor in education. The teacher motivates the student and facilitates the teaching-learning process, setting the goals, formulating the tasks, and discussing the problems with the learner; holds consultations and evaluates students' progress; determines the best learning resources for each distant student, etc. These new roles and responsibilities of the distance education teacher include serving as consultant, tutor, and evaluator.

The *author* of the distance learning materials is a key figure in the DE process, and is critical to its success. That is why a special place in DE is occupied by methodology and technologies for developing and producing learning resources using different media.

The *learning resources* used in DE take on a number of the functions of the teacher and consultant in traditional education—to orient and motivate distance students, to expand their knowledge, to offer proper and interesting forms of self control, to discuss answers and to allow self-assessment of progress, to provide help, etc.

The *administrator* is another key figure in the process of DE. His or her role is to maintain the information necessary to service all DE participants.

The function of the virtual environment is determined by participants' activities (Table1).

<p>Visitor</p> <p>Access to common information</p>	<p>Sending and reading messages on the message board</p> <p>Using library resources</p>
<p>Student</p> <p>Registration</p> <p>Access to common information</p> <p>Examining and downloading learning materials</p> <p>Self training</p> <p>Answering the questions for self training</p> <p>Filling in examination tests</p> <p>Communication with the teacher, administrator, and other students</p> <p>Participation at discussion forums</p> <p>Sending tutor-marked assignment (TMA)</p> <p>Requiring reports from administrator</p> <p>Sending and reading messages on the message board</p> <p>Using library resources</p> <p>Purchasing from bookshop</p>	<p>Author</p> <p>Registration</p> <p>Communication with administrator</p> <p>Downloading the templates of learning materials</p> <p>Filling in the templates of learning materials</p> <p>Publishing learning materials</p> <p>Republishing learning materials</p> <p>Reading own learning materials</p> <p>Using library resources</p>
<p>Teacher</p> <p>Registration</p> <p>Communication with the students and the administrator</p> <p>Preparing examination tests</p> <p>Assessing the students and writing the assessments in the database (DB)</p> <p>Organising and leading discussion forums</p> <p>Requiring reports from administrator</p>	<p>Administrator</p> <p>Registration of the DE subjects</p> <p>Communication with students, authors, and teachers</p> <p>Support of the DB for all DE subjects</p> <p>Support of the DB for all DE objects</p> <p>Inserting information and advertisement about offering programs and courses</p> <p>Preparing DB reports</p> <p>Sending reports to the teacher and the student</p> <p>Organizing the students in a group</p> <p>Determining the teacher of a given group</p> <p>Inserting new resources in the library and the bookshop</p>

Table 1. Activities of the DE subjects

The elements of the virtual environment are divided into the following two groups:

- Subjects — student, teacher, author, administrator, visitor;
- Objects — common information resources, learning program, learning course, learning material, learning test, library resources, bookstore goods, message board, message forum, e-mail, group.

Distance Learning in Bulgaria

Priorities and directions for expanding the implementation of distance learning in Bulgaria are:

- Moving gradually from conventional to Distance learning;
- Enlargement of Distance learning forms in retraining;
- Implementation of profiled distance learning;
- Education during lifetime.

What are the benefits of this new type of education?

For institutions the benefits are: multilateral cooperation in new education technologies, affirmation of specialties, course transfers, accreditation, foreign financing of educational activities, access to the international exchange of information in this field, and participation in international research programs for new educational technologies.

For students distance education provides access to European educational standards, information resources, the possibility for national and European accreditation, and contact with the best courses and lecturers.

For teachers it brings the opportunity for professional development, access to European standards educational, research in this new area, introduction to European educational technologies, learning programs, and materials.

From 1995-1999 the EU, in collaboration with the European Commission and other organizations, successfully carried out a project for the development of Distance Learning in Central and Eastern Europe.

A National Center for Distance Learning was established in 1994 in Sofia with the participation of universities, MES, National radio, National television, and others. In the same period the following were achieved:

- Established of Regional Centers for Distance Learning;
- Conducted research of needs and readiness for implementation of distance learning;
- Popularized ideas, opportunities, and perspectives of distance learning;
- Organized seminars and conferences;
- Prepared authors, teachers, consultants, administrators for the needs of DL;
- Created DL programs and courses;

- Conducted and evaluated experimental distance courses;
- Spread positive experience of distance learning;
- Fostered international cooperation and integration with the European DL net.

An important task was the preparation and acceptance of respective legislation related to implementation of DL in Bulgaria. Up until now a Memorandum of intent and a National concept for implementation of DL have been issued. NCDL must prepare and distribute an informational bulletin on DL. One of the most important activities was the creation of the Regional Centers for DL. Such centers were established in Sofia, Plovdiv, Varna, Rouse, Blagoevgrad, and other cities.

A network of local centers was later associated with every RCDL. They were established in existing education institutions in order to implement specific DL programs. The main purpose of these centers is to approach potential learners.

These centers have been involved with many activities such as the establishment of libraries, and the organization of periodic consultations and courses. The infrastructure which has been created and the accumulated positive experience with DL in Bulgaria provide a solid basis for future development. There are, unfortunately, a number of yet unsolved problems including a the lack of a normative legislation act, academic and institutional resistance, inadequate funding, lack of specialists in DL, and inadequate computer networks at the universities.

THE UNESCO CHAIR IN APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHER EDUCATION AND TRAINING

Ratimir Kvaternik, Croatia

In recent years, after Croatia's reintegration, there was much discussion among educational authorities and institutions about the future of education and "educational reform" in Croatian higher education and primary and secondary schools. The growth in the use of technology, new educational environments with increased individualization, new ways to manage schools, new standards for literacy, and other global issues were the main topics. From these discussions the need for efficient and focused international cooperation, both bilateral and multilateral, became clear.

Such was the purpose and vision for the establishment in 2000 of an UNESCO Chair in "Application of Information and Communication Technologies in Teacher Education and Training". Its goals were to initiate gradual profound change in the educational system based on a new paradigm that can be summarized as:

- New learning/teaching environments based on new concepts in education and pedagogy focused on learner centered and collaborative instruction in which the teacher is a mediator of knowledge, rather than a source.
- Professional Development of Teachers as a Lifelong Learning Activity as part of the "3 Is" continuum: "Initial education," "Induction" (structured support at profession entry), and "In-service continuous professional development."
- Utilisation of Information and Communication Technology
- New role of education in the society.

At the operational level the following activities for the Chair were envisaged:

- To help introduce ICT to schools at a national level by initiating activities and facilitating the cooperation among institutions and the MOE
- To initiate regional and sub-regional cooperation in education, particularly in the field of ICT application
- To organize national and international seminars and conferences
- To foster international cooperation of UNESCO Chairs and other educational institutions
- To strengthen cooperation with UNESCO

The first preparatory meeting was held in February 2001 in Zagreb and the following issues were discussed:

- Teaching program methods (such as distance learning vs. face to face teaching, new pedagogy, content presentation, evaluation of results, interactivity, multimedia, etc.)
- Hardware/Software requirements
- Staff requirements and training (of trainers)
- Operational issues and problem (Cost/benefit issues, initial investments, maintenance costs, limitations, and future developments)

It was decided to establish a task force to research these issues and prepare a draft proposal for the establishment of the Chair. The proposal was discussed at the next meeting in Dubrovnik, 24-25 May 2001. The Chair was proposed at the Croatian Academy for Arts and Sciences as the host institution with the residence in Dubrovnik (temporary residence in Zagreb). The Chair will take a regional approach in its activities and become one of the regional centres for South-Eastern Europe for such UNESCO activities. Developments did not take place quickly and a third preparatory meeting was held also in May 2002, again in Dubrovnik. At this meeting it was decided that the Chair's role should be to initiate, develop, implement, coordinate, evaluate, and support educational ICT activities and projects at regional, national, and international levels. The activities would include research, innovation, and international cooperation.

In March 2002 a proposal was submitted to UNESCO and in September 2002 the proposal was accepted; however a final approval of the Chair was conditional on the submission of official letters of participation from the participating international institutions. These include: Rutgers University (USA), University of Mostar (Bosnia and Herzegovina), University of Maribor (Slovenia), Layos Eotves University—UNESCO Chair (Hungary), and UCLA (USA). National participants are the Faculties of the University of Zagreb: Mathematics and Natural Sciences, Electrical Engineering and Computing, Organization and Informatics, Economics, and Teachers Academy. The main objectives of the Chair were identified as following:

- To initiate, promote, and support modern ICT based approaches in teacher education, training, and research in Croatia
- To initiate, promote, and support exchange of information and activities and co-operation among institutions and researchers in the South Eastern-Europe region and other countries in transition, and to work in cooperation with UNESCO on the exchange of best practices
- To organise distance learning opportunities for teacher education in Croatia and in-service teacher training to upgrade teachers' knowledge and skills in the use of ICT
- To develop curriculum on the use of ICT in teacher education and training
- To organise international seminars, workshops, summer schools, and conferences in ICT application in teacher education and training
- To take leadership in networking with institutions, researchers, and teachers in the region via Internet to exchange practices and experience, initiate projects, discuss the professional and social status of teachers and the teaching profession, discuss the positive and negative consequences of ICT use in education, the digital divide in the region, and other related issues.

At present the following activities are already in progress :

- Participation in the implementation of inservice teacher training for the application of ICT in Croatian schools.
- Inservice training has been initiated by the Ministry of Education in cooperation with the Chair. The Chair developed an evaluation package and will conduct independent evaluation of achieved skills and knowledge, including:
 - Digitalisation of Educational Contents
 - Development of Educational Web Portal
 - Organisation of an International Seminar

Since the Chair envisions intensive international cooperation in the region and beyond, institutions are invited to cooperate with the Chair and participate in the work and activities of the Chair, particularly at intentional seminars, workshops, and conferences.

IN-SERVICE TEACHER TRAINING FOR THE APPLICATION OF ICT IN CROATIAN SCHOOLS

Ratimir Kvaternik, Croatia

It is very important to foresee trends in education and implement them in the correct manner. With the development and growing prevalence of the PC, and more recently, the Internet, Information and Communication Technology (ICT) has had a huge impact on all human activities. Developed countries lead the way in technological innovations and their application to education.

In Croatia, these developments in education took place early but without much efficiency or success. In recent years, the Ministry of Education has realized that efforts must be organized and on a massive scale. Most schools are equipped with computers, but the majority of teachers remain “computer illiterate”. The Board for Informatics, an expert Ministry body, established a Task Force to develop an In-service Teacher Training Program to train teachers and other school staff on the application and use of ICT in schools and other educational environments.

The main goals were to produce a structured program and to define the organization and procedures for implementation, such as determining the operation of the program, and the evaluation of acquired knowledge and skills using standards previously defined in a catalogue of necessary knowledge and skills.

At first glance it may seem that this was a pretty straightforward task. However with 47,000 teachers needing the training, a timeline of only two to three years, and budget limitations, it is a big project indeed; in fact, it is the biggest training program ever implemented in the country.

Several ideas were accepted as an approach to achieve the goals. The most critical of these were:

- Using the “training the trainers approach” where trainers are selected from teachers who will teach informatics subjects to others at the same school
- Define skill and knowledge levels to be achieved through several phases of training
- After finishing the training, participants should have the basic knowledge and skills to use equipment currently in schools and homes
- Trainers at the schools should serve as technical support staff to advise teachers and help them apply the acquired knowledge and skills properly

Another guiding principle was to view training as the key implementation strategy of the project. This principle guided all project requirements such as project management, evaluation, implementation, availability of funds, and limitations. It was also felt that the project should be open to possible cooperative participants such as computer companies, institutions, outstanding individuals, and the faculties of universities around the country, especially the University of Zagreb. It was felt

that the program proposal should be in accord with the country's accepted development strategies for the educational system as a whole.

An extensive analyses revealed that there are essentially five groups of school staff to be trained: teaching staff, principals, informaticians, professional staff, and administrative staff. Three levels of knowledge and skills were defined, advancing in difficulty: basic level, advanced level, and specialist level. Not all groups of staff have to master all levels, or may learn only parts of some levels. The basic level covers the following subjects:

- Basic Concepts in Computer Applications (6)
- Operating Systems (12)
- Text processing (18)
- Spreadsheets (14)
- Presentations (8)
- Internet (E-mail, WWW) (14)
- ICT in education (4)
- Optional : English (18)

The numbers in brackets are suggested hours needed to cover each subject. The level of detail for each subject was determined according to the catalogue of required knowledge and skills for this level. After much discussion of appropriate instructional delivery methods, it was decided that at the basic level a face-to-face method was still most appropriate because the trainees must use computers and have no skill with them yet. However at the advanced and specialist level, Internet based distance learning combined with face-to-face lectures and CD-ROM based self-studies will be used.

At the advanced level there will be optional subjects. The following subjects will be included in the training and participants may make choices according to their needs and fields of specialization:

- MS Office (advanced) (36)
- Networked Classrooms and their Use (18)
- Integration of ICT in Teaching (18)
- Internet (advanced) (18)

A statistics teacher will probably choose to learn Excel in the advanced MS Office segment, while a biology teacher might choose to study the Internet. "Integration of ICT" covers the integration of ICT into the teaching and learning process. The curriculum for this segment has not yet been developed, but the goal is to make it "a window to another world of teaching."

Finally at the specialist level, subjects should be chosen that closely match the professional needs of the trainee. The following subjects are proposed:

- Programming (36)
- School Information Systems (EMIS) (18)
- Multimedia in Teaching (18)
- Special Software for Subject Fields (18)
- Authoring Tools—Production of Teaching Units (18)
- DTP—Publishing a School Magazine (18)
- Library Information Systems (18)
- Networks and Communications (18)

A school librarian will obviously choose to learn about library information systems, a principal would choose school information systems, and an informatics teacher, programming.

There were many questions and concerns about the advanced and specialist level programs. Who would train the trainers? Who would teach at the advanced and, especially, the specialist level? What materials would be used, and what type of evaluation would these levels employ? Because many of these questions cannot be answered without a trial and error approach, the training was divided into several phases, as shown in the table below.

The first phase was a test phase in which several groups of teachers were trained. This phase has been completed, and there were two important lessons learned. First, the teachers were very motivated to learn the use of ICT. This was not the initial assumption of the Task Force because many teachers were unsatisfied with their social status and pay, and with the present educational system. The second lesson learned was that there were two kinds of beginners—absolute beginners who, for example, have never touched the keyboard, and beginners that have tried to use ICT but have no real skills. The absolute beginners were much slower to advance, so the training was divided into two groups.

	Phase I Test 2002	Phase II Pilot 2002	Phase III Implementation 2003-04	Phase IV Implementation 2005+
Basic Level	TS	TS	All	
Advanced Level	IS	IS	IS	PR,PS,AS*
Specialist Level	TT*	TT* TSp*	TS, IS* TSp*	PR,PS,AS*

*Optional selection of subjects (courses)

TT - Potential Teacher Trainers

TSp - Trainers Specialists

TS - Teaching Staff

IS - Informaticians (teachers+technical)

PS - Professional Staff (assistants)

AS - Administrative Staff

PR - Principals

Table 1. Implementation Plan for Training the Staff in Croatian Schools

During the second pilot phase, adjustments and changes will be made as a result of the experience gained thus far. In this phase schools in all counties will start the program, and the trainers who will instruct the teachers and other staff will themselves be trained, including several expert trainers for the specialist subjects. After this phase a thorough analyses will be conducted so that further refinements can be made to the initial program and implementation plan. Finally during the third and fourth phases, the program will be fully implemented. The project is scheduled to end by December 2005.

Evaluation and certification of the training participants are also critical parts of the program. To keep the evaluation independent of the training process the program will cooperate with the newly established UNESCO Chair in Croatia. The Chair, whose expertise is teacher education, training, and utilisation of ICT in education, has developed a PC based evaluation package that provides an efficient and independent evaluation of achieved knowledge and skills. The test, like the program itself, takes a goal-oriented approach. There is a predefined set of skills and knowledge that must be learned during training, but the ways to acquire those skills are not defined, so that the same results can be achieved in different training settings (i.e., hardware, software, trainers' attitudes and methods, working materials and manuals used in different parts of the country). A catalogue of required knowledge and skills was developed to use as a common yardstick for all trainers and trainees, and the evaluations are also based on and reflect the catalogue requirements. The certification of training participants will be officially issued by the Ministry of Education and Sports.

The project's most important goal is for teachers and other school staff to achieve basic computer literacy. Therefore it is important to ensure its success on a massive scale. There should be some motivating incentives, but there should also be some basic requirements. The carrot-and-stick approach should result in more ICT use, which is really the purpose of the training. This type of measure is not part of the training program but was strongly recommended to the Ministry of Education as a supporting and parallel activity. For example, the program could collaborate with a PC vendor for a "laptop for every teacher" sales promotion, so that teachers could buy discounted laptops on credit and would then have access to an educational portal with helpful links and features such as sample lectures and reports and an international learning community among schools and teachers.

On the other hand, it was recommended that training be compulsory for all teachers and that certification should be a condition for career advancement. It was also suggested that computer literacy training be incorporated into teacher education programs so that the basic training can be phased out gradually and only the advanced and expert training provided via distance learning will be needed.

It is hoped that this approach to the mastery of ICT will become a permanent activity that will foster lifelong education in the teaching profession and will contribute to the improvement of education in Croatian primary and secondary schools.

ONLINE EDUCATION IN ICT TEACHER TRAINING AND EDUCATION IN THE CZECH REPUBLIC

Miroslava Cernochova, Czech Republic

Stanislav Sinor, Czech Republic*

Abstract. The article presents basic information about uses of distance learning, especially online education, in ICT teacher training and teacher education in the Czech Republic. The article describes an actual system of ICT teacher training to develop the information literacy of primary and secondary school teachers. It also provides an example of two models for developing online teaching of teachers' skills used at the Faculty of Education of Charles University in Prague. The article aims to contribute to the development of distance education in ICT teacher training and education in the Czech Republic.

A System of ICT Training for Primary and Secondary School Teachers in the Czech Republic

ICT in Czech Primary and Secondary Schools

During the last ten years some schools, without any official support, have started to integrate ICT into education and school management. Some of them have developed their own information and communication systems to support educational activities in the school with access through the Internet, and have gained good experience in international projects based on a Internet collaboration. They present their experiences with ICT in teaching and learning every year at seminars, national conferences (POSKOLE¹), and exhibitions (INVEX, ScholaNova, InternetWorld etc.). Some examples of how ICT can change education in Czech schools were also described in a set of case studies for the international research SITES M2².

It is not enough to have enthusiastic teachers. It is necessary to create a functional background, financial conditions, and technological and advisory services for schools, and to define certain principles to allow schools to systematically apply ICT in education.

At this time there are two key opportunities that could improve the situation for Czech Primary and Secondary schools in the near future: the proposal of a new educational law and the realisation of the Governmental Information Policy in Education.

* Ministry of Education, Czech Republic Department of the Governmental Information Policy in Education, stanislav.sinor@msmt.cz

¹ The National Conference POSKOLE: <http://chaos.pedf.cuni.cz/poskole/index.php>

² International Research SITES M2: <http://sitesm2.org/>

The new educational law developed by the Czech Ministry of Education will be proposed to the Parliament in September 2003. The proposal could be more "progressive", nevertheless it proclaims that "for each subject or branch of primary or secondary education, and pre-school, artistic and language education, general educational programs will be developed that define the required content and conditions for education. The new law will include provisions for development of school programs, evaluation of education, development of textbooks and teaching materials. The general educational programs give great attention to *an intensive development of pupil/student information, communication skills, and knowledge*. The Czech Ministry of Education will prepare the programs. On the basis of these programs each school will propose its own educational program considering local and regional conditions, possibilities, traditions, etc. It will be issued by a head-master and presented to the public. Secondary education can be offered not only in a daily face-to-face form, but also in a distance or combined form via ICT. The new educational law could help improve conditions in schools that would like to integrate ICT into compulsory education and school life.

Governmental Information Policy in Education (GIPE)

ICT use in Primary and Secondary schools may also be affected by the Governmental Information Policy in Education (GIPE), accepted in 2000 by the Czech Government as a key document to support integration of ICT into schools to educate children for life in the information society and to begin to create new conditions that will allow all citizens to use ICT in their lives and professions.

The GIPE³ focuses on three main areas of concern:

- teacher training in ICT to develop ICT literacy of teachers at different levels and to support the needs of administrators, etc.
- strategy for the development and distribution of educational software and other educational sources, and
- technological infrastructure in schools.

Teacher training in ICT is examined in the following section.

ICT Teacher Training to Develop ICT Literacy of Primary and Secondary School Teachers

The ICT literacy of teachers plays a key role in the process of integration of ICT into school education. During the last few years, some institutions, pedagogical centres, foundations, and computer and educational companies have offered ICT courses to teachers that were mostly focused on working with a particular software product. Some teachers have developed their own ICT skills and have discovered the educational potential of ICT for themselves. Some Czech teachers have gained some ideas of what to do with ICT in education in the framework of international projects (Comenius, TEMPUS, SOCRATES, etc.).

³ The Czech Ministry of Education: <http://www.msmt.cz>

On the basis of the GIPE a system of ICT teacher training was developed in 2003 that could be a starting point for teacher professional development and life-long learning. Within the GIPE framework, there are several levels of ICT courses and training for different groups of teachers⁴:

- **Basic Courses - Level Z**-these courses are for all teachers, regardless of their professional orientation (subjects), with little experience with ICT (25 hours). These courses will be used by about 75% of Czech Primary and Secondary School teachers who have little or no experience with a computer. The main goal is to motivate teachers to use ICT in schools and at home. The Level Z courses develop basic ICT user skills and knowledge. The courses' content covers topics such as operating systems (file management, programs, system configurations, etc.), LAN's, text-processing, use of a post-client, Web browsers, and Internet searches. After the Level Z courses, participants are tested, and on passing receive a level Z certificate⁵. The courses are organised by training centres. Each training centre that offers such courses to teachers must fulfill general, professional, and technological criteria and standards (instructors, tutors, and experiences with courses for teachers, computer classrooms, hardware, software etc.). This structure provides the opportunity for schools advanced in ICT use to become a training centre and offer Level Z courses for additional income.
- **Courses - Level P**-these courses are intended for teachers with some specialisation and experience working with ICT (+ 30 hours), and for about 25% of Czech Primary and Secondary School teachers who have finished level Z courses and are advanced users of ICT. The main goal is to develop those key competencies that are critical for a teacher to be able to use ICT in his/her everyday teaching. Level P courses are not simply training on how to work with a set of software products. Courses are organised in a modular system and are designed to respect different types of school institutions. Each Level P course consists of three modules: an introductory module (common for all) and two modules that participants choose from a set of modules (electronic publishing, graphic communication, ICT in Physics education, etc.) Each course ends with a final project. Each module is 30 hours; 20 hours in the classroom face-to-face and 10 hours via the Internet or other distance form. The distance form depends on technological and organisational conditions of the pedagogical centres that offer level P courses.
- **Special ICT Courses - Level S**-these courses are intended for teachers who are interested in ICT at a professional level. The courses can be organised as workshops, courses, seminars, and as educational activities with accreditation from the Ministry of Education.
- **Courses for ICT Co-Coordinator**s-these courses are taken over two semesters of university studies. They will be offered and organised by faculties of education. These courses provide an extensive study for ICT coordinators who manage school technology facilities and who serve as advisors for teachers on how to use ICT in education.

⁴ WWW for the GIPE: <http://www.e-gram.cz>

⁵ There are three ways how to get a certificate of level Z: a) testing at the end of the course level Z, b) testing without a study of courses level Z, c) administrative solution (to graduate of a university study of ICT; ECDL, etc.).

Conclusions:

Distance education for ICT in-service teacher training is still in the embryonic stage in the Czech Republic. Some experience was gained at Charles University, in collaboration with the Czech Technical University in Prague, during pilot projects for Secondary School teachers (project VIK, TEMPUS Telematics etc.). Within the framework of the GIPE, the Czech Republic will gain experience based on different models and in relation to the different possibilities of educational centres and technological conditions of teachers both at home and in schools. The Internet will be used to distribute teaching materials, tasks, and exercises, and eventually, to consult with tutors and instructors.

Two Models To Develop Student Teacher Online Teaching Skills at the Faculty of Education at the Charles University in Prague

The Faculty of Education is part of the Charles University in Prague, founded by Charles IV in 1348. It is the oldest university in Central Europe, and its goal is to make Prague a new centre of learning and science. The Charles University now has 17 faculties with about 35,000 students. Its main focus is high quality scientific studies at the university and postgraduate level.

It was the Charles University that first made many Czech educational institutions examine how to organise distance education in virtual environments and how to distribute it via the Internet. The answers were given at the first International Conference "Telecommunications for Education and Training" (TET⁶) organised in Prague by the Charles University in 1997. Experts from many countries presented experiences and models of distance education and demonstrated technological solutions for distributing education and training through telecommunication systems and computer networks.

At present, the Charles University Computer Centre⁷ offers a set of online courses for academic staff. Some online courses are provided not only for university staff or distance education trainers, but also for Secondary School teachers (of Maths, Physics, Chemistry and Biology) and are organised by the Laboratory of Distance Education⁸ at the Faculty of Maths and Physics.

The Faculty of Education of the Charles University officially opened on 15 November 1946. Its mission is to prepare teachers for all types and levels of schools, and to prepare specialists and scientists in the areas of pedagogy, educational psychology, and didactics, or didactics of several subject areas. Though the preparation of teachers is also provided at five other faculties (Faculty of Maths and Physics, Faculty of Science, Faculty of Arts), the Faculty of Education holds a unique position in that it fully focuses on the issues of Education.

⁶ TET: <http://chaos.pedf.cuni.cz/tet/index.html>

⁷ Charles University Computer Centre: http://www.cuni.cz/cucc/index_en.html

⁸ The Laboratory of Distance Education at the Faculty of Maths and Physics (<http://telmae.karlov.mmf.cuni.cz>) is managed by Zdena Lustigova. It organises not only online courses for teachers, but also it offers on the Educational Portal TELMAE online journal publications concerned with topics of distance education (technological systems, best practice, case studies, research, evaluation, management, courses).

Currently the Faculty of Education has about 4000 students in regular and other forms of study with about 350 specialists, scientists, and pedagogues.

The Faculty of Education offers the following fields of study to obtain the Master Degree:

- Four-year study for teachers of elementary schools (teachers of children 6-11 years of age)
- Five-year study for teachers of general subjects either at the lower secondary schools (12-15 years of age) or at the upper level of secondary schools (15-18 years of age)
- Five-year special pedagogy study focused on the education of children and youth requiring special care.

In addition to studies for obtaining the Master, the Faculty of Education also offers Bachelor studies for future kindergarten teachers.

Many years ago the Faculty of Education started to develop student ICT skills and knowledge⁹ for study purposes and for teaching. These skills are trained within a framework of a set of compulsory subjects in the study programmes for all students. Practically all students have to be trained in at least one of these subjects to be able to work with ICT. The Department of Information Technology and Technical Education is responsible for ICT education in 7 modules (each takes one semester and ends with an exam):

- Introduction to computers for teachers,
- Computers, for information and communication,
- Computers, for creative teacher activities,
- Internet as an educational environment,
- Computer assisted learning,
- Author systems, and
- Computer networks.

Currently the Faculty of Education¹⁰ also offers the Master study programme in Information and Technical Education to prepare specialists in ICT for Primary and Secondary Schools purposes and to become ICT coordinators in schools.

Online Teaching Methods in Teacher Education?

A few years ago we integrated online teaching methods in several subjects focused on ICT applications in education. There were several reasons that led us to start with online teaching in teacher training:

- To introduce student teachers to the principles of online teaching methods (in the future they would apply these methods in their profession);

⁹ In the Czech Republic there are several universities that prepare student teachers to become teachers for different type of schools. Each university has developed its own plan about how to develop ICT skills and knowledge of student teachers. In the Czech Republic there doesn't exist a common standard ICT study programme obligatory for university teacher education.

¹⁰ Dpt. of Information Technology and Technical Education: <http://it.pdf.cuni.cz>

- To test how virtual learning environments (VLE) work (our professional inquisitiveness to get experiences and results into the effectiveness of VLE in education, what it brings, and what its limitations are);
- To make our teaching more attractive for students;
- To do some teaching experiments (we could gather a few student groups to collaborate and to share data, information, results, ...)

To understand better what it means to teach online, we decided to give our student teachers a chance to experience two quite different roles:

- As an online student.
- As an online teacher.

We use LearningSpace as a standard VLE (with a client access/Web browser, connectivity to the Internet, privacy protection, secure system, replication). LearningSpace offers tools to develop and distribute online study materials in multimedia forms, for communication and interaction with participants and study materials (discussion, annotation, voting, survey), to test students, and for self-testing.

MODEL 1: Student Teachers as Online Students

This first model is based on systematic online support of the regular face-to-face teaching of several compulsory subjects (Computers in teaching and learning, Didactics of information education) in which online education is also one of the main topics. The online support is developed as a standard online course that offers to students:

- a schedule of the course (topics, aims, calendar)
- learning materials
- assignments and questions to solve
- tools for discussion and collaboration
- space to present results
- portfolio
- final exam

Student teachers take the final exam online from anyplace that is available to them, such as at home or at a student hostel.

Benefits and Advantages for Students:

Some of the benefits and advantages for online students include the following:

- feedback
- access to study materials with searching tools (keywords, fulltext)
- an opportunity to see what was done at face-to-face seminars during the whole semester (including a discussion, tasks, results of surveys, voting)
- portfolio

- improved social relations
- an opportunity to continue participating in the course when students cannot participate in person (illness, 4 weeks on practice teaching in schools)
- access via the Internet anywhere anytime

Benefits and Advantages for Teachers:

For us as teachers, online teaching provided new situations and advantages:

- feedback for teacher self-reflection
- a set of tools to motivate students (online publishing, describing learning progress of each student, voting among students, surveys)
- a set of tools to monitor how students progress through a seminar (survey, tests)
- a set of tools to evaluate student progress
- a digital portfolio of all students
- an opportunity to develop to written communication skills
- Opportunity to summarise ideas or reach conclusions online if there is not enough time during the face-to-face seminar
- ease of making course modifications
- a teacher must very clearly define goals of topics, and formulate tasks and questions; s/he must think more thoroughly about her/his teaching activities
- a teacher can concentrate more on the teaching process in face-to-face seminars, and save time with online support (autotests, surveys)
- online support can be used many times with different groups of students
- everything is archived (discussion, materials, student activities); online support can assist with the analysis of the teaching process
- if a teacher cannot participate in a seminar, students can continue without teacher assistance or with a teacher who can work with students from anywhere (such as from home)
- a teacher can get personal information about students, to better know students (Profiles) that contribute to better interpersonal relations
- a teacher has more time to answer student questions
- a teacher can give more attention to those who need it
- a teacher develops skills with instructional design
- online support contributes to teacher ICT skills development
- a teacher can provide the agenda for the next face-to-face seminar
- a teacher can offer a variety of tasks, tests, questions, and assignments according to student interests and abilities
- a teacher can teach from home
- a teacher is in continuous contact with students (including holidays)
- a teacher can communicate and collaborate with groups of students who never meet personally

Problems and Disadvantages for Students:

There are some problems and disadvantages of online teaching for students. These include:

- students can have problems with orientation in "learningspace" (Who can see me? Who can read my messages and documents? Is there anybody?)
- limitations with the technology
- limitations of the ICT skills of students

Problems and Disadvantages for Teachers

Online teaching can also cause some problems and disadvantages to teachers:

- online support teaching takes a lot of time
- it is not necessary but it is very useful to have access from home
- limitations with the technology
- limitations of the ICT skills of teachers

Some Opinions from Students Regarding the Online Trials:

"What is perfect? I have access to all study materials. It saves me a lot of time."

"It was an interesting experiment."

"For teachers it will need hours and hours of work."

"It was perfect I could work and learn online when I had time."

MODEL 2: Student Teacher as an Online Teacher

After several years with model 1, we have found that the most effective way to develop student teacher skills for online teaching and the best way for students to understand the educational potential of online education is to give those student teachers the opportunity to propose, develop, and manage their own online course.

The idea of the eDIHO Project (Education via the Internet for Long-Term Hospitalised Children) developed in Spring 2001 when we started to think about what to do in an required subject - Internet as an educational environment. The subject is included in a study programme of Pedagogy in the fifth year. Graduate Pedagogy students can work as researchers in research institutions, as experts in advisory centres, as pedagogy teachers at secondary schools or universities, or as tutors in educational institutions.

To find a solution for involving Pedagogy student teachers whose Information and Communication Technology (ICT) skills and abilities differ widely we developed a set of starting points:

- The Internet can serve as an environment for organising education. The student teachers in Pedagogy courses have not as yet been able to identify the practical educational dimensions of the Internet. They use ICT as a tool for everyday needs and for communication. It is necessary to promote their theoretical knowledge and to develop their practical skills in educational activities distributed by the Internet.

- During their university study the student teachers of Pedagogy obtained theoretical knowledge about teaching methodology and also learned how to carry out and manage education. Therefore they ought to be able to analyse educational situations, to formulate educational goals, and to create study materials and tests.
- During their five years of university study the student teachers absorb concepts (learning by doing, collaborative learning, project teaching, teamwork) and so they ought to be able to apply those concepts in their own work and activities.
- Development and realisation of their teaching ideas in online courses could contribute to development of student teachers ICT skills (working with a scanner, using basic software, working with the World Wide Web (WWW) browser). Learning by doing can contribute to ICT skills more than standard ICT courses.
- It is necessary to produce online courses for children who really need online education. If the student teachers can test their online products in learning contexts, their responsibility to develop high-level online courses will increase.

So we asked several questions:

- "Who needs online education? Who would be the ideal online student for student teachers to work with?" We thought that the "ideal" online student should have good technical conditions such as daily access to the Internet, for example. Thanks to Project Majaky¹¹, conducted in some Czech hospitals, many children do have daily access to the Internet. So we thought those hospitalised children would be ideal "partners" for novice online teachers.
- Which model of online education to apply? It must be very simple. It could be based on a dialogue between a child and our student teachers focused on some interesting questions and tasks to solve. It should not be a typical drill and practice online course. The didactic value we will see in a process of communication among online children with their online student teachers will be of benefit to both the children and future teachers. It is the best way for student teachers to develop their pedagogical communication skills, too. The online course will not replace compulsory teaching in schools but will support the learning activities and interests of children in some school subjects.
- Which subjects will we support? It will depend on the student teachers we train. Therefore there is now a set of online schools for different subjects: Arts, Maths, English, History, Informatics. For some topics and assignments we consult with teachers from the Hospital School.

¹¹ Majaky. <http://www.majaky.cz>

- On what level of difficulty should the tasks and assignments be for children? It was a very difficult question because a hospital could have children of any age and ability. So, the online course will offer a wide spectrum of activities.
- How to teach children to use a system for online learning? We visited a few times with some students in a hospital to see how children live and to explain how to work with the environment. Children in general can use a computer and can work with the Internet. We organised a seminar for a hospital teachers to explain how to use the system so that they could help the children. The children's parents were also taught them how to use the system, because children can continue online learning activities after they return home. The children's projects and results in online learning would be gathered in a portfolio.

As a result of our idea, Project eDIHO¹², which helped support the school activities of long-term hospitalised children in several subjects via the Internet, was established. The project doesn't replace compulsory school education, instead it completes and extends the hospitalised children's schooling by opening a space for communication and dialogue with their "new" virtual teachers.

Creative activities aimed at developing novice teachers' ability to propose, develop, and manage online education gives student teachers an opportunity to identify possibilities for Internet education, and at the same time improves the ICT skills of the novice teachers. The most effective way to increase student teachers' motivation and concentration is to create the best model of online education and give student teachers the opportunity to test their models with real online students, as in the case of eDIHO with long-term hospitalised children.

eDIHO Community

Project eDIHO includes not only a group of student teachers of Pedagogy from the fifth year, but also other student teachers who continue work they had initiated in 2001. The project now includes student teachers from the Faculty of Education in Prague, children in the hospital and their parents, and teachers from the Hospital School. We also collaborate with doctors at the hospital. Some graduate students of Pedagogy have continued their eDIHO activities to see how the project helps children's learning. In fact, the eDIHO project attracted a graduate student of Informatics from the Faculty of Maths and Physics in Prague who teaches children in the hospital the elements of Informatics. She is now developing and testing a new online course to teach the basics of Web page creation.

It is very important to have personal contact with the hospital staff and children in the hospital. Sometimes we visit children to see what they do and which kinds of problems they have with online learning activities. During our visits in the hospital we discuss the project with the hospital-based teachers.

¹² Online kurzy. <http://chaos.pedf.cuni.cz>

Conclusions:

The model of online learning to support learning activities for long-term hospitalised children and enrich these children's learning works thanks to the enthusiasm of parents, student teachers, and teachers at the hospital. It serves as an educational model for any child's online learning and is also a "space" to develop student teachers' ICT skills and pedagogical competencies.

The model gives student teachers a good chance to apply theoretical knowledge from pedagogy, didactics, and psychology, to get firsthand experience in designing online courses, to develop written communication skills within a responsible position, and to discover the limitations of online education in virtual learning environments.

ICT IN EDUCATION: A COURSE FOR PEDAGOGICAL UNIVERSITY STUDENTS

Jevgeni Koshelev, Tallinn, Estonia.

Since 2000 there has been a training program in "ICT in Education" at Tallinn Pedagogical University for part-time students and teachers with no pedagogical education and previous full time students. The course is mandatory and consists of 7 lectures and 9 laboratory assignments.

Lecture materials are placed in a forum. Practical work consists of:

- Overview or a small exploration of ICT use for a particular subject
- Lesson plan containing ICT use
- Lesson plan incorporating the use of external information resources (Internet, library, etc.)
- Creation of a subject-oriented Web-page

During the course, students submit their work via E-mail and forum and communicate with teachers while working on learning materials.

A unique aspect of distance education in Estonia is that most participants use Pan-European or Russian editions of Microsoft Windows. There are problems associated with the use of different character sets (Baltic Windows - 1257, KOI8-R, etc.) Users must have high level ICT skills to deal with these circumstances. Experience with the "ICT in Education" course over the last two years has shown the critical need to focus on and resolve these issues, especially when students develop web-pages involving the use of different character sets.

DEVELOPMENT OF DISTANCE EDUCATION AND ICT USE IN EDUCATION IN HUNGARY¹³ Problems, Challenges, Solutions

Gabor Laszlo, Hungary

Abstract. The appearance and rapid spread of ICT tools have created a new challenge for society. It also represents both a challenge and opportunity for education. ICT completely changes all of our ideas about education. ICT in education is a complex subject. It has many professional and political aspects. We must think about transforming education with ICTs and the new forms of learning activities to support the objectives of education. This paper will introduce a brief analysis of the Hungarian situation.

Keywords: distance-learning, ICT based education, SchoolNet

Foreword

In this sub-region (Central and Eastern Europe) the countries face similar problems. Their political systems have changed, but the past still strongly affects the current situation. No country on earth can afford to lag behind. However, the solutions in applying ICT in education within each country may follow its own unique path. It is impossible to say that one way is the only way to success.

Education is especially important in the life of a nation's economy, since it will determine the economic potential of the country. Changes within the educational system have a long life span. The effect of the new technologies on the educational system, depending on the speed and unification of the introduction, could be as long as 5 to 15 years. We could safely say that the sooner adaptation happens the better.

Problems in Distance Education

Distance education creates a broad possibility for life-long learning and the spread of traditional structures. Among the most important elements of distance learning is that its cost is lower than the cost of the old fashioned traditional training and education. Most of the cost comes from preparing and producing the training material. Distance education ensures great freedom for all students due to its flexibility in scheduling, timing and placing.

One of the basic requirements of distance learning is continuous quality supervision, in both the preparation of the learning material and the final exams.

¹³ (This paper is the edited version of the presentation "Using ICT in Hungarian Education" at UNESCO Seminar in Kiev, 21-23 November 2002.)

This paper discusses only ICT based distance education.

The appearance of ICTs on the one hand brings up the need for life long learning, and on the other hand creates new possibilities and challenges for traditional education, and therefore changes it fundamentally.

In the case of distance education, (as in the case of ICT technologies) the basic teacher-student model changes, and contrary to the current situation, the student becomes the centre of attention. The role of the teacher changes fundamentally as well, because the process of learning becomes indirect. The traditional roles and tasks in teaching become the duty of professionals, who develop training materials, and assist the students in learning. The role of the Educational Institute changes as well, because the Organizational Centre and the content provider roles may become separate. At the same time, the informatical elements used in today's education are often applied using traditional modes of teaching and learning and hardly make good use of the existing potential of ICT to transform education.

Currently Hungary is facing the following obstacles to distance learning:

- No unified framework;
- Lack of agreement in methodology;
- Lack of experience;
- Lack of content;
- Access.

The sources are fragmented, because several organizations and institutes are working on further developing content for distance learning, and concepts of distance learning and e- learning, but they lack a unified framework. They also lack pre-developed standards and frameworks.

The level of co-operation is low. The organisation, which needs to fulfill its duty as the centre of distance learning can not live up to expectations because it lacks the capacity to unify the results and develop recommendations. It also lacks experience, although this could be gained in time. But without developing a unified framework, it cannot expect a meaningful step forward.

Although, one can observe a desire for cooperation, this usually stays within the sphere of academia. This was clearly shown at the conference, which was entitled "Electronic Learning: The Pedagogical Challenge of the Third Millennium", where one could see that fragmented initiatives were unable to reach a unified framework.

By access, one usually thinks of physical infrastructure (computer, network, etc.) but, access, means a lot more than this.¹⁴ It is important to know the cost for accessing information and its contents. Cognitive knowledge is vital-one must also know how to use this knowledge. For this reason it is crucial to train people in ICTs. Content appears again, in the previously mentioned meaning, and the lack of it. Institutions have important roles, including their creation of access to this information. Last, but not least, politics and the intentions of the political leadership and the effect of their influence on the market are important.

¹⁴ By Ernest J. Wilson

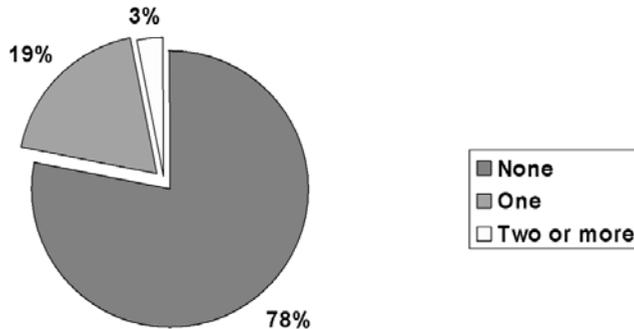
Digital Divide

The problem of access leads straight to the question of the digital divide.

The digital divide may be observed at 3 levels:

- between countries,
- inside the country,
- between students and teachers.

Among these, the division inside Hungary will be examined through the interrelation of access to computer equipment and Internet usage.¹⁵ In recent years, the number of households equipped with a computer showed a dynamic growth, but this number is still quite low.



Source: ITTK-TARKI-WIP 2001.09 N=5020

Figure 1. Households equipped with computers

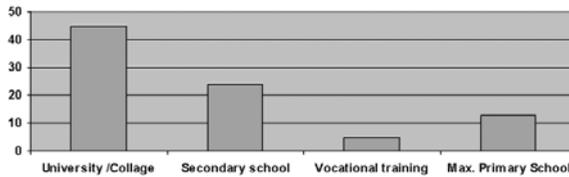
Another aspect is geographical location. "There is a significant difference between the most and least developed regions in Hungary with regard to the use of information technology. The southeast region of the country reached only 19.95 points in an IT scale of 1 to 100 points, while households in Budapest scored 33.1 points."¹⁶

In general, one can safely say, even in a worldwide respect, that the divide between users and non users is growing. Those who can not access ICTs and those who refuse to use the new ICTs are falling behind.

The digital divide also varies with the degree of education. The following two illustrations show the Internet usage in Hungary, based on the degree of education and the age of users.

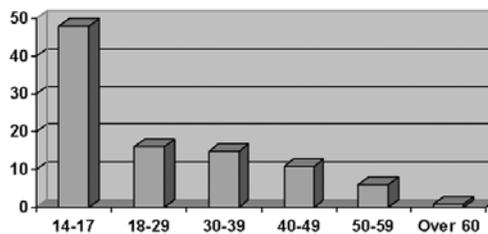
¹⁵ The complete text of studies: <http://www.ittk.hu>

¹⁶ Digital divide in Hungary <http://www.europedia.org>



Source: ITTK-TARKI WIP 2001.

Figure 2. Education / Internet use (%)



Source: ITTK-TARKI WIP 2001

Figure 3. Age and Internet use (%)

It shows that the Digital Divide in Hungary is also age-related, and this reveals an important aspect about the usage of ICT tools in education.

Several studies show, that recently-to varying degrees-there is an important role in the rejection, or the lack of interest, and not the relevant content. There is a role, therefore, for the previously mentioned political and institution aspects.

According to an OECD study, the cost of the access (on average) is the highest in Hungary among the OECD countries.¹⁷

SchoolNet

The SchoolNet program was started in Hungary in September 1996. Its main goal was to supply educational institutions with computers and Internet access. Hungary, at that time, was severely lagging in communication infrastructure, and the institutes for public education also lacked computers.

The rapid growth of the "New Economy" led to the development of today's knowledge society which has required that we integrate the appropriate level of information into public education and create effective communication channels between the participants of public education.

¹⁷ Local access pricing and e-commerce OECD report 2001. OECD <http://www.oecd.org>

	Jun. 1997	By the end of 1997	Sept. 1998	Sept. 1999	Sept. 2000	Sept. 2001	Sept. 2002
Additional connection by SchoolNet	0	700	1350	1775	1875	1875	2340

Source: SchoolNet

Table 1. School Internet Connection Numbers

SchoolNet Express

SchoolNet Express is the next phase of SchoolNet. It was announced on the 16th of November, 2002. by the Minister of Education.

The Main elements of SchoolNet Express are:

- Network;
- Hardware:
 - Computers in schools,
 - Computers at home;
- Additional training for educators;
- Development of digital study material.

Network

According to the plan, the School Net Express will provide Internet access to all schools by 2005.

	Hungary	EU
Computers in schools	30 students / computer	9-12 students / computer
Internet access in high-schools	100 %	100 %
Internet access in elementary schools	34%	91-100 %

Source: TARKI, Ministry of Foreign Affairs, OECD

Table 2. Comparison data between the Schools of Hungary and Europe in reference to their number of computers and Internet access capacities.

The plan recognizes the educational value of developing internet access in Hungarian schools to allow access to cultural institutes in neighbouring countries, therefore making it possible to pursue the idea of over-the-border education.

Computers at Schools

By 2006, the goal is that all schools will be equipped with a minimum of 1 computer to 5 high school students, and 1 computer for 10 elementary school students, in contrast to the current 30 students per computer.

Computers at Home

In the interest of supplying educators with computers, the Swedish model was used. Starting in 2003 this model provides tax benefits for those purchasing computers.

Those educators, college and university students, and the parents of such students, purchasing or leasing computers will receive tax benefits. In some cases, this might mean that the computer is free. Starting in 2003, employers (such as schools) will be able to provide employees free computers and Internet access.

	1997	May. 2002	From June 2002.	From 2003
Educators who received a computer	650	+ 13.000	+ 6.500	Tax exemption for all educators who buy a computer

Source: SchoolNet

Table 3. Computers were given for educators

Teacher Training

The low level of teacher ICT competence is the main problem for ICT-based educational methods.

First, the competency for using ICT must be created and then this competency can be the basis for further training. Training programs for educators will start January 1st, 2003, and will make a distinction between educators with or without computer skills, and will provide training for those without computer skills.

All educators, who purchase, rent, or lease a computer during 2003, within the program called Sulinet Express, will receive free training, (informatical skills), and exams (for example, ECDL).

In those countries where information-communication technology training programs were introduced into the school systems, they have also prepared the educators for these programs. This was ensured by the training of educators of the elementary and middle schools; the training focused on general technology tools and software programs to be used in instruction. In some rare cases special methods were introduced, for example, those for teaching foreign languages and natural sciences.

The training of these educators was completed by using different levels of programs, and they have also considered the educator's prior knowledge of certain subjects. In Hungary, they have recently introduced the most important informatical skills into the educator's basic training programs. A number of countries have made advanced training in informatics mandatory, and there are some countries, where, besides having a degree in teaching, it is also mandatory to earn a certificate in a basic computer course. (The Netherlands for example, has developed an excellent program for this in distance learning.)

Development for Digital Study Material

Four independent associations have encouraged the development of educational content on a large scale recently in Hungary: Apertus Foundation, Soros Foundation, IKB, and the SchoolNet Program Office. At the moment SchoolNet P.O. does, for official reasons, provide some content for schools.

The amount invested in this area exceeds 1 billion HUF, but it is not easy to estimate the improvements due to communication limitations, lack of strategy and other facts. The above-mentioned organizations, for example, are totally independent from one another. Furthermore a quality evaluation system has not been developed in this area.

Basic tasks for the next 2 years are:

- decentralization of curriculum development,
- inviting partners to the program,
- more intense participation in building European standards,
- starting and coordinating teacher training,
- providing professional and technical background to teachers involved in the program.

Most important goals

The Main goal is a complete curriculum-database that can be developed and customized.

Main points:

- contents should be widely accepted and agreed upon;
- large number of teachers should take part in developing contents;
- "learning objects" should be developed freely, database shouldn't be "closed";
- elements can be movable to fit in different teaching-learning strategies;
- content should be compatible to the European qualifying standards of teaching software and Internet;
- content should be compatible to the International standards of e-learning;

- set up of the knowledge base;
- require the review of the system regularly, follow-up.

ICT in Education

Using ICTs in education is not the same as teaching ICT use. ICT is a subject and also an educational tool.

According to the SchoolNet plan, by 2006 informatical education will be mandatory from the fifth class on in elementary school, and school-leavers in high school will be required to take the ECDL exam.

Last year much successful work proved that informatical and communication technologies have a place not only as a subject, but also as working tools in the schools. This thinking has reorganized the structure and the function of the school system.

The demands for providing in-service training of teachers have intensified. The skills necessary (such as independence, effectiveness of teamwork, skills for solving problems, etc.) are growing and becoming more important. At the same time, those who adopted new technology (for example benchmarking) are participating in pedagogical research.

"Teaching and research centres for educational technology and ICT are currently being established. The UNESCO Chair for ICT in education, found at Eotvos University, acts as a catalyst for educational research and the introduction of computer culture in teacher training. Major research efforts of this centre are testing of ICT-based teaching and examination packages and multimedia teaching aids. These efforts are jointly undertaken by the centre, the Hungarian research site of the EMILE-Educational Multimedia in European Schools project, and the Association of ICT Teachers (ISZE). Increased support allows school libraries to act as knowledge centres, through regular grants for hardware and through grants and training programmes for software."¹⁸

Conclusion

To build the knowledge-based society, new technologies are necessary in the education and in-service training of teachers. These technologies change the foundation of the educational system. These changes are now underway and it remains to be seen where all this will lead. Until then, the present technologies must be integrated to make the most of their potential.

¹⁸ Karpati, A.: ICT in Hungarian Education - A brief overview

References

1. Szabo I., Educational challenge and the possibilities of the distance learning (Study) (Oktatási kihivasok es a tavoktatas lehetosegei (tanulmany)) (2000) <http://www.ntt.hu> (Downloaded Nov 16. 2002) (Hungarian)
2. "The age of the digital study material (SchoolNet Program Office Topic of debate) ("A digitalis tananyagkorszak" Sulinet Programiroda, vitaanyag) 2002. <http://www.sulinet.hu/sulinetwork> (Downloaded Nov 16. 2002) (Hungarian)
3. "ICT in public education, ICT in the ScoolNet", Research program and teacher training schedule by the SchoolNet Program Office ("IKT a kozoktatasban, IKT a Sulinetben" Kutatasi program es tanar-tovabbkepzesi terv, Sulinet Programiroda) (Hungarian)
4. Karpati, A.: ICT in Hungarian Education - A brief overview
5. Local access pricing and e-commerce OECD report 2001. OECD <http://www.oecd.org> (Downloaded Nov 16. 2002.)
6. World Internet Project <http://www.ittk.hu> (Downloaded Nov 16. 2002)
7. Information Society and Trend Research Institute <http://www.ittk.hu> (Online Nov 16. 2002)
8. Ministry of Education <http://www.om.hu> (Online Nov 16. 2002)
9. SchoolNet <http://www.sulinet.hu> (Online Nov 16. 2002)

LATVIAN EDUCATION INFORMATIZATION SYSTEM (LIIS) PROJECT

Iveta Gultniece, Latvia

During 1990 – 1997 the level of acquisition and use of information technologies (IT) in Latvian schools declined. On June 13, 1997, the Ministry of Education and Science of the Republic of Latvia and the University of Latvia signed an agreement, "On the Latvian Education Informatization System".

The mission of this project is to create the conditions for the successful continuation of education system informatization during the following years.

The project covers the whole informatization grid:

- Education content;
- Management;
- Information services;
- Infrastructure;
- User training at several levels (schools, school boards, and Ministry of Education).

In 1997, the project entered its pilot phase.

In 1998, informatization of regional support centres was carried out. Figure 1 shows the location of regional and pilot centres.



Figure 1

In 1999 educational content was developed and tested; teachers, educational staff, and students were trained; management functions were automated by providing to every school at least one computer with dial-up Internet service; computer equipment was purchased; and information service products were tested.

Between 2000 and 2003, the results of these efforts were compiled. Current efforts, in cooperation with local governments, will lead to an all encompassing informatization of the Latvian educational system. With local government co-financing, every school in Latvia will be supplied with computers and Internet connections, providing one computer per 10 students in grades 10-12, one computer per 25 students in grades 5-9, and one computer per 10 teachers.

Project Financing

The project makes effective use of external funds. External funds have been raised from municipalities at different level, from several funds, and from companies.

Fund raising included:

- Budgets from state and local governments (see Table 1.);
- Direct investments for development of the infrastructure and implementation of the project;
- Significant discounts and donations of software and hardware for educational institutions.

The maintenance of the infrastructure (service staff, line leasing etc.) is financed entirely by the institutions that are using the infrastructure elements.

Stage	Goal	Budget	
		State	Local governments
1 - 1997	Informatization process set-up	\$260,000	\$160,000
2 - 1998	Creation of regional support centres, trainer training	\$1,750,000	\$2,168,000
3 - 1999	Creating an extensive informatization infrastructure, extensive training of trainers and teachers	\$4,095,000	\$2,507,000
4 - 2000	Installing computer classrooms in every secondary school, extensive training of trainers and teachers	\$4,000,000	\$2,300,000
5 - 2001	Internet connections for every school, extensive training of trainers and teachers	\$4,000,000	\$2,300 000
6 - 2002	Extensive informatization	\$5,644,000	?

Table 1

Figure 2 shows how the budget was allocated in 2002, and is similar to other years.

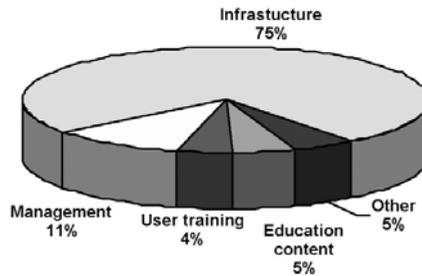


Figure 2

Infrastructure

Each year there was a different priority for infrastructure development:

- 1997 - pilot structures;
- 1998 - regional computers centres;
- 1999 - computer labs in schools;
- 2000 - administration of schools;
- 2001 - libraries;
- 2002 - subject teachers in classrooms.

Results of the infrastructure development are shown in Table 2.

Indicator/Year	1997	1998	1999	2000	2001	2001
Pupils per computer	67.3	49.5	39.3	32.3	26.3	20.0
Internet connectivity of schools	9%	21%	35%	97%	97%	97%
On-line connections				16%	34%	37%
Real use of Internet				51%	67%	75%

Table 2

Within the framework of LIIS a special system of teacher training was developed to teach IT use to the more than 40,000 Latvian teachers.

Pilot Phase

In 1997 the program was operated in a pilot phase, in which three groups of teachers were trained with the two test-programs. The basic goal of the programs was to instruct teachers in the use of Microsoft Windows 95, the Internet, and the standard version of Microsoft Office.

The training was implemented in sessions of three eight-hour weekend days. At the conclusion of courses, each teacher fulfilled a qualification assignment, then received a certificate stating the content of the training program. Various types of training were used in the sessions: lectures, practical work, seminars, and, especially, differentiated individual work with previously prepared materials and various drafts of methodological training resources.

Regional Computer Centres

In 1998, 39 regional computer centres were established to train teachers in the respective regions in the use of computers with the two programs that were established in the pilot project. To ensure that training could proceed without interruption, each of the computer centres were staffed with four instructors, with at least one able to provide minimum maintenance of the centre's equipment, including program installation and administration of the local area network.

Training of specialists for regional computer centres is organized according to the following plan:

- Courses and seminars are organized according to specific programs.
- Each course involves a methodological seminar (2-4 hours) where teachers share their own experiences and make proposals and recommendations.
- After each course there is an examination, and certificates are awarded.

It should be mentioned that in most Latvian regions and cities, the creation of the regional centres was met with great interest. Finding and keeping centre staff is difficult because the well prepared teachers often leave for work in commercial environments.

Teacher Training to Use IT

Starting on September 1, 1998, after taking courses and passing exams, regional centre trainers organized computer literacy courses for the teachers and school board staff of their region. Taking into account the real situation in schools, the wishes of teachers, and the results of the teaching program in the pilot phase, the teacher training was organized into 72 and 96 hour programs.

Program I (72 hours):

- A look at standard Microsoft Windows programs - 8 hours;
- Fundamentals of the Internet - 12 hours;
- Text editor - 18 hours;
- Electronic tables -16 hours;
- Preparation of presentation materials - 10 hours;
- School management software - 8 hours

Program II (96 hours):

- A look at standard Microsoft Windows programs - 8 hours;
- Fundamentals of the Internet - 16 hours;
- Text editors - 20 hours;

- Electronic tables - 16 hours;
- Preparation of presentation materials -12 hours;
- Technologies for designing WWW pages -16 hours;
- School management software - 8 hours.

From 1998 to 2002 various training programs were designed, updated, and implemented for the regional centres of LIIS. In 2001 these programs were tied with the content of the European Computer Driving License (ECDL), taking into account the specific needs of teachers.

Teacher training results are shown in Figure 3.

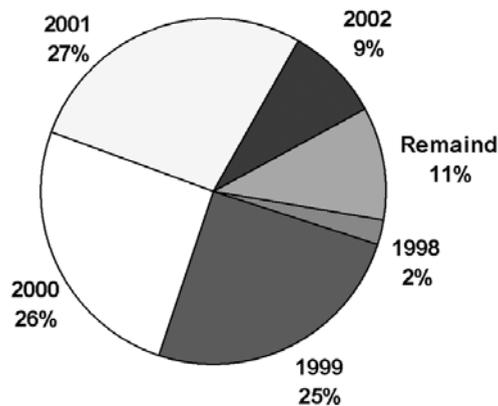


Figure 3

In 2002 and beyond, there will be an expansion of distance education and advanced training of informatics teachers. Every teacher can sign up for any of these courses. LIIS organizes about 50 different courses for teachers:

1. LIIS school management software-5 courses (Lotus Notes, databases of teachers, students, financial accounting and library);
2. Computer classroom administration-10 courses (Windows, Lotus Domino, CISCO).
3. For informatics teachers and RC instructors-22 courses:
 - OS-Windows;
 - Applications (MS Office): Word, Excel, Access, Outlook, PowerPoint, FrontPage;
 - Programming: VB, VBA, Pascal.
4. For other subjects teachers-12 courses (same examples):
 - For music teachers-Passport Encore 4.2 un Sonic Foundry Sound Forge 4.5;
 - Computer algebra systems-DERIVE.

Internet Based Teaching

To ensure successful mastery of the courses, the development and improvement of teaching materials that began in 1998 will continue. These texts are placed on the LIIS central server and are accessible to anyone who is interested, providing the opportunity for self-instruction in any course.

From the very beginning of the LIIS project, it was decided that Internet based teaching aids would be emphasised over diskettes, CD-ROMs, etc.

In the future, special attention will be paid to interactive teaching aids, including servers for automated learning and distance education environments.

Distance-Learning IT Course for Teachers

During 2000-2001, within the LIIS framework, a distance-learning course, "Computer Literacy," was developed and implemented. The aim of the distance-learning course is to prepare students to learn and work using modern IT.

The course is based on this author's four years experience as a teacher trainer and organizer of the teaching process. During the year, six course authors had many discussions regarding the form and content of these books.

The Internet course version, created with two other authors, has some additional interactive features:

- demonstration videos of tasks such as connecting devices, using disks;
- macromedia files demonstrating searching files or deleting text.

URL of the course homepage is www.liis.lv/mspamati/

The language of the course and books is Latvian.

The course consists of Six parts (books):

- First steps (Basics of computer and Microsoft Windows 98);
- Word Processor Microsoft Word 2000;
- Spreadsheets Microsoft Excel 2000;
- Presentation graphics Microsoft PowerPoint 2000;
- Networking and Internet (Basics of networking, Microsoft Internet Explorer 5.0 and using public e-mail boxes);
- Web pages (Microsoft FrontPage2000 and Microsoft GIF animator).

The distance-learning course "Computer literacy" consists of:

- 6 or 7 seminars in 2 parts:
 - New theme review;
 - Examine previous theme;

- Students' regular work with these materials;
- Students' home work (course parts 2, 3, 4 and 5 include training exercises).

If student works 5 hours per week, the course takes 4-6 months to complete.

The next IT distance-learning training course is related to the European Computer Driving License (ECDL) Syllabus version 4.0.

Since its inception in 1997, a variety of teaching aids, equivalent to 31,000 printed pages, have been developed for the LIIS project. Major attention is devoted to the areas of study which correspond to the major modes of cognition-rational cognition (mathematics), empirical cognition (the natural sciences, especially physics), cognition by modelling (informatics), and emotional cognition (literature). Using these materials together with original educational software ensures that approximately 20% of the high school program can be taught via computer. In some disciplines, e.g., Latvian language and mathematics, the percentage is 75% of the whole syllabus.

Currently, students and teachers are able to access rich resources and materials:

- On the internet, using searchable full-text database classified by keywords, titles, authors, courses, and types (online, printed, ftp);
- On CDs. Every summer new versions of two LIIS compact disks are sent to every school;

The rapid development of IT and the great increases in the number of computers in Latvian schools requires the continual improvement of existing courses and the development of new courses.

Examples of some of these products, which are extremely popular among high school teachers and students, include:

- A review of mathematics materials on the Internet for students and teachers consists of two parts: a review of educational software and a review of online materials. They are classified accordingly to the needs of Latvian high school curricula (www.lanet.lv/info/intermat/framengl.htm).
- A Latvian sign language dictionary is an interactive teaching aid to hearing-impaired children and their relatives (www.liis.lv/latval/zimval/index.htm).
- Geography and history of Latvia is interactive software which covers the location of important places in Latvia and important facts about them ([ftp.liis.lv/macmat/pedagog/sp_latv.zip](ftp://liis.lv/macmat/pedagog/sp_latv.zip)).
- Astronomy on the Web covers such topics as "Astronomical News", "Latvia from Outer Space", Internet survey, "This is for you, teacher", "Astronomical Vocabulary" etc. (www.liis.lv/astron/).

ICT TEACHER TRAINING IN LITHUANIA

Valentina Dagiene, Lithuania

The National Strategy for ICT implementation in Education

For many years, the absence of a purposeful national long-term policy for ICT implementation in education and a constant lack of funds resulted in a very slow, ineffective computerization of education. So, in 2000 the new *Strategy for Implementation of Information and Communication Technology into Lithuanian Education* was developed and approved by the Ministry of Education and Science [1]. The Strategy was developed for years 2001-2004 with the intention to revise it in 2002.

The strategy covers primary, lower secondary, upper secondary, high, vocational, youth, and special schools, which provide general education. It is based upon the aims of the National Programme of Information Society Development in Lithuania and the objectives of the National Curricula of the Lithuanian general education.

The National strategy provides an extensive vision of ICT use and its systematic introduction into different areas of education. According to the document the following seven areas of education should be dramatically changed, while implementing ICT in education: (1) the relationship between society and education; (2) life at school; (3) contents and methods of education; (4) provision of computer equipment and learning aids; (5) *the teacher's role and qualification*; (6) the connection between science and education; (7) management and funding of ICT implementation.

I have dealt with one part of the Strategy-discussing the direction of teacher training in connection to ICT.

What are the main goals and scope presented in the Strategy?

To provide conditions for all teachers to obtain complete ICT literacy and skills to apply new technologies and modern teaching methods in education:

- a) to prepare information and technology literacy standards for teachers and to provide necessary conditions for all 9-12 grade teachers and school librarians to acquire basic knowledge;
- b) to gradually provide conditions for all 1-12 grade teachers and other educational specialists to acquire standard ICT application skills.

To provide conditions for informatics teachers and ICT coordinators to acquire and constantly improve their qualifications:

- a) to prepare information technology literacy standards for informatics teachers;
- b) to prepare information technology literacy standards for ICT coordinators.

To change the role of school librarians and to appoint them as school information centre and information skills education specialists:

- a) to prepare the standards of compulsory information literacy and ICT application for all school librarians.

To develop an effective and flexible system of teachers' in-service training and life-long learning, which ensures a constant opportunity for all teachers to improve teaching of their subjects by using new technologies.

To develop a several-level system of incentives for all teachers who apply ICT in education:

- a) To apply information technology standards for the certification of all teachers.

The national strategy splits the implementation of the most relevant tasks into four stages: (1) the first stage aims at the development of financial, legal, and technical foundations and provision of elementary ICT skills for the school staff; (2) the second stage includes modernization of libraries and development of teachers' computer centres; (3) the third stage focuses on the ICT integration into teaching and learning of various subjects; (4) the fourth stage aims at the development of an educational network.

Changes in Teachers' Roles and Staff Development

The Strategy asserts that the teacher must be a true citizen of a life-long learning information society.

First, the teacher should constantly improve his/her professional, technological, and social competence.

Second, forms, methods, and tools of life-long learning (distance learning, support networks, etc.) have to become the essential elements of in-service and pre-service teacher training systems. This is to be achieved by: (1) providing conditions for all teachers, school librarians, and ICT coordinators to acquire both sufficient ICT literacy and skills needed to apply new technologies and methods in education; (2) to develop an effective and flexible system of teachers' in-service training and life-long learning, (3) and to develop a several-level system of incentive for all teachers who effectively apply ICT in education.

The Main Points in Teacher Training of ICT

Several universities in Lithuania are offering bachelors and masters studies curricula for teachers of informatics. Study of informatics are commonly coupled with the study of mathematics. The introductory ICT courses are also implemented in other subject curricula. Unfortunately, such courses are in the minority and make up only 5% of credits of the whole subject curriculum.

By the end of 1999 there were also more than 40 in-service teacher training institutions located at the municipalities and regional centres of Lithuania. In-service teacher training was decentralized, so the content, volumes, and methods of the courses varied a lot.

What appears to be far more effective is to bring teachers as quickly as possible to a point where they can recognize, and begin to appreciate, the relevance of computers to their own classroom practice in their own subject areas. Once teachers get acquainted with how the proper use of ICT can make a real contribution to their professional work, the motivation to acquire fresh technical knowledge can be easily developed.

So the most important element in a new approach to teacher training is not to concentrate on teaching technical knowledge and skills but rather on the principles by which the pupils' learning is improved. For this reason, the main priority in teacher training is given to the design of electronic educational materials that are compatible with the compulsory school curriculum subjects. The focus of in-service training courses is also shifted from development of technical skills to the didactical aspects of integrating ICT into education. Great attention is paid to develop new thinking and skills to be required in the information age (e. g. handling of enormous amounts of information, searching and selection of information needed for a particular task, developing projects, algorithmic-structured thinking and problem solving).

The Role of Informatics in Disseminating ICT in Schools

The main factor that influences ICT implementation in the primary, basic, and secondary school levels, as well as teacher training in ICT, is the teaching of informatics and Logo.

1. In Lithuania, Informatics has been a separate school subject for many years. The compulsory course of Informatics has been taught at school since 1986. Following the guidelines of the State Education Reform, the whole content and structure of the course has been recently revised. An introductory compulsory course of Informatics is now taught in leaving-classes of basic school (in grades 9-10). Further informatics courses implemented in the upper secondary school (grades 11-12) are split in two levels: core, and advanced. The core curriculum goal is to strengthen the practical ICT skills of all students in five fields: (1) text processing, (2) spreadsheets, (3) Internet, (4) presentations, and (5) social and ethical issues.

The advanced course is based on the modular principle. Every school can choose one module from the following: (1) database, (2) programming, and (3) hypertext and multimedia.

Because there is a separate Informatics subject at school we have teachers of informatics. That is very important for schools—each school has at least one expert in ICT who can work as a trainer (tutor) of other teachers.

2. Logo (in the sense of Seymour Papert) has long been taught in the Lithuanian basic school. The main emphasis here is to develop creativity, thinking skills, and problem-solving abilities—long-term benefits that will impact future society. If a school has a computer lab, it often is used to teach the use of com-

puters. For the 5-7 grades, this is usually Logo. At the elementary school (grades 1-4) some teachers use Logo as well, but this is rare.

Experience shows that individual project-based learning is more acceptable for Lithuanian teachers. It does not require deep management skills that teamwork projects do, and is more similar to the traditional instructional approach. Meanwhile, those teachers using Logo become more technologically and pedagogically stronger. They aren't afraid of the modern ICT tools, and, what is probably even more important, they become more creative.

3. Some Lithuanian professional societies conduct educational activities that help the teachers to improve their ICT skills. One is the Lithuanian Computer Society under the auspices of which a Working Group of Teaching and Learning (WGTL) was founded in 1994 (http://www.liks.lt/liksb_an.htm). The aim of the WGTL is to bring together teachers and researchers who are interested in ICT implementation in education. What should be stressed here is the high level of activity and creativity of the teachers involved. The members of WGTL get together several times a year in different parts of the country (usually in a school) to share their experience with colleagues and teachers from local schools. Special attention is paid to small rural schools, for which in-site seminars, workshops, and lectures are offered periodically.

The second body is the Lithuanian Association of Informatics Teachers (LINMA) established in 1999 (<http://www.ipc.lt/linma/>). The main aims of LINMA are to collect, evaluate, and share the methodological know-how of ICT use at school.

4. Active participation of students (from 13 to 18 years old) in National Informatics Olympiads is also a major factor that helps teachers to develop their ICT practices. Simple use of e-mail can serve as an example. A few years ago electronic mail was used to exchange tasks and students solutions. It was an innovation that stimulated all teachers involved to begin to use e-mail communications. Today all the schools are provided with electronic mail and at least one teacher at each school is an expert in this area.

The ICT Literacy Standard for Educators

As mentioned in Strategy, the ICT Literacy Standard for Educators is necessary to develop and implement to structurize and improve teacher training [2].

In December of 2001, the ICT Literacy Standard for Teachers (the Standard) was developed and approved by the Ministry of Education and Science.

The Standard establishes the requirements for the teacher pre-service and in-service study syllabuses of all levels as well as for the organisation of the studies. The Standard is a part of teachers' certification requirements for those teachers who are seeking a higher certification category. It defines the mandatory professional qualifications for application of ICT by the teachers in the process of teaching and self-help.

The Standard rests upon:

1. European Computer Driving License (ECDL) Program. It conforms to minimal computer literacy requirements for the teacher as a public services provider.
2. Concepts of application of ICT in education, didactic approach to the professional development of teachers, requirements to understand the use of ICT in the educational process, to understand social and ethical diversity and skills in computer educational software.

The Standard is targeted on minimum requirements for literacy of educators to enable them to:

- (Technological part) Organize the educational process using ICT.
- (Educational part) Develop professional competence.

The Technological part consists of three main issues: (1) Application of software in education, (2) Preparation of textual and visual teaching and learning materials, (3) Use of basic Internet services in education.

The Educational part was focused on four problem fields: (1) The ability to use ICT in the educational process, (2) The development of an information culture for students and teachers, (3) Development of professional competencies in employment of ICT, (4) Knowledge of the main forms of dissemination of educational information. The Implementation of ICT Literacy Standard for Educators

The ICT Literacy Standard for Educators was implemented in spring 2002. In the beginning it was taught in the usual way: face-to-face courses of 40 hours organised in the computer centres.

In summer 2002 the course for the Technological part was designed and prepared for distance learning, and in autumn, the course for the Educational part. Thus, all the material correspondent to the Standard is now available on the Internet and teachers all over the country may use it.

The material prepared for distance learning was designed according to the criteria listed below:

- The material was strictly structured, grouped in small portions so that readers could easily take breaks during the process of learning.
- There were self-control questions, exercises, and other tasks added to the material so that readers could constantly test their own level of understanding.

The material for the Technological part corresponds to the ECDL program and uses the same testing base. Completely new material for the Educational part was created.

This year there were 7500 teachers instructed in the Technological part using face-to-face (6400) and distance learning methods (1100). The course on the Educational part was given only by distance learning. In summer there were 100 teachers instructed, and some of them became teacher trainers. Currently 1000 teachers are studying the Educational part by distance learning. In total 8600 teachers were instructed in ICT from lower and upper secondary schools. This means that 50 percent of all teachers working in secondary schools (in grade 9-12) were reached.

Conclusions

- The National Strategy for ICT Implementation into Education was developed, in which the roles and qualifications of teachers are the most important element of the strategy.
- The focus of in-service teacher training courses shifted from development of technical skills to the didactical aspects of integrating ICT into education.
- Teaching of Informatics has a great influence on in-service teacher training of ICT.
- The ICT Standard for Educators was developed a year ago and is the most important document in ICT teacher training. The Standard consists of Technological and Educational parts. The Technological part is based on the ECDL syllabus while the pedagogy was originally developed.
- ICT Literacy Standard for Educators was implemented in summer 2002. Approximately 9000 teachers have participated in courses to fulfill requirements of the Standard, many via distance learning.

References

1. Informacijos ir komunikacijos technologijos diegimo Lietuvos svietime strategija (2000). Informacijos technologija mokykloje, Vilnius, 153-197. URL: <http://www.ipc.lt/english.htm>; Dokumentai. (in Lithuanian, The Strategy for Information and Communication Technology Implementation in the Lithuanian Education)
2. Teachers' computer literacy standard. URL: <http://www.ipc.lt/english.htm>

INCORPORATING ICT INTO EDUCATION IN MACEDONIA

Andrea Kulakov, Macedonia

Keywords: Teacher education, curriculum planning and development: approaches, strategies, and models for integrating distance education and ICTs into teaching.

The Center for Open and Distance Education at the Faculty of Electrical Engineering in Skopje, Macedonia (odl-skopje.etf.ukim.edu.mk), worked with the Non-Governmental Organization Schools-Online (www.schoolsonline.org) of San Jose, California, USA, on a project to introduce the use of ICT in primary schools. The project also involved partners in Bulgaria and Russia.

The Schools-Online organization donated equipment for computer classrooms in 12 Macedonian primary schools, which included computers, a printer, a scanner, and a digital camera for each classroom. The Macedonian Telecommunication Company donated Internet access. Later they found that these computer classrooms were rarely, if ever, used. After conducting a survey, they discovered that the classrooms were not used because the teachers in the schools (except the Informatics teachers) were not familiar with the technology and they did not understand English (except the Informatics and the English teachers).

Instead of translating computer literature into Macedonian, the Schools-Online organization built a curriculum around best practices and adopted it in three local versions: Macedonian, Bulgarian, and Russian.

They organized two Master Trainers Seminars where four people from each country were trained to teach the teachers about the use of technology. Then in Macedonia, the Center for Open and Distance Education, with the local Non-Governmental Organization "Svest" ("Awareness"), organized two seminars which trained two or three teachers from each of the schools that had the Schools-Online equipment. These teachers were then asked to train the rest of the teachers at their schools in the use of computers, telecommunications, and other new technologies, for use in their classes and the preparation of their courses. The second seminar was held six-months after the first one with the same participants, thus providing the opportunity to see how they used the knowledge from the first seminar.

The introduction of the use of ICT is not about the equipment, it is about teaching methods. Teaching methods must change in order to better utilize ICT in the educational process. The teacher trainers became familiar with principles such as the following:

- Introduction of active teaching and learning
- Constructivism
- Activity theory (from Vygotsky)
- Goal-oriented learning

- Project-based learning
- Collaborative learning.

Introduction of Active Teaching and Learning

Our emphasis is on active teaching and learning, rather than environments in which students are passive recipients of information and facts. With computers, students may be active in the learning process by exploring and creating new knowledge rather than simply memorizing information or steps to achieve a certain goal. Teachers should encourage pupils to do something on their own, rather than being passive participants in the learning process.

Constructivism

We have taken a stance on the psychological tradition that we follow in our seminars. The constructivist theory basically states that knowledge about new things should be gradually introduced. New knowledge should be grounded on previous knowledge. All concepts should be connected either among themselves or through metaphors with similar concepts from the student's experience.

Activity Theory (from Vygotsky)

Following the best Soviet tradition of the Vygotskian psychological school (which is becoming more and more popular in traditionally western psychology departments), we have emphasized the importance of socialization in learning where all activities should be seen in a wider context of their applicability to the outer world. We have taught teachers the ways that concepts such as 'zone of proximate development', may be translated into effective instructional strategies. For example, first introducing several related things to ready the pupil for the new concept and then introducing the new concept.

Goal Oriented Learning

Most of the ICT books are written by professors of mathematics who became interested in computers. Thus, most of the examples are about how to solve math problems. Also, the computer programs are learned by listing all of the possible commands in the menus.

In contrast, we have taken a minimalist approach-teach the pupil only what is needed to achieve a particular goal. So, we give a task, about formatting a document for example, and only show the pupils how it is done the fastest way. Only later if they show interest in other aspects of the computer program do we show them additional techniques.

Project-Based Learning

Another supplementary change that should be introduced is project-based learning, in which pupils are given real-world practical tasks to perform using technologies such as digital cameras and scanners.

Collaborative learning

Collaborative learning has been used as a means to facilitate students learning of a second language. What we have urged the teachers to do is to give pupils tasks from two different subjects, one being English and another subject such as Geography, the mother language, or literature. Pupils then work in small groups of two or three using English while learning the other subject. This has helped students improve their knowledge of English as well as the content of the particular subject, and create new materials in the local language which can further help the professor for future classes.

To demonstrate how documents, messages, and resources can easily be shared via the Internet, we have used the free yahoo.com Web site. We have created a special group for the seminars and it has remained active.

Problems of Language and Culture

Most of the middle-aged teachers do not understand English, so Internet resources are not useful for them. That's why we have paid special attention to finding resources in local languages (Macedonian in our case) or in languages other than English, such as French and Russian, which most of our participants understand well. These kinds of searches require use of national keyboard layouts, but also require transcriptions of Cyrillic letters into Latin letters. All these approaches lead to different sources on the Internet, providing greater availability of resources.

We have also encouraged the teachers to use other Slavic languages that they understand while searching information on the Internet, because the languages are similar and sometimes it is easy to use these materials. Concern about the national keyboard layouts and different transcriptions applies here also.

Automatic translators can help those who do not understand English. There are Web pages which provide, though not a perfect translation, a passable one, from and into several widely used languages such as English, French, Russian, German, and Spanish.

The examples that we have found from other curricula were not only translated, but adopted to the local culture to enhance their applicability and instructional relevance to our students.

E-LEARNING IN EDUCATIONAL MANAGEMENT

Simion Caisin, Moldova
Petru Gaugash, Moldova

The Need to Improve Educational Technologies

The volatile nature of the market economy often impels people to study and learn on a continuous basis, so that they are equipped to face competition at work and change jobs or professions. This constantly changing environment demands new methods of teaching, characterized by flexibility and variety. Educational institutions must learn to respond to the new market demands by offering new educational services. This requires prompt and multilateral changes in the organization of the teaching process. Three aspects of such changes are:

- Change in methods and teaching approaches;
- Introduction of new information technologies;
- Change in the management strategies of educational institutions.

Most educational institutions admit the need for innovations in the first two areas, but initiatives are seldom successful in these areas if not accompanied by changes in management. The creation of new educational services is impossible without a change in the management of educational institutions based on new principles that cater to consumers' needs. The use of new educational technologies in particular often conflict with existing methods of educational institutions. Changes are long awaited.

Not only the functions, but the principles of Higher Education Management Policy must be changed to support the needed changes in educational institutions' activities. Training is needed to provide new skills and promote new values for managers at different levels, from project managers in charge of developing new educational services, to managers of local and central educational institutions.

E-Learning Model

One of the new educational services is E-learning, a form of Open Education based on the application of new network technologies. E-learning represents a new educational paradigm, which makes the learner the key figure in the teaching process and focuses on the learners' needs, not the teachers' or institutions'. The teacher becomes less a source of information in E-learning systems and more a manager of the learning process. E-learning gives students more control over course content, teaching strategies, and educational resources. This new approach allows students to choose what, when, where, and how they study. Distance Education and other new information technologies make this type of teaching possible. The reform of the teaching process based on Open Education techniques highlights the need for highly qualified personnel, updated content for educational programs, and new technologies for teaching.

The rapid technological changes in the world community were at the base of developing new educational forms and techniques, which are mainly oriented toward wide use of e-manuals and net teaching techniques.

Teaching with these new conditions will require updated texts for all university curriculum subjects. They should correspond to the new educational programs and may include:

- Theoretical courses;
- Syllabi of practical lessons;
- Model and Final tests; and
- Guides for specific subject areas.

The Need for Training Specialists in Educational Management

The current state of higher education in Moldova requires new strategies and serious reforms based on educational technologies to improve the quality of educational services offered. This will require specialists who can implement educational reforms, make good decisions, and serve as links between the government, and public and educational institutions. The State University of Moldova and the Institute of Continuing Education, understanding the need for training of school and university managers involved in educational reforms, have developed new training programs and refresher courses for all levels of educational system managerial staff. The State University of Moldova and the Institute of Continuing Education, in cooperation with Alicante University (Spain), The Royal Institute of Technologies (Sweden), and Centrinity Company (Sweden) have developed a project called "The National Center of Educational Management," sponsored by the TEMPUS Program under the guidance of Moldova Ministry of Education, that will provide training and refresher courses for school and university managers. These intensive courses, launched within the framework of the project, use E-learning methods that allow students to tailor the instruction according to their personal interests.

These modules must cover the range of managerial styles and strategies. Topics covered include personnel issues such as organizational structure, human resources management, managing conflicts, and conducting meetings, as well as curriculum management, monitoring and evaluating school activities, decision-making, educational marketing, financial management, and reform management.

Seven modules will be developed for future managers: 1) Introduction to Education Management, 2) Institutional Resources Management, 3) Institutional Evaluation of Quality, 4) Planning and Financing in Education Management, 5) The Meaning of Education Change, 6) Information and Communication Technologies in Education, and 7) Educational Management System in Moldova.

The Institute of Continuing Education will handle this project relying on the UNESCO policy "Education for All", providing opportunities for study for everybody, irrespective of age. New Innovative teaching and learning methods based on information and communication technologies will be widely used in these continuing education programs.

E-learning Advantages

Interest in the Internet is growing everywhere in the world. People's need for continuing education increases daily. The development of informative and communicative technologies creates new possibilities for continuing education at a comparatively low cost. New technologies allow people to study at home or office. The learning process can occur at any time and according to individual schedules. All that is needed is a computer and Internet access.

The main advantage of learning via the Internet is its flexibility in time, place, and pace. Internet-based long-distance teaching models can include effective teaching materials and presentations such as: campus portals to resources and processes, links with automatized response systems, and access to Internet resources, such as interactive multimedia, audio teleconferences, and educational radio and TV.

To meet market requirements many educational institutions have hastily developed teaching resources, mainly based on e-mail, audio, video, and printed materials. Too often, however, the methods of teaching used represent an application of the "correspondence model" of distance learning.

New technological systems must meet certain standards and be compatible with various application models. Open Education learning models are based on electronic and Internet technologies, encompassing a wide range of systems including computerized training, education, and intellectual systems. Educational environments for such systems are based on standards for interfaces, formats, and information protocols exchange that help provide flexibility, stability, and effectiveness.

Trends in E-learning Development

E-learning is becoming one of the most important uses of the Internet. Leading universities in the USA offer a wide range of electronic educational programs. According to a poll by University Access (www.universityaccess.com/index.htm) and articles in *The Wall Street Transcript*, (www.twst.com) the growing dissatisfaction with traditional forms of education are resulting in substantial changes in education. New methodological and technological models are being developed.

Today E-learning consists of three major technologies:

- Multimedia CD-ROMs for self-instruction, computer-based training (CBT), and interactive video disks (IVD);
- Interactive, synchronous, and asynchronous multimedia such as online conferences, interactive TV, (ITV) and integrated voice and data conferences;
- Shared multimedia such as the World Wide Web and the Internet.

Mobile Internet is another promising technology, which allows people to choose where they receive their education. Educational content is always available for students practically anywhere through this "nomadic" technology.

Perspectives of e-learning suggest that corporate educational systems should use Internet technologies. There are a number of standard MBA programs for top managers, as well as electronic educational programs at leading business schools that have contracts with various technological companies in using the Internet to provide or support their programs.

EDUCATION REFORM IN MONTENEGRO AND INTRODUCTION OF ICT IN THE EDUCATION SYSTEM IDEAS FOR TODAY AND TOMORROW

Radoslav Milosevic-Atos, Serbia and Montenegro

Abstract. The Modernization of Montenegro's educational system will require bringing ICT into all primary and secondary schools so that students have the opportunity to become computer literate members of the information society. Teachers will also become computer literate, assuming that ICT becomes an integral part of their curricula at Teacher Faculty. Beyond the human resources needed, the informatization of the country's school system will require integration of ICT into curricula, development and upgrade of local networks to provide fast Internet access, standardization of software, purchase of hardware, technical support, and the necessary organizational structure.

The ICT mission will develop processes to create and use information and communication technologies that support the educational system. Every citizen of Montenegro will be able to access and share information within the system at all levels.

The information system for education in Montenegro will not be a management system, in which only those at the top have access to collections of data. Rather, the educational information system envisioned will be a shared construction of understanding about objectives and methods in which everyone participates. It must also allow for the systematic observation of the effects of change, and provide the basis for experimentation and the sharing of innovation.

This work updates the paper "ICT Strategy of Montenegro".

Key words: strategies, ICT, information system, innovations, computer literacy, MEIS, human resources, processes, input.

Introduction and Context

1. KEY DATA ON MONTENEGRO

- Former Republic of FRY. Was independent Kingdom till 1918. New Constitutional Charter between Serbia and Montenegro adopted.
- Population 650,000.
- After a decade of international sanctions, the Montenegrin Government is engaged in economic restructuring processes and reforms.
- Continuous reform of the education system has regained its priority after the stabilization of the political framework as a result of the elections October 20, 2002.

- Round tables in schools on elements of new curricula (ICT based) completed November 22, 2002.
- The Book of Changes (White Paper) published in 2001. Several more books have been published since, or will soon be published.
- Strategic Plan finished. ICT is a consistent part of the strategies.
- Laws on Education adopted on November 28, 2002, and Bylaws continually being adopted.

2. DONORS ACTIVITIES

Donors have supported Montenegro continuously. Donors include OECD, the Stability Pact Task Force, Council of Europe, UNESCO, Unicef, European University Association, WORLD BANK, USAID, Foundation Open Society Institute, British Council, CHF, ETF, IRD, OSCE, EUROPEAN AGENCY FOR RECONSTRUCTION OPERATIONAL CENTRE PODGORICA, Proni Institute of Social Education, EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT (EBRD), CRS , Save the Children UK, Canadian International Development Agency; "VET Project in Montenegro" FAS International/Human Dynamics, An EU-funded project managed by the European Agency for Reconstruction; Kulturkontakt, and many other organizations from around the world.

3. EXPECTATIONS FROM DONOR CONFERENCES

Montenegro hopes that its recent achievements will be considered worthy of future investments through funding of concrete projects. Donor Information Meetings on Education Reform in Montenegro were held April 16, 2003 in Brussels, November 6, 2003 in Podgorica, and November 10, 2003 in Belgrade. A final one-day Donor Conference on Education Reform in Montenegro will be held on November 24, 2003 in Podgorica, Montenegro.

Among the projects prepared for the conference, ICT Strategy will play an important role in:

- General Education,
- Vocational Education and Training,
- School Infrastructure and ICT in Education,
- Children with special needs,
- Textbooks Publishing,
- Higher Education Reform.

Montenegro's Ministry of Education and Science, and conference supporting partners FOSI, ROM, and UNDP, recognize the importance of ICT and will do everything necessary to ensure that ICT projects are given top priority. The hope is that the many conference participants who represent governments, institutions, and other organizations will consider the support of ICT strategies among their priorities.

4. RESULTS OF SURVEY - REVIEW ¹⁹

SCHOOLS	COMPUTER	PUPIL/STUDENT
PRIMARY SCHOOLS	1	174
SECONDARY SCHOOLS	1	72
AVERAGE VALUE	1	142

5. AIMS REVIEW

General Aims

- Modernize the entire education system in Montenegro and improve the quality of the education provided so that all primary and secondary school pupils can become fully involved, computer and information literate members of the information society.
- All primary and secondary level schoolteachers and teacher trainers at teacher faculties will develop skills and use ICT for teaching and learning.
- Introduce a Management and Information system based on EU experiences to provide management and quality assurance for the education system of Montenegro.

Specific Aims

- Develop an integrated ICT based education system in Montenegro.
- Raise performance standards of pupils, students, teachers, trainers, and school managers.
- Achieve a computer/pupil ratio of 1:5 in Montenegro by the end of the ICT implementation process.

¹⁹ The Strategy of Introducing ICT into the Education System of Montenegro (up to University level), Podgorica 2003

6. OBJECTIVES ACCOMPLISHMENT REVIEW

1.	DEVELOP A GENERAL STRATEGY	●
2.	DEVELOP A PROJECT FOR THE SELECTION OF HARDWARE, OS, AND SOFTWARE	●
3.	ANNOUNCE A TENDER TO PURCHASE EQUIPMENT AND SOFTWARE FOR FOCUS SCHOOLS	
4.	EQUIP FOCUS SCHOOLS WITH ICT	
5.	DEVELOP A PROJECT TO ESTABLISH TWO INDEPENDENT COMPUTER NETWORKS (MANAGERIAL AND EDUCATIONAL)	●
6.	ANNOUNCE A TENDER TO GATHER CONTRACTOR BIDS FOR INSTALLING AND CONNECTING NETWORKS IN FOCUS SCHOOLS	
7.	BUILD LOCAL NETWORKS IN FOCUS SCHOOLS, MES, INSTITUTE, ICCC CENTRE AND CONNECT THEM	
8.	ESTABLISH AN INTERNET LINE FOR FOCUS SCHOOLS	
9.	DEVELOP A PROJECT FOR MAINTENANCE OF EQUIPMENT AND SOFTWARE	●
10.	ANNOUNCE VACANCIES FOR ICT POSITIONS IN HARDWARE AND SOFTWARE MAINTENANCE DURING THE PROJECT	
11.	DEVELOP A TEACHER TRAINING PROJECT AS A PERMANENT TASK FOR BETTER USE OF ICT IN TEACHING. START TEACHER TRAINING	●
12.	DEVELOP A PROJECT FOR TEACHER TRAINING AT TEACHER TRAINING FACULTIES	
13.	INTRODUCE ICT INTO CURRICULA OF TEACHER FACULTIES	

7. SHORT REVIEW OF THREE MAIN PROJECTS

Implementation of Montenegrin Education Information System (I-MEIS)**REFERENCE NUMBER:**

48GSOPIS

FIELD OF SUPPORT:**RATIONALE:**

Main characteristics of the educational system in Montenegro are a heterogeneous and distributed structure (functional, organizational, and geographical) and a very large number of users (pupils, teachers, employees). For efficient functioning of the whole system (for all levels from preschool up to the University) it is necessary to develop a Montenegrin Educational Information System (MEIS) as a backbone for the new

**INFRASTRUCTURE
AND ICT**

**PROJECT
DURATION:**

12 MONTHS

Contact person:

Mr. Goran Sukovic

GORANS@MAIL.RU

**Estimated
budget:**

180.000 euro

**Reference
number:**
49SPOPIS

teaching methods based on information and communication technologies (ICT). MEIS should provide management and quality assurance in Montenegro's educational system. Head project for MEIS, financed by the Government of Montenegro, is completed and approved.

PROJECT AIM:

Stepwise development and implementation of MEIS, based on head project for MEIS.

MAIN TASKS:

- Provide software tools for development and implementation.
- Create database according to project proposal and data model.
- Develop uniform web interface for all parts of the educational system.
- Develop and implement software components for administrative and financial tasks in the educational system.
- Develop and implement software components for registering employee and pupil grades, attendance, promotions, exams, electronic register, etc.
- Develop and implement software components for registering all teaching and non-teaching activities and educational resources.
- Develop and implement software components for children with special needs and likewise schools.
- Incorporate existing solutions into the new information system.
- Incorporate didactic software tools into the new system, including tools for children with special needs.

Success indicators:

- Functional, tested components for administrative and financial tasks.
- Functional, tested components for registering teachers, pupils, and employees.
- Functional, tested components for teaching and non-teaching activities.

Physical Architecture of Montenegrin Education Information System (PA-MEIS)

Rationale:

Creating a computer communications network is an

important part of improving educational processes and a significant step forward in building its information system.

Field of support:

Infrastructures and ICT

Project duration:

12 months

Contact person:

Igor Ivanovic

IGOR@CG.AC.YU

Estimated budget:

1.715.380 euro
+ 2.515.220 euro
4.230.600 euro

Project aim:

Building the communication infrastructure and supplying computer/communication equipment will ensure the development and improvement of the education system.

Main tasks:

- Install passive network components such as cables, patch panels, and racks, to build local computer network infrastructure.
- Supply and install local area network active components such as L2 and L3 switches.
- Integrate LANs into a unique network within the Ministry of Education.
- Supply focus schools with workstations, supporting equipment, and software.
- Supply and install servers and supporting equipment at central locations in Podgorica.
- Maintain computer and communications equipment as well as support systems and DB software.
- Establish a support structure for the implementation of ICT into the education system of Montenegro
- Link ICT into the process of change in the education system in order to achieve its full impact.
- Present the project through a "logical framework".

Success indicators:

- Ability to access and interchange data using didactic software.
- Ability to access a central educational database.
- Ability to access the Internet and use Internet services.
- Faster administrative decision making, and improvement of the education process with better tracking and control.
- Schools with improved flexibility that can implement new plans and programs based on standards and scientific methodology in education.

Reference number:

50SSOPIS

Field of support:

Infrastructure and ICT

Project duration:

24 months

Contact person:

Ph. D Stevan Scepanovic

STEVANSC@CG.YU**Estimated budget:**

233.750 euro
 + 257.400 euro
 491.150 euro

Computer Education for Teachers (CEFT)**Rationale:**

Computers are not used appropriately in Montenegro's educational system, especially in primary and secondary schools. Students do not acquire sufficient knowledge of informatics, Internet use, and other benefits that computers can provide. Few teachers use information and communication technologies in teaching.

Training is critical if teachers are to effectively use information and communication technologies. This suggests the need for a single permanent system for training school teachers and informatics staff. Creation of this system is the goal of this project.

Project aim:

Quality technology training of teachers, students, and informatics staff in schools, and an efficiently functioning information system in education.

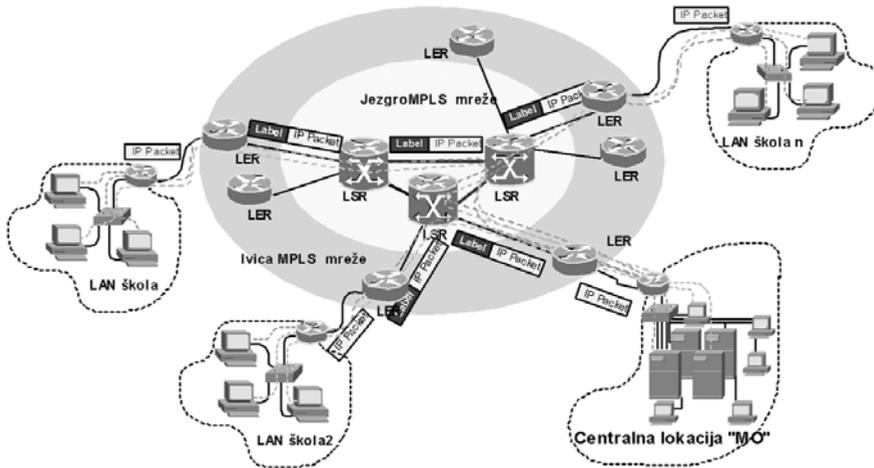
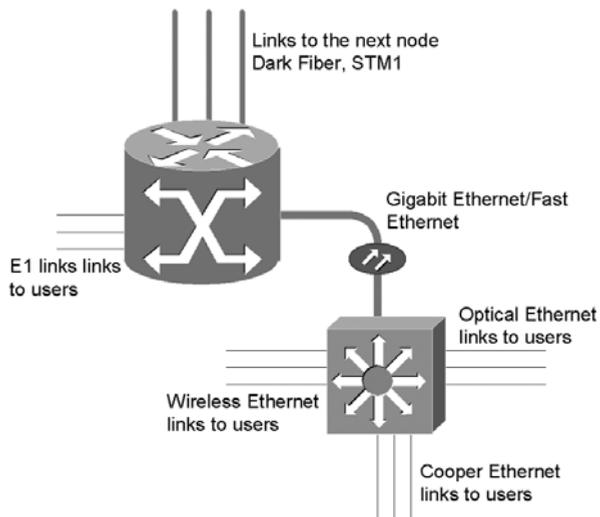
Main tasks:

- Solve problems efficiently to improve informatics training for teachers, students, and informatics staff in schools.
- Improve teachers' and students' knowledge of informatics and computer use.
- Develop an educational system open to new possibilities for the use of computers in the teaching process.
- Develop a system to download information and submit relevant data in an electronic form for use in various subjects.
- Apply accepted world standards to develop information and communication systems by researching best practice in other areas.

Success indicators:

- Obtainment of the necessary level of informatics education for teachers and students.
- Large increase in use of computers and Internet in schools.
- Efficiency in the teaching process, with the use of computers in schools.
- Automated monitoring and control of the teaching process.
- Creation of a more qualitative base for faster decisions, better management, and improvement of the teaching process.
- Flexibility of schools during implementation of new curricula and methodologies in the teaching process.

8. MEIS MONTENEGRIN EDUCATION INFORMATION SYSTEM

MODEL MPLS VPN MINISTRY OF EDUCATION²⁰MIPNet - Architecture of IP MPLS backbone node²¹

Two very important characteristics of the future network will be scalability and modular design to enhance performance, capacity of interface, service, and functionality.

²⁰ Project: MEN - Montenegrin Education Network, ICT Networks in Focus Schools, p 31

²¹ Project: MEN - Montenegrin Education Network, ICT Networks in Focus Schools, p 26

9. REVIEW OF KEY ASSUMPTIONS FOR ICT ²²

- Determine the hardware and software to be used during the implementation of ICT strategies in Montenegro;
- Define equipment standards and identify space in schools and institutions involved in the implementation of ICT;
- Define procurement procedures for hardware and software, conditions for signing contracts, and different levels of responsibility;
- Develop system hardware maintenance procedures and define working relationship between institutions-users and computer equipment suppliers;
- Establish standards for didactic software[1], together with the prioritization plan for production of didactic software in compliance with educational needs and other requirements;
- Conduct testing of didactic software and define conditions for adequate updating and maintenance;
- Determine hardware and software for obtaining licenses, and the necessary conditions for procurement and exploitation;
- Standardize administrative software, databases, and data exchange on a state level;
- Procure equipment to fulfill aims and strategies of ICT implementation in Montenegro;
- Ensure equipment meets guaranteed standards of quality;
- Develop Basic Software Toolbox: Curriculum software, Software Help Sheets.
- Procurement contracts must state that equipment vendors will include training in the use of the equipment and maintenance of the equipment;
- Define technical support procedures for schools;
- Define responsibilities for maintenance, procurement, and funding of ICT equipment;
- Teachers will attend salary incentives for ICT coordinator in schools.
- Develop network in line with Master Plan.

10. INTEGRATION OF ICT IN CURRICULA

- Integrate ICT in the curricula for secondary (3 and 4 years) and post-secondary vocational education programs, and art, and at other schools and institutions;
- The integration of ICT in schools is phased and scalable. Necessary preparatory measures include curriculum design, materials development, capacity building for management and evaluation, professional development, support of teachers, and technical preparation of classrooms;
- Project will provide specific interventions to institutions serving children with special learning needs, such as communications aids and access tools.

11. SHARING RESPONSIBILITY

- Ministry of Education and Science;
- Secretariat for Development of Montenegro;
- Academic Network;

²² The Strategy of Introducing ICT into the Education System of Montenegro (up to University level), Podgorica 2003

- Partners and other actors who provide financial and other support to the ICT Strategy.

12. ICT IN MANAGEMENT AND ADMINISTRATION

- Ensure management and administration of the education system understands ICT's needs and requirements;
- Define needs of the education system's administrative sector in relation to its obligations to state, and other, institutions;
- Define technical and other conditions necessary to build an integrated system of school and other networks through subprojects;
- Establish an integrated information system of management;
- Develop a data-interchange agreement (DIA) covering the sources, transfer protocol/formats for data, and requirements for all parties, including schools, municipalities, QA system, textbook supply system, VET Centre, Ministry, Institutes, Health providers, statistical bodies, etc. This is a major task but an important preparation for the ICT project. A DIA allows for flexible implementation, phased rollouts that can accommodate overlap with manual systems, and the use of different software. This is useful for comparative purposes;
- Train administrative, managerial, and higher-level staff to use data properly and to customize and use fool-proofing data-entry formats.

13. SHARING RESPONSIBILITY

- Ministry of Education and Science
- Secretariat for Development of Montenegro
- Academic Network
- Partners and other actors who provide financial and other support to the ICT Strategy.

14. INTEGRATE DISTANCE EDUCATION AND OPEN LEARNING THROUGH ICT INTO TEACHING/LEARNING?

- Develop a series of brochures to inform educators about distance and open learning as a new policy for Montenegro;
- Conduct research in the field, together with comparative analyses, on good practices in EU countries;
- Promote the results, and encourage educational institutions and decision makers to establish distance learning bodies within the education system.

15. FINAL GOAL

MEIS Montenegrin Education Information System
MEIS is an academic, educational, and research network-infrastructure established in Montenegro as an independent public institution.

16. ICT DEVELOPMENT PERSPECTIVE

- The strategy of implementing ICT as an integral part of the Strategic Plan of Education Reform brings the European horizon closer! It allows Montenegro to design an EFA Action plan, Distance Learning, and all the LLL streams as a Millennium Umbrella!

THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES AND DISTANCE EDUCATION IN TEACHER EDUCATION: TRENDS, POLICY, AND STRATEGY CONSIDERATIONS

Anca Nedelcu, Romania

The ICT Aided Education System Government Programme

Guidelines

As part of the "eEurope 2005: An Information Society for All" initiative framework, Romania developed a National Strategy for Implementing an Information Society, with a national coordinating structure, The Economic and Social Council (CES). The main goal of the strategy is the transition to an economy in which the key factor for sustainable development is knowledge, the Knowledge Economy (KE). The implementation of the strategy is based on a sector approach and the coherence of the specific measures taken with regard to the use of ICT is ensured by an inter-ministerial work-group, The Group for Promoting Information & Communication Technology.

Due to its essential role in the development of human resources for the knowledge economy, education has been placed at the top of the Romanian Government political agenda in relation to the eEurope initiative. As part of the eLearning European initiative, in 2001 the Romanian Government began the implementation of the *ICT Aided Education System* programme. Its goal is to promote the use of ICT on a large scale in the education and training. The *ICT Aided Education System* is a complex, long-term programme, involving large investments both in human resources and infrastructure.

Objectives

- To enhance the teaching-learning process in various subjects through the active use of ICT in the classroom; To increase the level of ICT knowledge and related competencies, both for teachers and students;
- To stimulate students' creativity and teamwork spirit and the acquisition of higher level key-competencies for professional and social inclusion for the KE;
- To support communication and networking within the education and training system; To support the management & governance of the education and training system.

Action Plan

To achieve the proposed objectives, the major activities of the *ICT Aided Education System* programme are as follows:

- To provide schools with ICT infrastructure; To provide training at all levels; To develop and implement educational software;
- To create opportunities for communication and networking within the education and training system as well as for open and distance learning; To develop and implement specific software for supporting management and governance of the education and training system.

The expected outcome of these major initiatives is a national network of ICT "packages" consisting of hardware, software, communication provisions, and trained human resources.

Achievements to Date

Implementation of the *ICT Aided Education System* programme began in autumn 2001 with a pilot-based approach. The summary of the results of the pilot-phase of the programme, as per the major initiatives mentioned above, are as follows:

- 113 high-schools and 7 University-based human resource centres each equipped with 1 ICT laboratory (server, 25 workstations, switch, router, modems, printer, all LAN connected) Basic and advanced ICT training was provided to approximately 2,000 teachers; The Educational Assistant for High-schools® Oracle® based software was developed and implemented in each location to provide support for the teaching-learning process (mainly for sciences); A portal was set up at www.portal.edu.ro;
- A specific module was added to the Educational Assistant for High-schools® to support creating and working with school databases, ensuring connection to a future education system Intranet. As for macro governance, special software was developed and implemented for student selection pertaining to the transition from compulsory to non-compulsory education. The software, ADLIC®, was awarded an eGovernment best-practice award in 2001 by the European Commission.

Medium-term Future Development

A legal provision to continue the programme was recently created by the Romanian Governmental Decision no. 828/31.07.2002. The decision authorises the Ministry of Education and Research, in cooperation with the Ministry of Public Finance, to engage an external three year financial leasing in the amount of \$60,000,000 USD to ensure the necessary resources.

This second phase of the programme will focus on the enlargement of the existing national ICT "packages" network to all of the approximately 1,400 high-schools in Romania. Special care will be given to the teacher training that will be provided using existing legal and institutional frameworks.

Teacher Training for the Use of ICT

Pre-service Teacher Training

Pre-service teacher training in Romania is mainly provided through pedagogical high-schools for pre-primary education teachers and through colleges and universities for primary and secondary education teachers. At the higher-education level, the institutional structures responsible for the pre-service teacher training are the universities' Teacher Training Departments. Currently, the structure and curricula of pre-service teacher training are established with the national strategy for teachers' and education managers' professional development in mind.

The content of pre-service teacher training is mainly focused on *Pedagogy, Psychology, and Subject Didactics*. Themes on the use of modern technology, with a view to the use of ICT in the teaching of specific subjects, are usually included in *Subject Didactics*. An important component of pre-service teacher training is *Practice Teaching* in actual school environments. Both the theoretical approach and the time allotted for the practice teaching component are currently being reconsidered.

It is assumed that pre-service teacher training will be considered part of the teacher training provided immediately after graduation and enrollment, as part of an induction period (1-2 years). During the induction period, assistance will be provided through open and distance learning and mentoring.

In-service Teacher Training

In-service teacher training is currently provided on an open-market basis. Teacher training providers have to submit the training programmes for evaluation to a national level structure, The Council for Teacher Training. Upon receiving official approval of the programme, the provider is authorised to perform the training, to release an accreditation, and to establish through specific evaluation methods the number of training-credits the programme provides. This mechanism has only recently been put in place, and the first outcomes are expected during the 2002/2003 academic year. Considering the situation prior to these legal and institutional arrangements, the most important training providers will probably be universities, various NGOs, institutions, and firms with expertise in teacher training. It is assumed that this combination of open markets and standardized evaluation will ensure high quality training programmes and the effectiveness of the educational policies endorsed by the Ministry of Education and Research.

In this context and in relation to the use of ICT in the teaching-learning process, the Ministry of Education and Research will promote two major course of action:

- Basic ICT training for the acquisition of basic digital competencies;
- Advanced ICT training for the acquisition of higher-level competencies as a prerequisite for ICT use in teaching various subjects.

As for basic ICT training, ECDL/ICDL is currently offered through a number of universities, via open and distance learning and a CISCO Academies network is cur-

rently under development.. Efforts to provide advanced ICT training are only now beginning, due to the lack of specific curricula and human resource provisions.

Funding for in-service teacher training is yet another issue that must soon be addressed in a comprehensive manner, and governmental involvement in this area must increase. During the last decade, teacher training was mainly funded externally-EU funds, CEDB and WB loans, etc.-and this type of financing is foreseen for the next 5 years as well. However, funding provisions within the state budget are expected to increase in the next period.

Valuing Learning

Valuing all kinds of learning, with a formal recognition of competencies acquired in informal learning environments, is one of the key-messages of the European Commission *Memorandum on Lifelong Learning*.

Many teachers are already digitally literate, a fact discovered in the nationwide survey undertaken last year for the *Memorandum on Lifelong Learning*. Basic ICT-related competencies were acquired mostly through informal learning environments (*auto-didactic* approach), an outcome of the rapid evolution of ICT opportunities both at professional and social levels.

Seen as an important concrete action towards professional and social inclusion, as well as an opportunity for human resources development, the Ministry of Education and Research is currently developing a comprehensive approach for the formal recognition of basic ICT-related competencies acquired in informal learning environments.

This approach must encompass legal provisions, standardized procedures, rules and regulations, institutional structures, and human resources. It is anticipated that formal recognition will be primarily provided to teachers, and possibly extension for other regulated professions such as medical staff and public administration staff. EU support, along with partnerships with various stakeholders is expected to provide the necessary expertise for establishing a national basic ICT competency recognition system by 2004-2005.

The Ministry of Education and Research believes that such a system, besides offering concrete support to lifelong learning issues, will encourage further ICT training, hence improving the overall efficiency of in-service teacher training.

Social Dialogue

The use of ICT in the teaching-learning process of various subjects is also raising a whole range of labour-related issues (e.g. workload, class and timetable management, etc.).

Based on a rich tradition of cooperation with teachers' unions, the Ministry of Education and Research has empowered existing institutional structures to open a special negotiation chapter dedicated to labour issues. The outcomes of the negotiations will be incorporated into the protocol for relations between the Ministry of Education and Research and the teachers' unions.

INTRODUCTION OF ICTS AND DISTANCE EDUCATION IN PROGRAMMES FOR TEACHERS AND TEACHER EDUCATORS

Svetlana Kudrjajtseva, Ukraine

Introduction

Technologies in various forms have come to play an important role in the infrastructure of education in Ukraine. In the past few years, the Ukrainian government has focused on the challenges of integrating information and communication technologies (ICT) into educational professional practice. Educational authorities require teachers to use ICT in their teaching activities, but teachers are put off by the emphasis on technical issues. The challenge lies not only in the technical conditions for ICT use, but also in making certain that teachers are mentally prepared for it. The lack of a pedagogical architecture is one of the main obstacles to the effective use of ICT in education. Teachers want to develop their ICT abilities to support and extend learning and teaching. New technologies challenge conventional concepts of teaching and learning methods and materials by changing how teachers and learners gain access to knowledge. To meet these challenges, educational organisations must move toward transforming the traditional paradigm of learning. A new paradigm of the teaching-learning process is emerging that encompasses the following views of the human learning process (UNESCO):

- Learning is an active process;
- Learning is a social process;
- Learning is a flexible process;
- Learning is integrative and contextualized;
- Learning is based on a strength model of student abilities, interest, and culture;
- Learning is assessed through real problem solving of both individual and group efforts.

The key to success is not in the speed of the computer and Internet bandwidth, it is in educators, whose understanding and creative use of ICTs and distance education can lead them to a higher level of excellence for themselves and their students. If we wish to implement ICTs into all fields we must educate users in those technologies. The development of ICTs for use in education and the increased use of open and distance learning technologies means that support staff will need to be more closely involved in resource development, delivery, and student support. Further pedagogical training is needed to allow teachers to design and develop their own telematic-based instructional programmes. This training in ICTs and distance education is a central concept in Ukraine's educational information strategy.

Challenges for the Educational System in Ukraine

Currently in Ukraine, some teachers have already used ICT for educational purposes, but they still need training support including on-line courses for teachers and new approaches to teaching, learning, and assessment. High and secondary school

teachers and teacher educators need permanent and flexible access to current information resources to improve their proficiency level and obtain new high quality learning materials. An important aspect of professional development is to not only enable teacher educators to use ICT tools in their teaching practices, but to develop their understanding of how to couple technology with new approaches to teaching and learning. Today less than 20% of Ukrainian teachers use e-technologies in a pedagogically significant way. Staff and educational development must be improved and cannot be concentrated solely on the practical, ignoring the theoretical or conceptual. How do educational organisations help staff use e-technologies? What incentives are offered to teachers to acquire e-technology-related skills and apply them? It is essential to know the ways that e-technologies may be used to enhance teaching and learning.

To prepare future teachers with the knowledge and skills to effectively use ICT and new pedagogies in their teaching practices we must place new demands on teacher education.

- *Access to ICT and Resources.* A total lack of availability of ICT is a major barrier to their use (excluding those teachers who have a "computer science" background). We believe that every citizen should be able to access the life-long learning opportunities they need, when and where they need it.
- *Appropriate Training.* Training should stress the application and benefits of ICTs (encourage teachers' interest and incentive to learn).
- *Ongoing Support.* Ongoing support is needed to encourage progress, including technical support, evaluation of resources, and support of the organisational culture. Teachers need to know where ICT development fits into the organisation's priorities and development plans. They need to know that time spent on developing their skills and knowledge is valued, and that they are not working in isolation.

Appropriate and effective teacher and teacher educator training is necessary for the effective introduction of ICT in schools and higher education institutions. The best approach is to give teachers the opportunity to use ICT as the medium for their own learning and teaching. Developments in information and communication technologies have brought about a change in both the learning needs and the learning opportunities in the world of business, labour, government, and academia. Teacher educators need to develop competence in pedagogy, technology, collaboration, networking, and social issues.

The International Research and Training Center for Information Technologies and Systems (IRTC, Kiev, Ukraine) has opened for many Ukrainian universities a question how to organize successful ICT development and distance education for teachers training. A few years ago IRTC integrated online teaching methods into several programmes focused on ICT applications in education. The reasons that online courses were chosen for teacher training include:

- to introduce teachers and teacher educators to the principles of modern ICT use to achieve instructional reforms within educational organisations;
- to help teachers achieve a higher level of excellence for themselves and their students through understanding and creative use of ICTs;
- to research the changes that the introduction of ICTs and distance education brings for teacher education programmes and where the limitations are.

TDL Activity

Year	Preconditions	Results	Distance Learning Provided
1995	Computer-Based Didactic Lab: "An Information Environment for Teachers" - UNESCO Project (Ukraine, France)	TDL	
1995 – 1997	"Flexible and Distant Learning through Telematic Networks: a Case for Teaching English, and Communication and Information Technologies" - Copernicus project N 1445 (the Netherlands, Great Britain, Lithuania, Bulgaria, Ukraine)	Flexible distance learning model, Technology of distance course development, ICT course, English language environment	ICT course for international audience (1996-1999) English language course for international audience (1996-1999)
1996	Support for public distance learning on Internet literacy for national audience through Ukrainian computer network (is funded by the EURASIA foundation)	E-mail based course on Internet literacy	E-mail based course "Basics of Internet" for NIS countries (1996)
1996 – 1998	"STACCIS" project (Armenia, Byelorussia, Ukraine, Russia, France, Belgium, the Netherlands)	"STACCIS" project (Armenia, Byelorussia, Ukraine, Russia, France, Belgium, the Netherlands)	
1998 – 1999	INCO-Copernicus project PL-96 1125 - "Multimedia use in telematic educational network" (the Netherlands, Great Britain, Lithuania, Bulgaria, Ukraine, Russia).	Methodology of MM use for distance education, distance course "Multimedia distance course creation"	Distance course "Multimedia distance course creation" (1999)
1999	UNESCO Program "Information for All"	International workshop on the problem "Multilingual Internet"	
2000 – 2002	National Informatization Program. UNESCO Program "Information for All"	Online curriculum for teachers and teacher educators. Telecommunication education environment. E-learning Centre. International workshop "Telematic and Life Long Learning". UNESCO International Seminar "The Use of Distance Education and ICTs in Teacher Education: Trends, Policy, and Strategy Considerations"	Online and class-room-based teacher training on ICT use in education and distance course design and development

Table 1

ICT Curriculum for the Programme of Teacher Development

Seven years ago the Didactic Telecommunication Laboratory under IRTC started to develop teachers' ICT skills and knowledge to apply ICT to teaching/learning (see Table 1) These skills are taught within a framework of compulsory subjects in study programmes for university teachers and teacher educators. In 2001 the E-learning Centre was formed at the Didactic Telecommunication Laboratory. The E-learning services include learning (classroom and e-learning), development of e-learning educational resources, access to informational resources, and methodological support of e-learning distribution. The E-learning Centre is responsible for ICT teacher training in 7 modules (each one takes 30 hours and ends with an exam).

Below we look at the seven main modules for teacher professional development activities in the ICT area.

Module 1: Skills in using particular software applications, such as word processors, operating systems, or Internet access. The first module is an introduction to ICT tools. In this module teachers are developing their ICT literacy and learning how to apply ICT to a range of personal and professional tasks. It should be emphasized that the actual use of ICT will be different for teachers than it is for other audiences. Below is presented a brief description of the ICT literacy units of Module 1.

Unit 1.1. Basic Concepts of ICT

Teachers need to identify and understand the functions of the main components of an information and communication system. It is necessary to know the basics of ICT and the use of ICT for personal productivity.

Unit 1.2. Word Processing

Teachers must skillfully use a word processor to produce various documents. Word processing as application of ICT is helpful for making documents (tests, assignments, replies) for teaching purposes.

Unit 1.3. Working with a Spreadsheet

Spreadsheets are useful to teachers in many ways such as preparing class lists and recording grades. Teachers must understand and use a prepared spreadsheet.

Unit 1.4. Working with a Database

Most information systems used in the administration of educational organisations rely on the principles of databases. This unit allows educators to understand and a prepared database.

Unit 1.5. Internet Literacy

Using email and searching for information on the Internet is an important skill for teachers. Teachers must understand and be able to communicate online, with information sources and with each other.

Unit 1.6. ICT and Ethical Issues

Teachers must understand the social, economic, and ethical issues associated with the use of ICT. Privacy, copyright, virus protection, and other ICT issues are critical.

Module 2: Application of ICT in Subject Areas. This module leads on to the use of ICT tools in various subject areas. After teachers have acquired basic ICT skills and knowledge they are confident enough to apply ICT tools to the teaching of their own subject area. Integration of ICT into existing curricula is very specific. As we have mentioned, the opportunity to apply ICT in subject areas is limited by a lack of access to ICT facilities and resources. Although there are specific ICT competencies for each of the subject areas, teachers must understand the ICT tools and know why, when, where, and how they will contribute to their teaching objectives. Below we present a brief description of the units of Module 2.

Unit 2.1. ICT in Languages (Kameneva, 1998) The English Language Learning Environment (ELLE) created in Kiev, was originally planned as a case study for Ukrainian English teachers and their learners. However, it has evolved to respond to the national and international demands for language teaching and learning.

Unit 2.2. Modeling and Simulation (Stepanenko, 2002). The unit offers the opportunity to solve real problems instead of "artificial" ones. Students should be able to use ICTs for modeling and simulations: to identify main parameters, formalize models, and interpret the results.

Unit 2.3. ICT in Mathematics. Spreadsheets, applets, modeling packages, and statistical software tools are used for mathematical activities and solving certain mathematical problems.

Unit 2.4. ICT in Social Sciences. Teachers still need to control the teaching and learning process to ensure that lessons are a success: they experiment in the use of ICT in their instruction as their confidence with ICT develops.

Module 3: Infusing ICT across all subjects of the curriculum. This module describes how and when to use ICT tools to achieve particular purposes. Introducing the course "Curriculum and ICT" has provided an opportunity to change the nature of experimental work in educational organisations. ICT-related changes allowed more collaborative and cooperative activities within the curricula. Instead of focusing on "What are ICTs and how to deal with ICTs" this course reflects on the curricular values and impact of ICTs. The focus of professional development will be on developing the confidence and competence of teachers. Infusing ICT across the curriculum to enhance learning and the management of learning leads teachers to an understanding of how to transform their teaching practice and the learning of their students. Specific examples are provided below of how ICT is used to infuse subject knowledge and skills from across the curriculum to achieve learning objectives for teachers and students.

Unit 3.1. Learners study a current scientific theme. They act as reporters and consult various people. Collaborative learning through web-based conferencing tools is leading to new ways of learning.

Unit 3.2. Learners create multimedia software to aid learning different subjects (foreign language, mechanics, computer science, economics, etc.). Before undertaking instructional multimedia development, the learners must prepare carefully. They must determine the benefits and costs of the multimedia application and anticipate issues that will arise in its production.

Unit 3.3. Learners get the opportunity to explore problems that confront their community and to work on solutions (economics, marketing, management, ecology, finances, etc).

Module 4: Instructional Design of E-learning and Teaching. Our experience in ICT use has shown that the instructional use of ICT has not been generated by technology-related changes in the curriculum; the teachers must first have been prepared to apply ICTs in the educational process. Changes in teacher and student roles in learning, such as group work and collaborative learning activities, can be enhanced when ICTs are used to develop strategies for adaptive learning.

A telematic-based distance curriculum for "The Use of ICTs in Education" has been developed at the IRTC. The curriculum is aimed at providing student-teachers with basic knowledge about ICTs and giving them ICTs skills most often demanded in the workplace today. The main goal of the curriculum is to teach the design and implementation of multimedia telematic-based distance courses in various subjects. As a result, student-teachers will be able to create their own multimedia segments for a distance course. Although some of the teachers have had experience using basic Internet services for educational purposes, they still need training in this area, including telematic-based courses for educational applications. The curriculum includes three on-line distance courses.

Unit 4.1. Instructional Design of Distance Courses. The main goal of this unit is to teach the design and implementation of multimedia telematic-based distance courses. At the end of the unit the students-teachers will be able to create their own multimedia segments of a distance course.

Unit 4.2. Instructional Multimedia Applications. The teachers need a course to expand their skills in instructional multimedia technology. The course is a multimedia tutorial for improving teachers' professional skills in the instructional design of telematic-based courses and in using multimedia to create learning materials.

Unit 4.3. Internet for Teachers. The Internet can serve as an environment for organising education. The student-teachers in the courses have not been able to identify the practical educational uses of the Internet. They use ICT as a tool for everyday needs and for communication. It is necessary to develop their theoretical knowledge and to develop their practical skills in educational activities distributed on the Internet.

Model for Successful Introduction of ICTs in Programmes for Teachers and Teacher Educators.

ICTs are having a rapid effect on learners' approaches to study in educational organisations. It is possible to identify models for introduction of ICTs and distance education in programmes for teachers and teacher educators:

1. Develop a clear vision for the use of ICTs in education that includes appropriate goals, target groups, and curriculum models that take into consideration the emerging technical capabilities in the coming years.
 - Establish specialized centres (e-learning centres) providing teachers the training and retraining to use ICT and distance education in professional activities;
 - Create and distribute educational methodology literature on the organisation and management of distance education, in particular creation of the appropriate tutorial for teacher universities;
 - Initiate e-forums which provide opportunities to discuss problems with colleagues and experts and receive qualified help.
2. Keep the human role in teaching by linking "real" people with students through telecommunications, and giving them the tools to access, reconstruct, and create knowledge.
3. Find ways to fund the development of multimedia learning materials through partnerships between media producers, telecommunications companies, and educational institutions.
4. Create new (or transform existing) curricular models to enable more negotiation between learners and teachers to meet individual needs:
 - Development of international, national, and regional seminars, conferences, symposiums, and round tables for sharing of experience/good practice in a context of design, creation and distribution of distance education;
 - Development of curriculum for teacher training/retraining.
5. Develop new institutional or organisational structures built around the collection, storage, creation, and distribution of digital learning materials including:
 - Educational and information portals;
 - Electronic libraries and catalogues linked to world information resources;
 - Databases of educational and methodical materials for teachers;
 - Electronic tutorials for development of distance education.
6. Create a regulatory environment that provides universal access, choice, and competition in instructional programmes, information resources, and ICTs applications including:
 - Computer rooms and classes;
 - Powerful professional networks with the appropriate network software.

- Cheap unlimited access to the Internet;
- Software for support and distribution of distance education.

This model provides a good way to give teachers and teacher educators an opportunity to apply theoretical knowledge from pedagogy, didactics, and ICTs to first-hand experience in designing online courses and developing communication competency. With the introduction of ICTs in teacher education, specialist groups need to be involved in the dissemination of initiatives for ICT teacher education: the dean or professor who has responsibility for managing change in the faculty or/and department; the teaching staff who are most closely involved in managing change in their individual teaching topics; administrators who have responsibility for ICT infrastructure; student teachers who have interest in acquiring the skills and knowledge to apply ICTs; ICT coordinators in educational organisations who lead staff development; government agencies that set policies regarding teacher professional development; and business and industry which may provide some infrastructure for training facilities.

References

1. Kameneva T, 1998, Telecommunication Technologies for Language Learning: Didactic Environment for English Secondary School Teachers. Proceedings of IFIP'98 Congress, Vienna/Hungary.
2. Stepanenko Ju., 2002, Real processes and phenomenon modeling in distance courses (in Russian), USiM, N 5-6.

DISTANCE LEARNING AT THE UKRAINIAN DISTANCE LEARNING CENTRE (UDLC)

Dr. V. Valuisky, Ukraine

Ukraine's experience with distance education at the Ukrainian Distance Learning Centre (UDLC) is presented. IBM software (Lotus LearningSpace Forum 3.x, IBM SameTime 2.5, Lotus LearningSpace 5.0) is used to provide asynchronous and synchronous distance learning via a distributed server system with Intranet/Internet access. About 60 distance courses were designed, including computer based testing, audio and video support, and JAVA software applets. About 650 Ukrainian specialists were certified by UDLC in distance learning. International projects in distance courses design are described. All distance courses, including demo versions, methodical requirements, normative documents are located at the UDLC Web site: <http://udec.ntu-kpi.kiev.ua>

The Ukrainian Distance Learning Centre (UDLC) opened in 2000 by special decree of the Minister of Education and Science as a subdivision of the National Technical University of Ukraine-"Kiev Polytechnic Institute" (NTUU-"KPI"). The decree made the UDLC the coordinating organization for Ukrainian distance learning (DL).

UDLC is supported by the Ukrainian Government and by a grant "Distance Learning Centre" of the U.S. Embassy in Ukraine. UDLC Internet access is provided through URAN (Ukrainian Research and Academic Network) which provides Internet and Intranet channels for more than 50 Ukrainian educational and research organizations under the leadership of NTUU"KPI" (NATO Grants in years 1997 and 2000).

UDLC provides:

- development and implementation of distance courses based on international certified distance learning platforms;
- development of a distance learning platform using modern computer technologies;
- development of the Ukrainian distance education concept and projects;
- expert consultation in the evaluation and organization of distance learning;
- coordination of educational establishments' activities in distance learning;
- training, retraining, and certification of specialists; and
- development of the methodological basis for distance learning in Ukraine.

UDLC uses a distributed servers system with Intranet/Internet access for DL and IBM software platforms such as Lotus LearningSpace Forum, IBM SameTime, and Lotus LearningSpace 5.0 to support distance courses. Descriptions of about 60 distance courses, requirements, demos, free testing procedures, and normative documents are available at the UDLC Web site: <http://udec.ntu-kpi.kiev.ua>.

UDLC provides intensive training in DL with a certification for local specialists. Certification is now available for:

- Design of Distance Courses;
- Software and Hardware for Distance Learning;
- Management of Distance Learning Projects;
- Design of Distance Courses with Lotus LearningSpace; and
- Electronic Intellectual Property and Author Rights.

About 650 specialists were certified over the last 18 months. UDLC designed the following distance courses:

- "The System of Distance Learning for French Language DELF-1 Preparation" (Joint Project with French Cultural Center, the Embassy of France in Ukraine);
- "The Ukrainian Language for Foreigners" (Joint Project with NTUU-"KPI");
- Distance Courses in Economics (Joint Project with International University of Finances) (about 60 courses are developed).

Following are some possible UDLC projects:

- distance courses in Information Technologies with International certification;
- second education in Information Technologies emphasizing use of DL.

UDLC supports the following International distance learning standards:

- AICC-Aviation Industry CBT Committee (<http://www.aicc.org>);
- ADL or SCORM-Advanced Distributed Learning or Sharable Content Object References Model(<http://www.adlnet.org>);
- IMS-Instructional Management System (<http://www.imsproject.org>).UDLC supports asynchronous and synchronous DL. Asynchronous UDLC distance courses usually include: an electronic textbook; profiles of students, tutors, and instructors; computer-based testing; discussions; and forums. UDLC distance course student exercises are supported by JAVA applets designed by UDLC specialists. A demo version of this author's course "Introduction into Linux" is presented at the UDLC Web site. The course is based on custom Lotus LearningSpace Forum libraries, and features a custom graphic interface, designed by UDLC specialists, and a local language environment (Ukrainian and Russian). The demo also illustrates the use of JAVA applets to provide students exercises and graphic-rich electronic textbooks via the Internet.

Real results of computer-based testing for the 60 4th year students in NTUU-"KPI" can also be shown. The testing was provided by UDLC during the last semester of the "Introduction into Linux" distance course and uses 12 testing modules in a Lotus LearningSpace Forum distance course format. Every module has about 20 test questions. The testing can be completed with minimum tutor assistance access and the results can be accessed at the UDLC web site upon special request.

The tests consist of "Yes-No", "Multiple Choice-Single Answer", "Multiple Choice-Multiple Answer", "Open-Ended Questions", "Fill in the Blank", and "Matching" questions. These are standard question forms in Lotus LearningSpace and most, except for open-ended and fill-in-the Blank, allow for automatic testing and scoring with a minimum of tutor assistant. Testing modules are inserted to the distance course as separate modules and Intranet/Internet access to them is planned and limited by a tutor. The testing was taken simultaneously by the 60 students. Students used a computer classroom to take the test at NTUU-"KPI" local area network with Intranet connection to UDLC servers, but Internet testing for students worked also. Testing and access to the course were free for students during a semester.

UDLC uses the Lotus-Notes Domino server and Lotus-Notes database system to support the services necessary for asynchronous DL, including courses access, communications, distance course administration, and automation. Course access is via the UDLC Web site, and the UDLC post server is used for communications. The UDLC computer system is protected from unauthorized attacks by a firewall. The main UDLC servers, all UDLC workstations, and the firewall run on the Linux operating system. Lotus-Notes includes client, designer, and administrator modules and provides an internal instrument for distance course design, modification, and administration.

Synchronous UDLC distance courses normally include text, audio and video chats, synchronous discussions, real-time testing, seminars with graphics, and a computer desktop simulation. An IBM SameTime 2.5 server is used and accessible via Internet/Intranet.

Currently, UDLC uses the Lotus LearningSpace 5.0 platform for distance course support, which combines the functionality of Lotus LearningSpace Forum (asynchronous DL) and SameTime (synchronous DL). Courses designed for use with LearningSpace Forum may eventually be migrated to Lotus LearningSpace 5.0 and its Collaboration Module for synchronous DL, which will integrate the use of IBM SameTime into distance courses. Macromedia Web Learning Studio is recommended as the platform for distance courses designed with Lotus LearningSpace 5.0, and includes Macromedia Flash, Macromedia DreamWeaver, and Macromedia AuthorWare.

A demo version of a distance course entitled "The System of Distance Learning of French Language (DELF-1 Preparation)," a joint project with the French Cultural Center of the Embassy of France in Ukraine, is available at the UDLC Web site. This demo has many audio segments and 120 self-testing procedures and is a first step in a joint project among three complicated modules in the DELF certification. The course was demonstrated to Ukraine's French Ambassador at the French Learning Centers and received positive reviews. This project will soon be developed further through a French initiative.

During the last 18 months, about 60 different delegations, including high-level Ukrainian government officials and representatives of international institutions visited UDLC. The UDLC experience in distance learning leads to the following conclusions:

- The best way to expand local distance learning is through local area networks using cooperating distance learning organizations. A local organization could use free computer communications and take advantage of distance learning. Distance learning can be effectively used at NTTU-"KPI" for the support of the educational process.
- Linux may be recommended as a base operating system for servers. This software is free and stable.
- Distance learning centres must demonstrate the possibilities of distance learning for local teachers using various types of intensive training so that teachers get practical experience with distance course design and tutoring using the most popular distance learning platforms. As UDLC experience shows, training for teachers may be effective simply using a ready-made distance learning computer system. Teachers will get the needed qualification and practical knowledge in distance learning with test distance course preparation.
- Distance learning must have government funding. Probably most important is remuneration for teachers who design distance courses.

MANAGING INNOVATION AND CHANGE: INTRODUCTION OF ICTS & DISTANCE EDUCATION IN PROFESSIONAL DEVELOPMENT PROGRAMMES FOR TEACHERS AND TEACHER EDUCATORS

Ivana Zlatanovic, Serbia and montenegro
Danijela Scepanovic, Serbia and montenegro

Background

The education system in the Republic of Serbia is one of the largest in the public sector. It comprises more than 1.4 million students and about 120,000 employees (teachers, pedagogues, psychologists and administrators). Due to the disruption, economic deprivation and isolation which prevailed during the previous decade, the education sector suffered considerable neglect as government funding declined. Investment in and maintenance of educational institutions were limited and reduced real earnings, creating a lack of motivation among educational professionals and forcing them to find alternative sources of income. Curricula and teaching methods stagnated and there was significant political interference in the operation of the education system. The influx of almost one million refugees increased pressure on the system. Further damage to physical infrastructure occurred as a result of the bombing in 1999. In spite of this, however, the system has continued to operate, but at a lower level of efficiency and increasingly ill-fitted to the needs of a modern economy.

Main Aims

The new governing body of the Ministry of Education and Sports (MoES) was established in February 2001 and began an overall educational reform process based on these critical government aims:

- To reorganize the school system in accordance with the need to efficiently contribute to the *economic revival* of the country;
- To modernize or reorganize the school system so that it substantially contributes to the *democratic development* of the country;
- To modernize or reorganize the school system so that it substantially contributes to the future *European integration* of the country.

The aims of the reformed education system are:

- Acquisition of generative and transferable knowledge, thinking skills, informed decision-making procedures, problem-solving skills, and effective communication skills;
- Mastery of life skills and functional literacy for an information-based society;
- Development of values that appreciate democracy and diversity, and respect of human rights, as well as the best national traditions.

Preparation for the reform process started with analytical reviews conducted from autumn 2000 to January 2001 by UNICEF, OECD, and the World Bank. The Local Consultation Process called ROR (85 RORs/65 large and small towns/8768 participants) was held during autumn 2001 and established nine expert groups for basic change and special areas. Among these groups The Expert Group on Teacher Education (17 members) suggested changes in teacher education for the period 2002 to 2005.

Quality Education for All-A Way Toward a Developed Society was published by The MoES, and presented the essential conception, strategy, and action plan, as well as the dynamics of reform described in this document.

Results of Consultation Process on Teachers' Professional Development:

Participants mainly stressed the need for:

- More practice during pre-service teacher training
- Change of induction procedure
- Improvement of practices: new type of training for new teachers' role
- Sufficient ICT equipment for all schools, access to databases, networking, and other equipment for education technology
- Establishment of regional centers for professional development
- Licensing of teachers

Short Summary of the Strategy Proposed by the Expert Group

The Committee for Teacher Education and Training gave a review focused mainly on pre-service Teacher Training, presenting the current situation, objectives, strategic guidelines, strategic dilemmas, and proposals for action projects. Changes in teacher professional development were accomplished by a department for professional development within the MoES.

Current Situation

- Since 1993, primary school teachers (class-teachers) for grades I to IV acquire university training at one of the five Teacher Training Faculties.
- Subject teachers from primary to university levels are trained at almost all universities and faculties.
- Not all faculties have special courses that prepare graduates for teaching; however, all university degree holders are entitled to apply for teaching jobs.
- Except for teachers of humanities and sciences who are trained in so-called teacher training faculties, faculties having teacher training departments are: Philology, Philosophy, and Sciences.

- Other teaching staff is recruited from different occupations such as: doctors, economists, engineers, lawyers, craft specialists, etc.
- Particularly scarce are teachers of the Mother tongue, English, Mathematics, Informatics and Arts, even teachers (of Geography, for example) who were until recently in surplus.
- The present curriculum for teacher training is not fully identical among the six faculties. Obligatory subjects, in most cases, in the first two years of studies are: Serbian language and literature; Instruction Theory-Didactics; Educational Psychology; Foreign languages; Developmental Psychology; General Pedagogy; Mass Communications; Education Sociology; Philosophy and Ethics; Information Technology; Sociology, and Social Ecology.

Objectives Set by the Council

Pre-service teacher education

- Curricular Changes for Teacher Training Faculties
- Developing a System of Practicum Sites for Teacher Faculties
- Induction
- Designing and Licensing a System for Teacher Induction
- Training the Mentors for Teacher Induction

In-service training

- Strategic teacher training for the reformed teacher roles
- Establishment of Regional Centres for Professional Development of Teachers
- Analysis of the current networks of training programmes/teachers
- Defining the Criteria/Requirements for Teachers' Professional Promotion

ICT and Distance Learning in Teacher Professional Development

"Although Internet communication was available and the way information specific to this area was obtained, it is noteworthy that the teaching staff in schools counts for a very small number of users of the Internet. This can be explained by basically two reasons: the lack of funds for the purchase of equipment, and computer illiteracy. Teacher training faculties need both personnel and equipment in order to become a channel that could substitute other modes of communication."

Objectives for the Institutional Framework of In-service Teacher Training

Modes of in-service training are to be diverse, with flexible structure, and adjusted to the needs and abilities of teachers involved. The whole training system should be based on the school as basic user, where the needs are defined and development plans are created and the regional center serves as the basic mediator and provider of continuous professional development.

The following framework may be used as a basis for continuous professional development:

1. **SCHOOL TEAMS:** in the school team teachers can be trained (but not systematically) through sharing good practices and through diverse forms of peer supervision (mutual class observation, joint analysis of classes, and professional support) and cooperation with other schools.²³
2. **(REGIONAL/NATIONAL) TEACHER ASSOCIATIONS** could organize thematic professional meetings, getting together teachers interested in specific themes and training modes.
3. **NETWORKS OF TEACHERS CREATED ON THE BASIS OF THEIR PARTICIPATION IN SPECIFIC TRAINING COURSES** (for instance, the teachers that implement programmes: Goodwill Classroom, Smilekeepers, Active Learning, The Culture of Critical Thinking etc.) These networks would be used for sharing good practices in programme implementation, further elaboration of existing programmes, etc. Long-term and obligatory objectives of each programme should be the follow-up and establishment of the network of teachers.
4. **REGIONAL CENTRES FOR CONTINUOUS PROFESSIONAL DEVELOPMENT** would be, as mentioned, basic mediators between: (a) schools and teachers, as users, (b) programmes provided by various institutions and organisations, and (c) the national centre for continuous professional development, defining the minimum of standards for programme accreditation and funding programmes of national importance.
5. **ONLINE/DISTANCE LEARNING** Thanks to the forthcoming computerization of schools it is possible to consider introducing systematic, and non-systematic distance learning that could be provided by teacher training faculties.

²³ Teams can plan needed modes of teacher training at the school level and make a selection from the provision of regional centres.

1. Regular, systematic external (expert) provision including all the contents alleged in the reviews of in-service teacher training modes (*seminars, courses, workshops, summer schools...*) would be provided in regional centres, depending on needs and available training programmes and trainees.
2. The regular external provision should include the offer of appropriate *handbooks* that teachers can use on their own.
3. Wider context appropriate for non-systematic, spontaneous advanced training would include professional literature, adequate TV and radio-programmes, websites, video tapes and audio-cassettes etc.
4. School teams might be formed around some research projects. They could serve as a base for action research projects set by regional centres; thematic professional meetings could have similar function where teachers could actively participate with their comments and suggestions.

National and Regional Centres for Continuous Professional Development

Establishment of the national and regional centers for professional development is aimed at providing more professional training integrated with work. This system aims at the continuous capacity building for different roles of teachers, and higher autonomy in planning, performance, and evaluation of the teaching process. It also sets up a demand for quality standards and achievement in teaching, in strategies of self-evaluation, more active participation in professional training activities, advancement of the education system, and inclusion in the process of lifelong learning. The planned national and regional centres will establish an institutional framework for professional development. There is also need for more active centres at faculties and institutes, school associations, expert associations, and societies-regional and national level teachers' groups of activists-at the school and municipal level. School teams and teachers' networks with specific programmes (active learning/teaching, classroom of goodwill, non-violent communication, critical thinking) are stressed.

The National centre for professional development will be responsible for:

- Strategy for professional development
- Plan and programme of professional development
- Accreditation of the programme for professional training
- Participation in development of the system for professional advancement
- Organisation and realization of seminars
- Information and documentation system on professional development (database)
- Coordination of the work of the regional centres
- Cooperation with institutions and organisations
- Analytic and research activity
- Programme evaluation
- Publishing *Projects in Progress*

Project: Development of The National and Regional Centres

This project is run by MoES and aims to establish an institutional and organisational framework for professional training as a support to the development of a strategy and concrete programmes for professional training. MoES is seeking donor support in order to establish these centres during 2002-2004. Funds for the formation of two regional centres have already been received. Reconstruction of the building and hiring of the staff is planned during 2002 and 2003.

Project: Professional Development Programmes - Accreditation Process

Since the system of professional training and advancement didn't exist, the need to develop one was determined after analysis of what was going on in the field.

Thousands of programmes run by the NGOs, domestic and foreign organisations, and centres in the past 10 years were without a systematic approach:

- There is no database on programmes
- There is no database on employees
- There are no data on programme evaluation
- There is no regulated mode for the award of certificates and diploma
- No assessment of needs of employees for professional training
- Professional training is not linked to professional advancement

Therefore a accreditation process with a clear procedure and transparent criteria was introduced to enable access to the programme for all schools, ensuring the quality of professional training and programmes and to expand the scope of professional development. Accreditation available throughout the whole year was first introduced in January 2002. In the six month period there were 274 total registered and 129 accredited and pilot projects. This number is higher currently. There were A, B, C, D, and E marked professional development programmes.

A	Credited	112
B	Pilot	17
C	Returned for completion	71
D	Not to be accredited	34
E	Not accredited	40

There were 10 ICT related programmes offering basic ICT literacy and none of the 274 programmes were offered at distance.

The reasons found for the lack in distance education are:

- Non-existence of distance education tradition-relating to media other than Internet (printed material sent by post, audio-cassettes, radio, television, video-cassettes, etc.)
- Highly centred and over-regulated education system
- Prevalence of traditional, ex-cathedra, face to face teaching methods *which is the opposite of the flexibility of distance learning*
- The lack of appropriate telecommunication network, ICT equipment, access to Internet
- Highly restricted access to ICT and basic equipment in some areas especially in schools-many schools without a single PC
- Overall digital illiteracy,
- Shortage of ICT professionals
- Small number of ICT trained teachers; prevents easy communication and access to information and resources, thus creating a huge barrier to the development of inclusion processes in the Serbian schools and education system into the broader European and world networks.

Conference

The Conference for Education Reform in the Republic of Serbia "The First Steps and the Forthcoming Challenges" was held in Belgrade from the 5th to the 7th of September 2002²⁴

Project: Working group on the Info-communicational Technologies in Education

This group's work was based on the realisation that the building of information systems and databases as well as the use of computer technology in teaching is critical for educational development and quality improvement. However, it was recognized that the building and application of these systems requires time and significant financial means.

- The Ministry of Education and Sports projects under development were presented:
- The building of an information system-project in cooperation with the World Bank
- Organisational experience and further development of the information network through area information centres for supporting the system of enrollment into secondary schools.
- The experiences of certain educational institutions and organisations were presented.

The speakers vividly presented the possibility of using info-communicational technologies in accordance with educational needs and characteristics of the given environment. During the presentation, numerous issues were raised that cannot be reduced merely to technology questions but belong to the social dimension, and the current conditions and needs of education.

One of the issues discussed is related to educational computer software-its creation, evaluation, accreditation, and production institutionalisation. The group noted the intention of the Ministry was not to establish an institution for producing software, but to open competitions for quality software and teaching content development in accordance with funding available from the budget. The group expressed concern over the low quality of work of most ICT teachers and the shortage of experts in ICT. They recommended that schools rely on their own forces and work on building existing capacity with emphasis on professional development in this area. Distance learning wasn't even mentioned.

²⁴ Around 1000 participants, domestic and foreign guests attended the Conference. The domestic participants are education representatives of relevant groups: principals and teachers in primary and secondary schools, university professors, school psychologists and pedagogues, experts and associates of science institutes, expert and professional associations, governmental and nongovernmental organisations, unions, representatives of republic and local political structures, as well as the Ministry of Education and Sports. The foreign participants represented significant international organisations and institutions

Project: Center for Media Research and Distance Education Development - Prospective Model

The Ministry of Science, Technologies and Development financially supports the Centre for Media Research and Distance Education Development - Prospective Model operated by the four-member team at The Teacher Training Faculty - Belgrade. The project leader is Associate Professor Svetlana Bezdánov-Gostimir. This project examines the current situation in the field of media research and promotes distance education, stressing its economy, efficiency, effectiveness. It is hoped that the Prospective Model of the centre will be part of the efficient introduction to our country of the world's leading trends. A multidisciplinary approach is planned.

Subjects of research among others are:

- Functional media and informatics literacy in the context of general culture-Research and Study,
- Current infrastructure for DE-Analysis
- International experiences in this area, as well as the selective integration into national environment-comparative analysis
- Possible target group users among teachers (marketing plan and research)-Identification
- Center for Media Research and Distance Education Development-Prospective Model-Concept, Programme, Effects

In order to gain insight into functional media and informatics literacy and to gauge interest in distance learning as a possible means of study and professional development, two tests and one set of questions, were developed. The set of 46 questions based on determined criteria were sent

- to 180 Primary Schools to question 1800 teachers; and
- to five Teacher Training Faculties to question 1000 future primary school teachers.

