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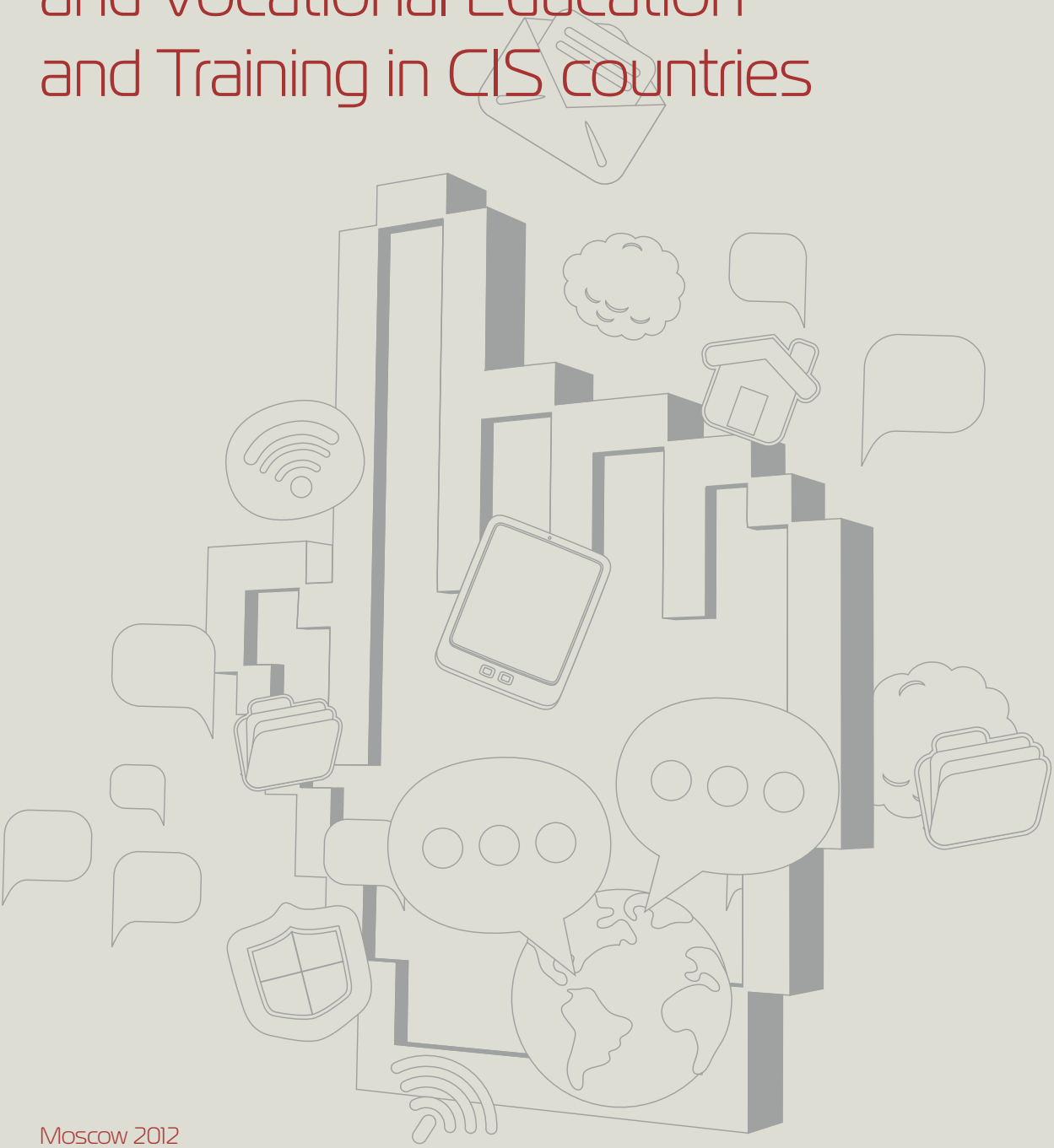
UNESCO Institute
for Information Technologies
in Education

Promotion of the Use of Information and Communication Technologies in Technical and Vocational Education and Training in CIS countries



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UNESCO Institute for Information Technologies in Education

Promotion of the Use of Information and Communication Technologies in Technical and Vocational Education and Training in CIS countries
Analytical Report

The present analytical report is prepared by the UNESCO Institute for Information Technologies in Education (UNESCO IITE) in cooperation with national experts from Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine and Uzbekistan in the framework of the joint project with the Intergovernmental Foundation for Educational, Scientific and Cultural Cooperation (IFESCCO). The report contains information on the current situation and main tendencies in ICT use in TVET in CIS countries, as well as recommendations on its further development, taking into consideration international experience, national priorities and contemporary socio-economic situation.

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Contents

Foreword

DEAR FRIENDS!

In recent years, development of Technical and Vocational Education and Training (TVET) has become one of the national priorities in the sphere of education for many countries, including member states of the Commonwealth of Independent States (CIS). This is due to the increased need for training of highly skilled specialists meeting the requirements of the labour market and the knowledge society. Quality TVET programmes contribute to the economic growth of the country and poverty reduction, as well as to the provision of state guarantees for social and economic inclusion of vulnerable and marginalized communities and people with special needs.

In their turn, Information and Communication Technologies (ICTs) play a special role in TVET development by making the exchange of information and knowledge between a teacher and a student more efficient and faster. ICTs also facilitate the education management, teaching/learning process and provision of training materials.

This analytical report presents the results of a comparative study on current situation and main tendencies in ICT use in TVET in CIS countries: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine and Uzbekistan. Besides, the report includes recommendations on further development and improvement of the use of modern ICTs in TVET.

The Memorandum of Understanding, signed between the Intergovernmental Foundation for Educational, Scientific and Cultural Cooperation (IFESCCO) and UNESCO on November 28, 2008 in Paris, laid the foundation for a fruitful cooperation of two organizations. Guided by the common objective of promoting and reinforcing intercultural dialogue, IFESCCO and UNESCO have implemented a number of joint projects, contributing to a noble cause of rapprochement of the nations.

On behalf of IFESCCO and the UNESCO IITE, we take great pleasure in thanking the national experts who prepared and provided materials for the present report, and express hope for further cooperation within the framework of projects on modernization of the TVET system in CIS countries.

We hope that this publication, and recommendations included therein, will significantly contribute to the development of national education policies and programmes in the field of TVET in CIS countries.

Armen SMBATYAN

Executive Director of IFESCCO,
Ambassador Extraordinary and Plenipotentiary

Dendev BADARCH

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Introduction

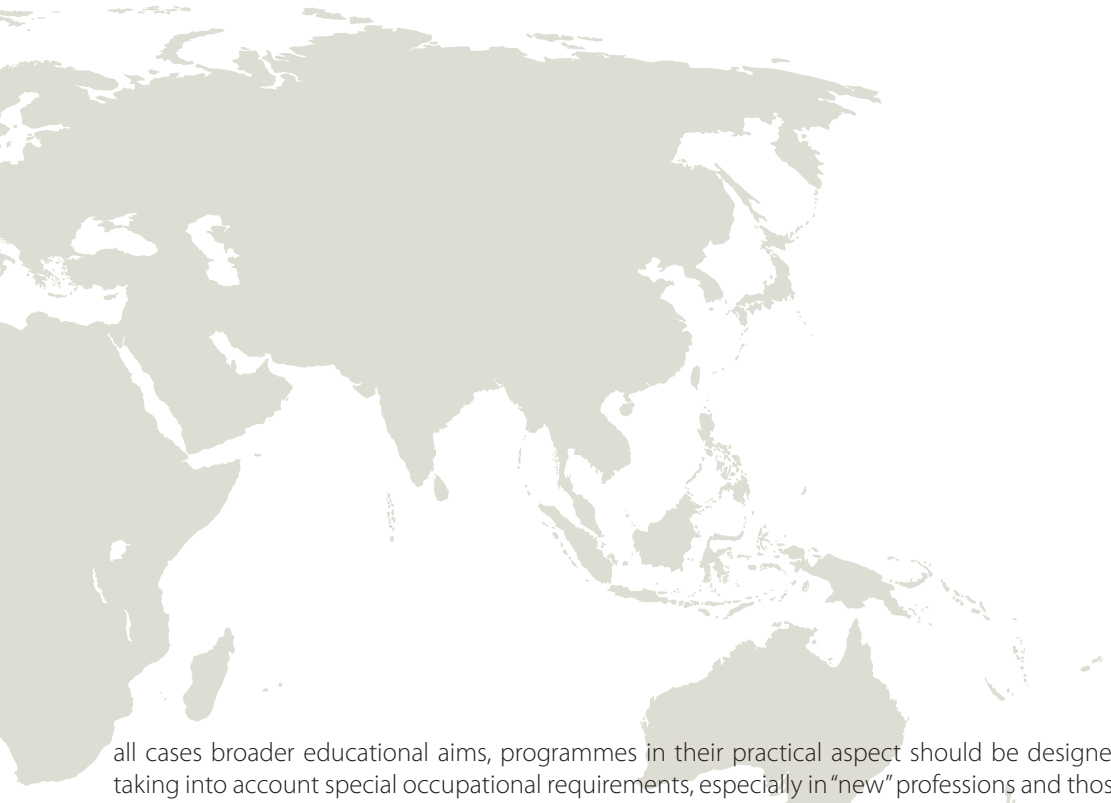
The present analytical report is prepared in the framework of the joint project of the Intergovernmental Foundation for Educational, Scientific and Cultural Cooperation (IFESCCO) and the UNESCO Institute for Information Technologies in Education (UNESCO IITE). The project overall objective is to promote the use of Information and Communication Technologies (ICTs) in Technical and Vocational Education and Training (TVET) in 10 countries[1]: Kyrgyz Republic, Republic of Armenia, Republic of Azerbaijan, Republic of Belarus, Republic of Kazakhstan, Republic of Moldova, Republic of Tajikistan, Republic of Uzbekistan, Russian Federation and Ukraine.

To conduct the comparative analysis and elaborate recommendations on further promotion of ICT use in TVET in the above-mentioned countries, a questionnaire with detailed instructions on writing individual reports by national experts has been prepared. The questionnaire consisted of the following sections: background and current situation with the use of ICTs in TVET in each country covered by the survey; overview of relevant national legislation; design of electronic/interactive educational modules, e-Learning resources and their usage in educational process; providing equal access to socially important educational tools, applications and services; transition to ICT-based knowledge and distance learning technologies; development of ICT-competencies of teachers, managers and supporting personnel of vocational educational institutions; usage of computer equipment and technical/electronic gadgets in educational process; shift to e-government.

The questionnaire has been prepared taking into account topical issues of ICT application and promotion in TVET as well as UNESCO priorities in this sphere (e.g. "UNESCO & ILO Recommendations on Technical and Vocational Education").

- Technical and vocational education should exist as part of a system of lifelong learning adapted to the needs of each particular country and to worldwide technological development (6).
- This system should be directed to improving the quality of life by creating a learning culture that permits individuals to expand their intellectual horizons, to acquire and to constantly improve professional skills and knowledge, and to engage positively in society to utilize the fruits of economic and technological change for the general welfare (6).
- Technical and vocational education should enable an individual to cope with the rapid advances in information and communication technology (8).
- While based on the above general principles and components, and thus pursuing in

[1] *In the publication the following official short country names are used: Armenia (RA), Azerbaijan, Belarus (RB), Kazakhstan (RK), Kyrgyzstan (KR), Moldova (RM), Russia (RF), Tajikistan (RT) and Uzbekistan (RU). Countries are listed in alphabetical order.*



all cases broader educational aims, programmes in their practical aspect should be designed taking into account special occupational requirements, especially in "new" professions and those undergoing change, and particularly the use of the new information and communication technologies as a tool for enhancing the effectiveness of all vocations, including those considered traditional (38).

- Full use should be made of contemporary educational technology, particularly the Internet, interactive multimedia materials, audiovisual aids and mass media, to enhance the reach, cost-effectiveness, quality and richness of programmes, especially in the promotion of self-learning (65).
- Technical and vocational education should be available to people with disabilities and to socially and economically disadvantaged groups such as immigrants, refugees, minorities (including indigenous peoples), demobilized soldiers in post-conflict situations, and underprivileged and marginalized youth in special forms adapted to their needs in order to integrate them more easily into society (7).
- Although governments carry the primary responsibility for technical and vocational education, in a modern market economy technical and vocational education policy design and delivery should be achieved through a new partnership between government, employers, professional associations, industry, employees and their representatives, the local community and non-governmental organizations (NGOs) (9).
- Open and distance education programmes provided through: correspondence; special radio and television broadcasting; the Internet and other computer-based media (31).
- In view of the high cost of equipment, its usage should be organized to yield optimum benefit (34).
- All programmes should be designed with the following objectives in mind: to develop in future teachers the ability to teach both the theoretical and the practical aspects of their field, with special emphasis on the need to use, whenever possible, the information and communication technologies (81).
- The professional preparation of all technical and vocational teachers should include the following elements in pre-service training and in-service upgrading programmes: training in how to create and produce appropriate teaching materials, including modular and computer-aided instructional materials, whenever such materials are in short supply (84).

As a result of the survey, a list of recommendations on further development of ICT use in TVET has been prepared. The present recommendations may be used by governments aiming to create modern Information Societies.

Chapter 1
Description of the Background and Current Situation with the Use of ICTs in TVET in the Countries Studied

For a more complete and comprehensive understanding of problems and prospects for ICT deployment in TVET systems in the countries studied it is necessary to consider the background to this issue – paying attention to all key initiatives taken in this area in each state up to now. In each and all the countries under consideration, the problem of ICT use in the sphere of education has become a priority for governmental agencies over the past decade. The task of ICT use at educational institutions (EI) is being resolved within the framework of the computerization of society in general. And although many important and necessary measures are being taken in this direction (national concepts, strategies and programmes) there are still a number of negative factors that delay the achievement of significant results in the use of ICTs in TVET. First, few state initiatives specifically refer to TVET, and focus mainly on general education schools and higher education establishments. Second, the low popularity of TVET is related to its lack of prestige. Third, financial instability in the countries results in the incomplete or haphazard financing of targeted projects. Fourth, the low level of international cooperation. It is obvious that all these elements are interconnected and, as a result, the resolution of any of them will involve a positive change in the others. Consequently, the extension of international cooperation combined with the introduction of successful experience may partly relieve the state of its financial obligations which, in turn, will promote more dynamic rates of computerization, thereby directly affecting the prospects, accessibility, progressiveness and, consequently, the popularity of TVET.

Armenia

The main problems for TVET are the rundown state of infrastructure and equipment, the acute lack of textbooks, teachers practicing old "Soviet ways" of instruction as well as the low level of employment for graduates.

Reforms in the primary and vocational education sector began after the independence of the Republic of Armenia (RA) was proclaimed. The restoration of former vocational technical schools [often abbreviated as "PTU" in Eastern Europe] - present-day vocational schools - began in Armenia a few years ago: nearly 30 vocational schools training students in approximately 40 specialities were restored virtually from nothing. As far as secondary vocational institutions (colleges) are concerned, they operated practically uninterruptedly. All in all, there are 83 state and 12 private institutions for secondary vocational education operating in the republic.

Since 2008, within the framework of the 2007-2015 National Educational Programme, work has begun on the restoration of teaching facilities, the acquisition of teaching equipment, the preparation of regulatory acts and educational criteria for vocational specialities, teaching plans and textbooks that meet modern requirements. It was additionally stipulated that approximately 3,500 educators employed in this sphere had to retrain in order to comply with international standards.

In addition, the European Union (EU) allocated a 16 mln euro grant for the recovery and development of initial and secondary vocational education in Armenia with 1 mln euro

FOR THE REPUBLIC OF ARMENIA KEY INITIATIVES IN ICTs HAVE BEEN:

✧ Decision No. NKh-896 of the President of RA "On the Creation of an IT Development Support Council" dated July 20, 2001.

This Council provides a link between the government, business, teaching institutions, donors, and international, non-governmental organizations; it organizes and holds discussions on the evolution of an information society and the solution of IT problems. The Council is chaired by the Armenian Prime Minister.

✧ Decision by the Council of Heads of Government of the Commonwealth of Independent States "On a Strategy of the CIS Member States Cooperation in the Sphere of Informatization and the Action Plan for its Realization for the Period up to 2010" dated November 25, 2006.

This presents a cooperation strategy for the CIS states, its aims and tasks. In the distance education field the main topics are: regulatory and legal support, educational technologies, management organization, study of distance education markets and marketing, evaluating the quality of training processes using ICTs, development of information and communication infrastructure at educational institutions, development of a system for the training of IT specialists, teachers and qualified users, development of systems for distance

to be spent on technical assistance. Also worthy of note is the programme "Assisting Reform in Initial and Secondary Vocational Education", which has been implemented since 2007 with the assistance of the United Nations Development Programme (UNDP), funded by the Government of Norway.

In 2008, the National Centre for Vocational Education and Training Development (http://www.mkuzak.am/) was created in Armenia with the aim of creating state educational standards for vocational specialities, modular programmes, teaching and methodological materials, developing teachers' skills and monitoring.

The "Electronic Armenia and Innovation Development Programme", worth $30 mln, contains two major components, one of which is a programme for computer and Internet availability and innovation encouraging.

National Centre for Vocational Education and Training Development .
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testing and opportunities for holding a single state examination based on paperless network technologies, development of a system for distance learning and information support for people with special needs.

✧ Vision (potential) for Restoring the Prestige of Education in Armenia dated July 12, 2007.

This document represents a basis for the state programme for the development of education in 2008-2015 and describes the strategic approaches required for the modernization of education policy, determining objectives from the point of view of priority areas regarding ICTs.

✧ Programme for 2010 to Assist IT Services adopted by the Decision No. 666-N of the Government of RA dated May 20, 2010. The programme aims to develop ICTs in RA. The programme presents a plan of ICT events, such as organizing exhibitions, conferences, contests, etc. One of the most visible ideas is the setting up of a Microsoft Innovation Centre, which is currently at the implementation phase. An Armenian-Indian ICT training centre is also in the pipeline.

Azerbaijan

Currently, over 1,000 EI in the country, 42% of vocational technical schools and lyceums are connected to the Internet via the Azerbaijan Educational Network that unites all the country's EI in a unified intranet network with Internet access. During the next few years all EI in Azerbaijan are expected to be connected to this network.

During recent years a number of important steps have been taken for the development of the Education Management Information System (EMIS) and the implementation of programmes for the use of ICTs in education in Azerbaijan. The adoption of the State Programme for the Informatization of the Education System of the Republic of Azerbaijan in 2008-2012 (http://www.ict.edu.az/) approved by Decree of the President of the Republic of Azerbaijan dated June 10, 2008, has promoted the use of ICTs in the educational process in general (and TVET in particular). The programme was developed based on the National ICT Strategy for the Development of the Republic of Azerbaijan (2003-2012). To implement the State Programme, a separate structure was created at the Ministry of Education by a resolution from the Cabinet of Ministers – the Administration of Informatization of Education (http://www.edu.gov.az/view.php?lang=ru&menu=279), and local and foreign partners were identified for participation in the Programme.

The main documents that promoted the use of ICTs in education are the "State Programme to Provide General Education Schools with Information and Communication Technologies (2005-2007)" and the "State Programme for the Informatization of the Education System of the Republic of Azerbaijan in 2008-2012".

Administration of Informatization of Education.
© 2009 Ministry of Education of the Republic of Azerbaijan

Another major project was the EU-financed "Technical and Vocational Education and Training Reform Strategy and Pilot Implementation in a Selected Region in Azerbaijan" (2008-2011). Within the framework of this project, a new national strategy for TVET was developed based on European standards taking into consideration the requirements of the local market and of education. Following the three-year project the specialities in highest demand in Azerbaijan were determined, including chefs, travel agents, waiters, hotel receptionists and bartenders. To train professional staff in these specialities, a tourism educational centre was created based on a former vocational technical school.

In addition, within the framework of the project, a pilot centre for vocational education in the field of tourism and the hotel business was created, which was the first modern secondary vocational education and training (SVET) institution created in Azerbaijan in the past 20 years.

In 2005-2011, budget allocations to the network of TVET institutions increased fourfold. However, there is still a shortage of textbooks. New textbooks for vocational schools were published only in 2009. Their electronic versions were made available on the Vocational Education Portal (http://www.avel.edu.az/).

"Thanks to vocational technical schools a lot of young people acquire professions, highly sought after in the local labour market, over a short period of time."

From an interview of Misir Mardanov, Minister of Education of the Republic of Azerbaijan. January 9, 2010

Vocational Education Portal.
© 2010 BakıNəşr

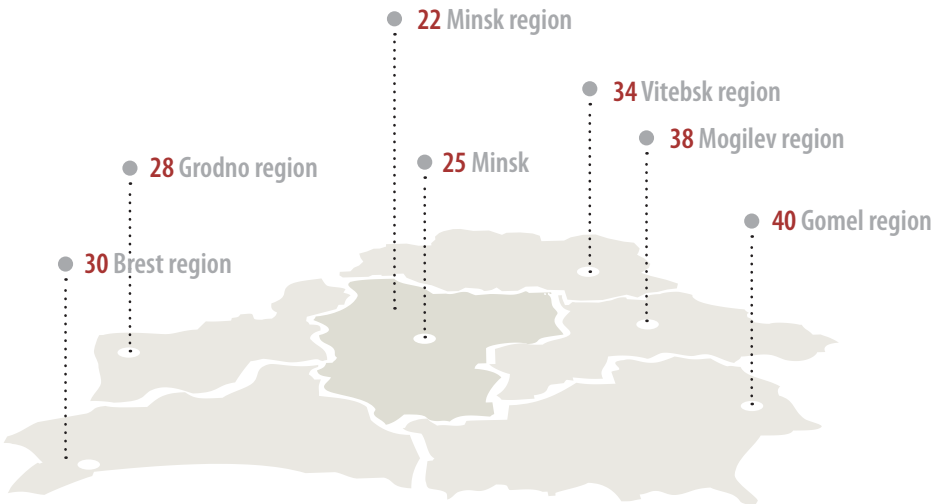
In the nearest future an agreement is to be concluded between the Ministry of Education of Azerbaijan and the German government, which won a 1.2 mln euro tender for the modernization of the existing Azerbaijani system of TVET in agricultural sphere. Cooperation agreements concluded in the field of TVET with Azersun Holding, Knauf Group, and JSC Billur Electroniks promote the development of a network of TVET EI in the regions.

Belarus

The Republic of Belarus (RB) has set the construction of an information society and a competitive high-tech national economy as a main priority of state policy in 2011-2015. This has been helped by the policy of informatization of education and society in general that has been pursued in RB over the past several years.

In 1998, a National Programme "Informatization of the Education System" was adopted (Resolution No. 129 of the Council of Ministers of RB "On Republican Programmes 'Informatization of the Education System' and 'Foreign Languages' " dated January 29, 1998). Within the framework of this programme, the comprehensive and systemic implementation began of all issues related to the informatization of education in RB. As a result of its implementation, the number of students per computer amounted to 30 people in 2006 (the statistics, however, included outdated hardware).

DISTRIBUTION OF TVET EI BY REGIONS OF BELARUS



National portal "Vocational Education" © PROFNET Web Team 2004-2012

The following were created under the aegis of the Ministry of Education of RB: the Coordination Council for the Informatization of the Education System of RB, the Coordination Council for Distance Learning, the Republican Methodological Association for the Informatization of Technical Vocational and Secondary Vocational Education. Informatization programmes are being adopted by educational authorities at a regional level.

These programmes have enabled the development and integration of national information educational resources, e-Learning tools and sectorial automated education management systems; an upgrade in the level of computer and office equipment access at TVET EI; an improvement in the competence of teachers and students in the use of ICTs; the creation of scientific approaches, methodologies, regulatory acts for the development and use of e-Learning tools; and introduction of e-Learning tools into the teaching process at EI.

In 1999, a Concept for State Policy in the Field of Informatization was adopted (Decree No. 195 of the President of RB "On Certain Informatization Issues in RB" dated April 6, 1999 (National Register of Legal Acts of RB, 1999, No. 28, 1/231)). Elaborated within the framework of this Concept was the State Programme for the Informatization of RB "Electronic Belarus" for 2003-2005 and until 2010 (Resolution No. 1819 of the Council of Ministers of RB dated December 27, 2002 (National Register of Legal Acts of RB, 2003, No. 3, 5/11734)).

In order to develop and supplement these underlying documents, a number of sectorial and interdepartmental informatization programmes were adopted in RB, promoting the wide and effective use of ICTs.

Resolution No. 1174 of the Council of Ministers of RB "On the Information Society Development Strategy in RB up to 2015 and a Plan of Priority Measures for the Implementation of the Information Society Development Strategy in RB for 2010" dated August 9, 2010 has been adopted. The Strategy is based on legislative acts of RB, international principles established by the UN Charter, and decisions from the World Summit on the Information Society (Geneva 2003, Tunis 2005). According to this document, in the system of technical vocational and secondary vocational education it is planned to extend the range of specialities with the aim of training specialists for ICT sphere, increasing admissions to courses that train staff for priority and high-tech sectors of the real economy, ensure the acquisition of knowledge and practical skills required to use state-of-the-art ICTs at a professional level in all specialities.

By 2015 it is planned to complete the creation of a national information environment for the education system of RB with the help of which information interaction will be achieved between all actors in the education system, as well as the formation of a national system of e-Learning resources. For all training institutions broadband access to international scientific and educational networks and the Internet will be provided. Improving the system of retraining and professional development of staff, and creating open educational resources (OER) will help achieve the principle of "lifelong learning" and provide an additional influx of highly qualified staff into the ICT sphere.

"We are aware of how diversified the modern world is, and that education systems of different countries are internationalized and interdependent with regard to the changes mapping the global progress. A key tool of efficient modernization of a national education system should be a full-scale introduction of ICTs in the educational process, improvement of already existing and development of new educational approaches and models on this base."

From an interview of Alexander Radkov, Minister of Education of RB (from 2003 to 2010) January 29, 2010

Kazakhstan

Informatization of the society as a crucial mechanism to create a competitive national economy is a priority of Kazakhstan's state policy. It is reflected practically in all the republic's programmes and strategic documents, in particular – in the annual Addresses of the President of the Republic of Kazakhstan (RK).

The Law of RK "On Informatization" (approved by Decree No. 217-III of the President of RK dated January 11, 2007) establishes a legal foundation for informatization, and regulates social relations arising during the creation, use and protection of electronic information resources and information systems.

With the aim of enhancing the quality and effectiveness of state administration and processes for providing socially important state services the Programme for the Development of "Electronic Government" of RK in 2008-2010 was developed (Resolution No. 1155-1 of the Government of RK dated November 30, 2007).

An important area of state policy on society and education informatization is the Programme on Reduction of Information Inequality, aimed at creating computer literacy among a wide section of the population and professional communities, including teachers and students at educational institutions.

The informatization of society is being carried out in line with the Concept for National Information Infrastructure, aimed at creating an electronic government, building open information and communication systems, standardizing and certifying informatization tools and systems, providing access to the resources of local and global networks, extending the use of the state language in the digital realm, and ensuring the security and protection of state resources.

Issues concerning the informatization of the TVET system were reflected in the Concept for the Informatization of the Education System of RK in 2002-2004, which established the main aims and tasks, areas, ways and mechanism for the informatization of all levels of education.

A Programme for the Informatization of Initial and Secondary Vocational Education Establishments (Resolution No. 616 of the Government of RK dated May 10, 2001) dealt directly with the informatization of the TVET system. The aim of the Programme is to introduce new training methodologies and modern equipment in initial and secondary vocational education organizations.

Specific areas of the informatization of education, including TVET, were reinforced in the State Programme on Education Development in RK for 2005- 2010.

The introduction in the TVET system of information, distance, and interactive learning technologies and the equipping of TVET institutions with modern IT equipment were reflected in the State Programme on the Development of Technical and Vocational Education for 2008-2012 (approved by Decree No. 626 of the President of RK dated July 1, 2008).

One of the main aims of the State Programme on Education Development in RK for 2011–2020 approved by Decree No. 1118 of the Head of State dated December 7, 2010 is the automation of the learning process, which aims to achieve the use of e-Learning systems at 90% of education institutions.

The main indicators on the introduction of e-Learning are reflected in the Strategic Plan of the Ministry of Education and Science (MES) of RK for 2011-2015 and in the Action Plan of MES RK for 2011.

In line with the recommendations of UNESCO experts, indicators of education informatization are represented by condition, assistance, and effectiveness indicators for the components of computerizing education as a system: regulatory and legal support, information and communication infrastructure, software, content and staffing.

Kyrgyzstan

In the Kyrgyz Republic (KR) the development of informatization has always been supported at a state level.

On October 8, 1999 the Law No. 107 of KR "On Informatization" was adopted (as amended by laws of KR dated January 24, 2002 No 10, June 24, 2003 No 116). An important aspect of this law is the fact that it establishes a state policy support for school, initial, secondary and higher vocational education, staff training and scientific research in the sphere of informatization as well as a requirement on the necessity of teaching special courses on information science and computer technology at initial, secondary and higher vocational institutions and organizations involved in teacher retraining and professional development.

In addition, a State Plan of Action for the implementation of the Programme for the Development of Information and Communication Technologies in KR (2002-2010) was approved by Resolution No. 248 of the Government of KR dated April 24, 2002.

In light of these documents the following tasks were resolved: the first stage of creating a state Internet portal (state computer network) was implemented, on which information is placed on the activities of government bodies and services provided by them; all central government bodies developed informational web pages and published them on the Internet; a network of centres providing public access to information was created for residents of rural and remote settlements; the regulatory legal base is being improved; sectorial information systems and resources are being developed (register of population, register of legal entities, register of education, register of transport, register of property rights, automated treasury systems, and systems for medicine, geology and mineral resources).

On March 5, 2003 the President of KR adopted "Kyrgyz Vision 2007" - a programme to build a state with a basic information industry. On September 16, 2003 plans of action were approved for implementing priorities of the National Strategy "Information and Communication Technologies for Development of KR" in the following areas: electronic government, electronic education, and electronic economy.

Currently, Kyrgyzstan ranks among the leaders in the CIS in terms of Internet user numbers.

In spite of the comparatively high rates of ICT development during recent decades the Kyrgyz Republic has not yet managed to catch up with industrially developed countries as regards the level of informatization of the economy and society. This is partly due to economic reasons (the lingering crisis in the economy, the low level of material welfare of most of the population).

It should also be noted that adopted documents practically fail to deal with the TVET system, although the first reforms to introduce informatization began as early as 1994-1998 as part of a World Bank project. Within the framework of this project, nine model centres were created aimed at introducing and disseminating international experience in the vocational training of adults using foreign equipment and modern training technologies and promoting the rapid adaptation of graduates to work with modern hardware under new conditions. Training at the model centres is organized based on a modular system that stipulates individual staged training; during the development of the teaching programmes the DAIKUM and SID systems recommended by consultants from Ohio University were used.

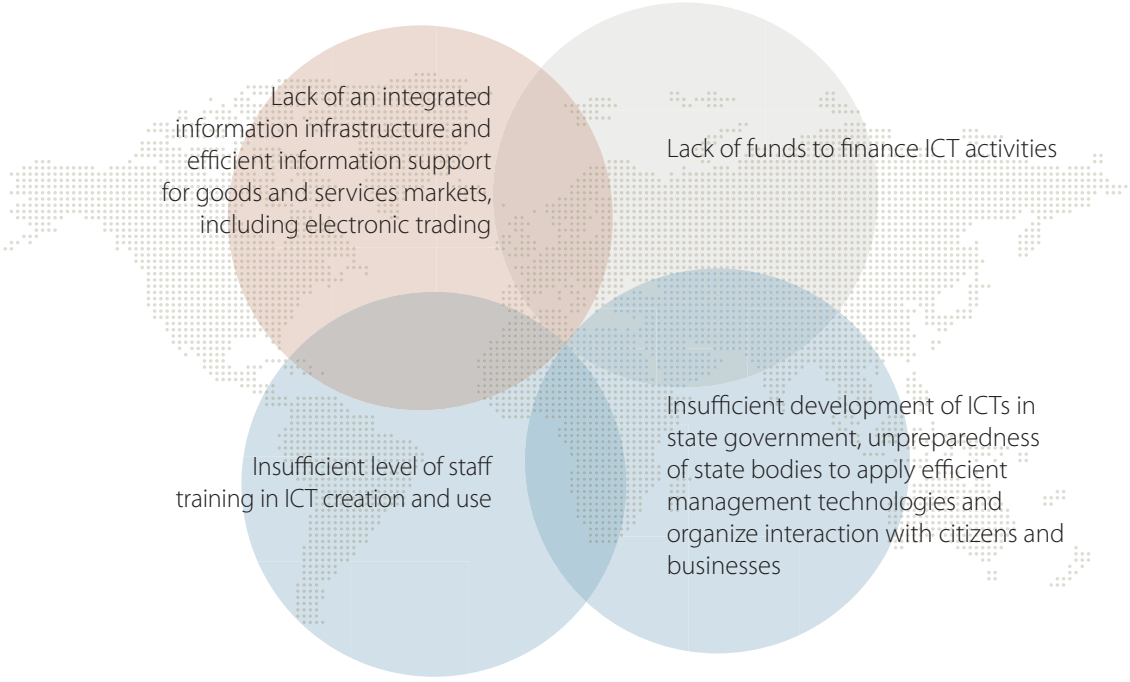
In 2007, the TVET system was spun off into a separate structure – the Agency for Technical and Vocational Education under the Government of KR. This independence and the establishing of development prospects gave impetus to the influx of investment. One of the largest investors was the Asian Development Bank (ADB) project "Vocational Education and Skills Development". This project involved the introduction of Information Management Systems based on the business-plans of EI, including the supply of computer hardware, personnel training, provision of Internet access, and the development of software.

This work was to have been carried out in 2010, but was suspended because of the political events in April-June 2010.

The political situation in KR has currently stabilized, and investor activity can be observed in the TVET system which gives grounds to expect positive results by the end of 2011.

In particular, a positive aspect is an initiative to introduce an international computer literacy certificate based on a Memorandum of Understanding concluded between the Ministry of Labour, Employment and Migration of KR and the ECDL foundation.

PROBLEMS IN THE SPHERE OF INFORMATIZATION:



Moldova

In accordance with a Statement of Intent signed by member countries of the Stability Pact for South Eastern Europe in Ljubljana in 2002, the Republic of Moldova (RM) assumed the obligation to create an information society with a focus on the interests of all citizens, taking into account the principles set in the UN Charter, the Universal Declaration of Human Rights and the Okinawa Charter on Global Information Society (2000).

In recent years, the development of an information society in RM has been manifested in pronounced growth in the density of mobile and fixed telephone communications providing access to information resources, with fiber optic trunk lines covering all administrative territorial units. There are also reliable international communications via satellite and fiber optic cables. In recent years, the number of Internet services and users in the republic has scaled up greatly. Thanks to an increase in state and regional financing there have been growth in quantity and improvement in the quality of technical equipment. However, demand among the population significantly outstrips the above supply, and the elimination of this imbalance is the main indicator of the development of the information society.

FOR THE REPUBLIC OF MOLDOVA KEY INITIATIVES IN THE FIELD OF ICT USE IN TVET HAVE BEEN:

- Presidential Programme for the Introduction of Information and Communication Technologies in the Education System "SALT" approved by Resolution No. 1424 of the Government "On the Achievements of the SALT Presidential Programme" dated December 22, 2004.
- Government Resolution No. 632 "On Policies for Building an Information Society in RM" dated June 8, 2004.
- Government Resolution No. 255 "On a National Strategy for Building an Information Society 'Electronic Moldova' " dated March 9, 2005.
- Government Resolution No. 863 "On Approving a Modernization Programme of Education System in RM" dated August 16, 2005 calling for the realization of training plans for technical vocational, secondary vocational and higher education with the aim of ensuring that future graduates are able to use information and communication technologies.
- Government Resolution No. 373 "On Reorganizing the Centre for New Information Technologies" dated April 12, 2006.
- Resolution No. 270 of the Government of RM "On Approving the Education Information System (EIS) Concept" dated April 13, 2007.

Russia

Informatization in the Russian Federation (RF) began 10 years ago and has proceeded in several stages.

2001-2005

FIRST STAGE

Computerization – was carried out in 2001-2005, and its main result was an improvement in the number of pupils per computer (from 250 to 80).

2006-2009

SECOND STAGE

Providing EI with broadband access to the Internet - was carried out in 2006-2009. As a result of this project in 2006-2007 52,322 EI were connected to the Internet, with the proportion of schools connected to the Internet reaching 100%. Since 2010, Internet access of all EI has been paid for from the regional budgets.

2009-to the present

THIRD STAGE

Provision of a free software package (FSP) to EI is still under way. The federal budget has been financing access to FSP and technical support, training and testing of 77,706 teachers and administrative-and-teaching workers at EI (at least one representative from each EI); 7,554 tutors have been trained.

Methodological support centres for the use of FSP have been set up in the regions of RF; trial zones for FSP usage are being organized within each EI of the region. Currently, over 92% of EI are covered.

One of the priority areas in the programmes for the development of national research universities is associated with information technologies (IT). Plans include the elaboration and modernization of educational programmes, the creation of methodological support and the organization of training, professional development and retraining in the field of ICTs; the use of distance learning (DL) for retraining and professional development of specialists in science-intensive branches of industry is being widely supported.

Tasks that are being resolved in RF as part of the creation of "electronic government" including with respect to the transition to provision of state services and discharging of state functions in electronic form, should be viewed as a separate unit. In the sphere of education these are services for the licensing of educational activities, admission of citizens to higher and secondary vocational training institutions and provision of information on education documents.

Tajikistan

Over a half of school graduates in the Republic of Tajikistan (RT) choose higher education and less than a quarter – initial vocational education. The situation as it is fails to correspond to the actual economic conditions and the professional structure of the labour market. The low population level with initial and secondary vocational education is due, on the one hand, to the limited materials and technical facilities of EI, and on the other hand – to the fact that youth are poorly informed about opportunities to quickly acquire a profession. School graduates are not fully aware that in the current socioeconomic conditions, the "prompt" acquisition of a profession will be a guarantee of successful work activity in the future. At the same time, the lack of flexibility of the education system itself and its failure to meet the demands of the labour market reduce the effect of receiving such an education.

During 2000 - 2010 the Government took some steps to perfect the regulatory legal base and to reform the initial vocational education and training (IVET) system.

According to the Plan of the Education System Reform Implementation for 2004-2009 approved by Resolution No. 291 of the Government of RT, dated June 30, 2004, TVET EI were transferred to the system of institutions of the Ministry of Education of RT from January 1, 2007. With the handover of the IVET system, the process began of reconsidering the whole cycle of existing teaching curricula and programmes.

With the adoption of the State Training Standard for Initial Vocational Education (2002), the new law "On Initial Vocational Education" (March 2003) and the State Concept for the Reform of the IVET System (October 2007) a new epoch began in restoring the TVET system and recognizing its socioeconomic significance.

The State Classification of Areas and Specializations of RT (Resolution No. 349 of the Government of RT dated June 30, 2007) systematized TVET training areas and specialities.

The National Strategy for Education Development in 2010-2020 (currently being developed) is the very document that will bring about considerable change in the structure and content of TVET. This document envisages considerable change in the management mechanism, training methodology and equipping of institutions. This strategy's action plan stipulates the gradual introduction of ICTs in TVET, the widespread use of information resources at TVET institutions and the rationalization of the system on the whole. New generation State Educational Standards (SES) will be introduced at all the levels of vocational education. Their development will be based on professional standards and take place with the direct participation of employers. The concept for the new generation SES includes a switchover to competence-oriented education and modular organization of educational programmes at all levels based on the requirements of the national qualification structure.

Ukraine

The active large-scale introduction of ICTs in the educational sphere, including the TVET system, began with adoption of Laws of Ukraine No. 74 "On the National Informatization Programme" dated February 4, 1998 and No. 75 "On the Concept of the National Informatization Programme" dated February 4, 1998.

The Programme's implementation resulted in the creation of the National Educational and Scientific Network URAN with access to the GEANT trans-European network; recommendations on the use of specialized software for distance learning were developed, distance training was organized for teachers in administration of computer systems, many teaching software packages were created, a bank of e-Learning resources was developed and the Scientific and Educational Portal "Island of Knowledge" (http://www.ostriv.in.ua/) was launched.

Scientific and Educational Portal "Island of Knowledge".
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Uzbekistan

The state policy of the Republic of Uzbekistan (RU) in the field of informatization is aimed at creating a national system that takes into account current world trends towards the development and perfection of information resources, technologies and systems.

With the aim of forming a national informatization system, widespread introduction and usage of ICTs in all spheres of society and extending access to world information resources, Decree No. UP-3080 of the President of RU "On Further Development of Computerization and Introduction of Information and Communication Technologies" dated May 30, 2002 was issued.

The Programme for the Development of Computerization and Information and Communication Technologies for 2002-2010 was approved by Resolution No. 200 of the Cabinet of Ministers of RU dated June 6, 2002.

Within the framework of the programme:

- A modern national information database was created;
- A market of information resources and services was created, and a consistent gradual switchover to electronic forms of information exchange was ensured;
- Extensive training of all students in computer and information technologies was provided;
- Conditions were created for widespread access by different sections of the population to national and international information networks;
- Progressive training systems based on mastering and active use of modern computer technologies were introduced in the teaching process of SVET EI.

Since 2002, the Centre for Development and Introduction of Computer and Information Technologies of the Uzbek Agency for Communication and Informatization has been in operation. Among other things, its activities are aimed at developing applications and customized software, information databases, websites and other software products for sectors of the real economy, and for management, business, healthcare, science and education as well as the implementation of an e-commerce programme.

Within the framework of the national programme, a legislative base of informatization and telecommunication was created in Uzbekistan determining the main economic, legal and organizational foundations for the operation of information and communication technologies.

Implementation of the first stage of the National Programme of Reconstruction and Development of the Republic's Telecommunications Network resulted in creation of a new digital trunk network, digital channels reaching 51 regional centres, and digital lines accounting for 32.6% of local telephone networks.

A data transmission network is being developed, its bandwidth capacity enabling access for up to 170,000 users. Over 100 businesses are engaged in providing Internet services.

At the same time, out of the 62 higher educational institutions and 531 colleges and lyceums only 40 and 22 respectively have access to the Internet. The computerization level of society fails to meet modern requirements, which is impeding the expanding of access to information networks.

The underdevelopment of the market for software and information resources in the country is also worth mentioning.

Chapter 2
A Review of Regulatory Documents Dealing with ICT Use in TVET

Obviously, state initiatives play a leading role in the development of ICT use in TVET; and so, in order to evaluate the current situation in this sphere, as well as to determine prospects for this area in a specific country, it is necessary to bear in mind the documents on which the education informatization process is based.

From the information provided by national experts it follows that the authorities of all the countries under analysis understand the necessity and potential of ICT development, and see informatization as one of the most important national priorities. However, the main danger consists in the fact that all the planned initiatives, which have been outlined in documents comprehensively and in detail, may for a long time remain as only plans for the future, in conditions of unstable and incomplete financing.

Armenia

Among the main state initiatives in the development of ICT use in TVET in Armenia the following can be identified:

1. Law of RA "On Initial and Secondary Vocational Education" adopted July 8, 2005.
2. Regulations on Distance Learning to the Main Initial and Secondary Vocational Education Programmes approved by Resolution No. 1028-N of the Government of RA, dated September 6, 2007. In accordance with these, the distance learning process is executed as follows:
   - Through direct contact or contact using telecommunications tools between the teacher and the student;
   - Through direct contact or contact using telecommunications tools between the methodologist and the student;
   - Through the students' independent studies with the use of training materials.
3. Strategy for the Development of Initial and Secondary Vocational Education adopted by Decision No 51 of the Government of RA, dated December 18, 2008.

The strategy states that there is a lack of effective processes for the systematic training of TVET personnel in the field of introducing and developing ICTs. Because of weak ties between training establishments and the labour market, the institution of social partnership is not yet fully formed.

On the part of the Government of RA, the following priority tasks for development of initial vocational (professional) and secondary vocational education were identified for 2011:

- Development and introduction of 19 unified criteria and programmes for initial and secondary vocational education;
- Improvement of facilities and equipment at 12 initial and secondary vocational EI;
- Updating and re-fitting of laboratories and computer classes at 12 initial and secondary vocational EI.

Since December 2008, German commercial organization InWent[2] - Capacity Building International, financed by the Ministry for Economic Cooperation and Development of the Federal Republic of Germany has been implementing the project "Institution Building and Human Resource Development for e-Learning in South Caucasus" in the three Transcaucasian countries. The project's aim is to familiarize the participants with the general approaches, provisions and principles of e-Learning (EL) as applied in international practice. Currently, an electronic training network has been created comprising eight organizations, two of them representing TVET.

[2] *At present – German Agency for International Cooperation (GIZ) – editor's note.*

Azerbaijan

After the Republic of Azerbaijan gained independence, a number of important documents significantly extending the legislative base for ICTs and their application in education were adopted by presidential decrees and directives:

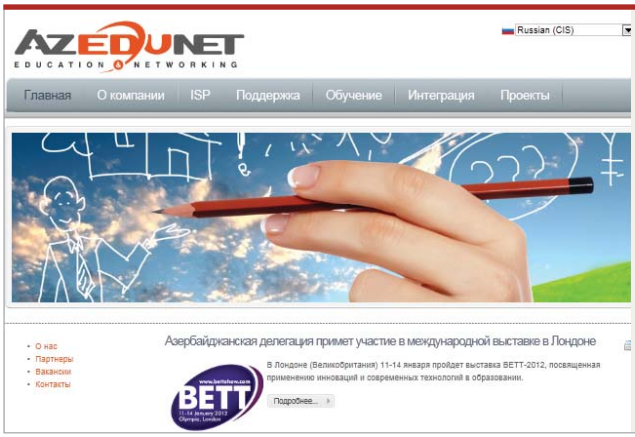
1. National Information and Communication Technologies Strategy for the Development of the Republic of Azerbaijan (2003-2012) approved by the Directive of National Leader Heydar Aliyev, dated February 17, 2003. This document reflects state policy on the use of ICTs and their spheres of application, and determines key aims, tasks, priorities and main areas of activity.

2. By Presidential Decree dated July 3, 2007 the State Programme for the Development of Vocational Education in the Republic of Azerbaijan in 2007-2012 was adopted. In connection with execution of the State Programme, an extensive Plan of Action was approved by order of the Ministry of Education of the Republic of Azerbaijan dated July 30, 2007.

The main priorities of the programme are the enhancement of the social status of TVET, improving management and strengthening the material and technical base of TVET EI, the formation of new economic relations between TVET institutions and business sector, human resources training in line with the requirements of the 21 century. With the aim of enhancing the social status of TVET and the development of mutual ties between employer organizations and training institutions, a Coordination Council was created consisting of representatives from state and non-state organizations. The Council is charged with reaching an agreed solution to problems arising in TVET.

3. The First State Programme on Informatization of the Education System in 2008-2012 approved by the President of the Republic of Azerbaijan Ilham Aliyev on June 10, 2008. The state programme stipulates the development of infrastructure, the use of electronic educational systems, the informatization of education management and the strengthening of HR capacity. As part of this programme:

a. The Azerbaijan Educational Network AzEduNet (http://www.azedunet.az/) was created, to which 44 out of 108 vocational technical lyceums and schools are currently connected. A network management and security system is provided by the Information and Resource Centre launched in summer 2009. The centre's technological and software capabilities allow for the remote update of antivirus software. To ensure information security, the Computer Networks Security Centre (CERT/CSIRT) was created. The centre is engaged in preventing incidents and threats related to AzEduNet.



Azerbaijan Educational Network AzEduNet.
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b. The National Educational Portal Edu.az was created. It, after being fully launched with the participation of Ultra, has no analogues regionally in terms of the quantity and level of services. Access to the portal is provided for four user groups: teachers, schoolchildren, students and their parents who can obtain the very information that is meant for them. In total, the project includes an education portal (http:// portal.edu.az/), a management programme (ASM) "Electronic School" (http://ict.edu.az/az/layiheler/elektron-mekteb.html), an electronic lessons administration (AeL), electronic lessons (SCORM standards) and the National Education Database (NED). The project is of great significance from the point of view of collecting education statistics in a single database as well as for strengthening parent-school relationships, upgrading education levels, and improving school management, etc.

4. Within the framework of the Second State Programme on Informatization of the Education System in the Republic of Azerbaijan in 2008-2012, approved by the President of the Republic of Azerbaijan on June 10, 2008, over 64,680 education workers have been involved in computer literacy enhancement courses.

In addition, training sessions were (and are) arranged on ICT use in teaching. Training is carried out by Madad (http://www.madad.net/) based on curricula such as "Improving Teacher Professional Development", "Intel: Teach to the Future", "Training Pedagogical and Administrative and Managerial Staff in Using ICTs in Education and Management Systems" as well as "Electronic School".

Intel has for years implemented programmes for the effective use of ICTs in the education system. For example, in Azerbaijan the programme "Teach to the Future" is being successfully implemented, and is aimed at the professional development of teachers. Additionally, a Memorandum of Understanding on the programme "Partnership in Education" was signed between the Ministry of Education of Azerbaijan and Microsoft. Within the framework of this Memorandum, a number of projects have been implemented, such as:

Help to Colleague	The project is aimed at perfecting the new knowledge and abilities of active teachers who would be able to perform the roles of instructors at schools and give practical advice to their colleagues on the use of ICTs in the teaching process.
People's Computer	The project was launched in April 2009 by the Ministry of Communications and Information Technologies of Azerbaijan jointly with the Ministry of Education of Azerbaijan, HP and Microsoft, with BestComp Group as the project operator. The main aim of the project is to give educators, pupils in general education schools and students in higher education as well as workers at state enterprises an opportunity to purchase computers on preferential terms – at a below market price and with payment deferred for 12 months.

Belarus

1. Law No. 216-Z of RB "On Technical and Vocational Education" dated June 29, 2003 (adopted by the House of Representatives on June 5, 2003, approved by the Council of the Republic on June 11, 2003 (as per the revision of laws of RB dated June, 12 2006 No. 123-Z, dated June, 29 2006 No. 137-Z, dated May, 12 2009 No. 19-Z, dated November 9, 2009 No. 51-Z); registered in the National Register of Legal Acts of RB on July 7, 2003, No. 2/965). Ceases to have effect from September 1, 2011 in connection with the adoption of the Education Code of RB dated January 13, 2011 No. 243-Z.

Among the clauses that indirectly assist in the use of ICTs in TVET, the following may be noted:

- Article 6 indicating the opportunity of introducing textbooks, teaching aids and educational and methodological kits, tests and other means of evaluating the quality of education, as well as educational technologies in the educational process in TVET;
- Article 10, providing for the organization of technical and vocational education of persons with special needs, including those with disabilities as well as other categories of citizens, based on individual training plans and in line with the procedure and in the cases determined by the Ministry of Education of RB, not excluding the use of ICTs in individual study plans;
- Article 14, indicating the fact that experimental activities may be performed at TVET institutions (possibly – with the use of ICTs) for the improvement of the educational process.

2. Resolution No. 1174 of the Council of Ministers of RB "On the Information Society Development Strategy in RB until 2015 and a Plan of Priority Measures for the Implementation of the Information Society Development Strategy in RB for 2010" dated August 9, 2010. Registered in the National Register of Legal Acts of RB on August 11, 2010, No. 5/32317.

The development of an information society is one of the national priorities of the republic and is considered a nationwide task requiring a united effort by the State, business and civil society. ICTs have been assigned the role of a necessary instrument of socioeconomic progress, one of the key factors for the innovative development of the economy. The formation of an information society is ensured by the availability of developed human capital, high scientific potential, and a system of state support for the development of ICTs. This goal is achieved by way of resolving the following tasks, which are implemented in accordance with the main areas of development of an information society as determined in this Strategy:

- Formation of a state information policy assisting in the development of an information society on an innovative basis;
- Development of an information communication infrastructure (ICI) to ensure that the growing information needs of citizens, business and the State are more than met;
- Development of a national information industry, attraction of investment in the production of ICTs, information resources and electronic services in the country;
- Improvement of the education system to ensure the training of a high-quality workforce.

The subprogramme "E-Learning" states: "Priority areas in the field of e-Learning development are the creation of an innovative system of e-Learning resources in the main branches of knowledge and the perfection of the infrastructure of access to these and to world educational resources.

The national system of e-Learning resources and the network infrastructure of the education system should form a unified information environment for the republic's educational system. The strategic aim of its creation is the provision of equal opportunities to acquire knowledge that meets current national, European and international standards for students and specialists at different EI, irrespective of their location.

The wide-scale introduction of ICTs at all levels of education must be provided for both technologically, by way of improving facilities at EI and developing network infrastructure, and methodologically, by way of developing methodological principles for the use of ICTs, and national and world e-Learning resources in the teaching/learning process. The system of professional development for teachers working in technical vocational, secondary vocational and higher EI in the field of ICT use will be further developed". The implementation of the programme is expected to result in the percentage of EI having Internet access reaching 100%.

3. Law No. 455-z of RB "On Information, Informatization and Information Protection" dated November 10, 2008. Adopted by the House of Representatives on October 9, 2008. Approved by the Council of the Republic on October 22, 2008. Registered in the National Register of Legal Acts of RB on November 17, 2008, No. 2/1552.

The law determines the main concepts (information, information systems, networks); regulations on the composition of state information resources, their formation and use of documented information from state information resources; a system for creating and using information technologies, information systems and information networks; a system for registering in the State Register of Information Systems on a voluntary basis.

4 Resolution No. 265 of the Council of Ministers of RB on approving the programme "Complex Informatization of the Education System of RB in 2007-2010" dated March 1, 2007. Registered in the National Register of Legal Acts of RB on March 13, 2007, No. 5/24853.

The programme is oriented mainly at the informatization of general secondary education as the basic element of the national education system. However, within this context the programme also dealt with TVET and the system for professional development and workforce retraining in the field of ICTs. Within the framework of the implementation of the Programme, national electronic manuals were created, along with an educational portal and methodological sites; and the construction of a unified information and communication infrastructure for the education system was further developed.

Kazakhstan

The main documents regulating the use of ICTs in TVET in RK are:

1. Programme for the Preparation and Issue of Manuals, Teaching Materials in Special Disciplines for Initial and Secondary Vocational Education Institutions in RK approved by Resolution No. 409 of the Government of RK, dated March 29, 2001.

The implementation of this Programme has enabled the supply of vocational training institutions in RK with new domestically produced textbooks, teaching materials and e-textbooks.

2. Programme for the Informatization of IVET and STEV Institutions approved by Resolution No. 616 of the Government of RK, dated May 10, 2001.

As a result of the implementation of this programme, computer access in the republic amounted to 20 and 23 students per computer in colleges and vocational schools respectively. In parallel with computerization is the process of gradual connection to the Internet. As a result, over 80% of state EI have been connected to the Internet.

The professional development of information science and computer technology teachers was organized. During the years the programme was implemented over 1,500 information science teachers have been retrained. In addition, national scientific and practical conferences were arranged on ICT use at institutions of primary and secondary education.

3. State Programme on the Development of Technical and Vocational Education in 2008-2012 approved by Decree No. 626 of the President of RK, dated July,1 2008.

4.8 bln. tenge (23,000 euro) were allocated from the local budget to equip training workshops and laboratories of TVET institutions. The allocated funds were used to purchase interactive training equipment, modern equipment for laboratories and workshops, interactive whiteboards, computers and multimedia devices, special virtual learning laboratories for various specialities (as a result, the portion of EI equipped with modern equipment amounted to 36% or 183 EI).

Over 500 items of interactive training equipment were installed using local budget funds, funds from subsoil users and the funds of TVET organizations themselves, with over 2,500 computers installed.

4. State Programme of Education Development in RK for 2011-2020 approved by Decree No. 1118 of the President of RK, dated December 7, 2010.

By 2012, changes will be introduced in the state educational standard of general education for TVET as regards the teacher training for work with the e-Learning system. Requirements for the creation of electronic manuals and teaching materials used in the e-Learning system will be developed and approved, as will procedural rules for individual and collective work by the system's users, and technical procedural rules (e-Learning system maintenance and operation).

To ensure the introduction of ICTs, the training and professional development of teachers will be organized. By 2011, it is planned to begin improving teachers' competencies in the use of e-Learning systems.

Organizational support for the e-Learning system will be provided by regional centres for new technologies in education, set up by the educational authorities of cities and regions. Electronic resources and content for e-Learning will be supplied on the basis of public-private partnership.

The development of technological infrastructure envisages linking educational organizations to the Internet with a bandwidth capacity 4-10 Mbit/s. Over 90% of TVET institutions will be connected to the Internet and have at their disposal Internet resources with the required training materials.

Broadband Internet connection, supply of equipment for the e-Learning system and the selection of service providers will be carried out in accordance with the current legislation of RK governing state procurement.

For each subject and special discipline, interactive and intelligent digital learning resources will be developed. It is planned to ensure the provision of complete open access for TVET institutions to digital learning content (content of information resources – text, graphics, music, video, sounds, etc.). E-Learning resources created by teachers will be developed (with the centralized creation and supply of libraries).

To introduce an automated learning processes, each EI will be fitted out with the equipment required: up-to-date computers, broadband Internet access, etc.

5. Programme for Development of Information and Communication Technologies in RK in 2010-2014 approved by Resolution No. 983 of the Government of RK, dated September 29, 2010.

A permanent Sectoral Council for the development of TVET and personnel training in information and communications was set up at the Ministry of Communications and Information (MCI) of RK (Order No. 17 of MCI dated January 24, 2011).

The main activities of the Council are:

- Ensuring interaction between partners on issues of staff training in sectors of the economy;
- Determining the staffing requirements in the sector;
- Participating in forming a state order for the training of staff with technical and vocational education;
- Assisting in the organization of internships and employment, assistance in strengthening the material and technical base of TVET institutions;
- Participating in developing qualification frameworks and professional standards for ICT-related specialities;
- Introduction of proposals to the National Council on the training of staff in technical and vocational education.

From 2012, within the framework of this Programme, it is planned to begin developing professional standards in two ICT specialities: "Computer Engineering and Software" and "Information Systems" based on which the state educational standards of general education and educational training programmes will be updated.

A network of specialized IT colleges will be created in four regions of the republic that will provide the country with highly qualified IT specialists. At the moment, JSC "National Info-Communication Holding Zerde" has developed a Concept of Creation and Functioning of a Network of Specialized Colleges on Information Technology (IT Colleges).

In 2011, the experimental launch of e-Learning will begin at 13 TVET institutions in 3 regions of the republic.

Kyrgyzstan

State initiatives and documents regulating ICT use in TVET in KR:

1. Order No. 778/1 of the Ministry of Education and Culture of KR "On General Education at Vocational Lyceums" dated August 13, 2003. According to this order, teaching programmes should include 68 hours of teaching of the foundations of information science and computer technology (FISCT).

2. Action Plan for the Reform of the System of Initial Vocational Education in KR till 2010 approved by Resolution No. 700 of the Government of KR, dated September 20, 2004. This document gives the order to "create conditions to supply the learning process with modern computer technologies". Because of budget constraints, the points of the Plan were not executed in full.

"A clear vision for the development of TVET as a whole is required today, as never before."

Address of the President of KR to the Supreme Council of Kyrgyzstan, January 2008

3. List of IVET Professions in KR was approved by Resolution No. 473 of the Government of KR, dated July 28, 2003. Included in the List, among other things, are professions related to the use of ICTs: electronic computer operator, specialist in automation and computerization of applied processes, local network administrator.

4. Resolution of the Government of KR "On Vocational Lyceums No. 16 (Osh) and No. 99 (Bishkek) of the IVET System of the Ministry of Labour and Social Protection of KR". This resolution gave vocational lyceums the right to provide specialists with SVET in ICT-based professions: "junior bank manager" and "specialist in automation and computerization of applied processes". (This work was organized within the framework of a project of the German Society for Technical Cooperation (GTZ)).

5. Grant agreement (project for vocational education and skills development) between KR and the Asian Development Bank dated September 21, 2007, GAS: KGZ 38298, grant No. 0074-KGZ (SF).

6. Consolidation and Modernization Strategy of Vocational Education System of KR for the period of 2009-2011 (within the framework of the ADB project). This Strategy and the Action Plan on its implementation are based on the priorities determined in the Country Development Strategy for 2008-2011 and the addresses of the President of KR to the Supreme Council of Kyrgyzstan and the Government in January and October 2008.

One of the points of the Strategy envisages the modernization of the organizational-and-managerial structure of TVET and the installation of an intra-departmental computerized system of information management and property accounting.

7. Order No. 1/238 of the State Agency for Technical and Vocational Education under the Government of KR on the implementation of activities for the introduction of information management systems within the framework of the ADB project, dated June 4, 2008 (the implementation of the plan was postponed due to a delay in project financing).

Moldova

1. State policy regarding ICT use in the vocational education system was established by Resolution No. 632 of the Government "On Policies for Building an Information Society in RM" dated June 8, 2004. This document aims to:

- Support the computerization of educational institutions and provide them with access to the Internet;
- Introduce ICTs in the educational process, provide for a constant exchange of information on innovations in the field of education with the aim of developing and spreading modern technologies;
- Develop distance education as a new way for specialists to develop professionally;
- Develop scientific research in the field of distance education and ICT application in the education system.

2. With the aim of implementing Presidential Decree No. 1743-III "On Building an Information Society in RM" dated March 19, 2004 and Government Resolution No. 632 dated June 8, 2004 "On Approving the Policy on Building an Information Society in RM", the Government approved the National Strategy for Building an Information Society "Electronic Moldova".

The main aim of the Strategy is the setting up of e-Learning (*e-educatie*) in the general education system and TVET, i.e. the use of ICTs with the aim of enhancing the effectiveness of the teaching/learning process as well as the promotion of self-development skills. The action plan for the implementation of the National Strategy stipulates that by 2015 50% and 40% of teaching staff will use computers and the Internet respectively in their teaching. 85% of EI are supposed to have websites by the same year.

3. The Education Information System Concept was approved by Resolution No. 270, dated March 13, 2007. The EIS is a set of software and hardware, information and organizational resources (including infrastructure and personnel), data transmission systems and data processing technologies as well as methods and legislative norms designed to create an information base for the country's education system. In order to implement the Concept, technical documentation was developed for two subsystems of the EIS: 1) integration of ICTs in education; 2) training of pedagogical and managerial staff.

Russia

The prerequisites for determining the main areas for the development and introduction of ICTs in TVET in Russia were:

1. Federal Target Programme (FTP) "Development of the Unified Educational Information Environment (DUEIE)". Within the framework of DUEIE, e-Learning resources were developed for the use in general education, as well as in initial and higher vocational education. Computer tools were designed for the independent installation of e-Learning resources by teachers and students at teacher training institutions. A system of federal educational Internet portals was created. Among the important results of the programme, special note should be made of the professional development of teachers at all education levels in the field of ICT use in the educational process, as well as a breakthrough in the equipping of EI with computer hardware.

2. "Informatization of Education" project. Its main aim was to create conditions to support the systemic introduction and active use of ICTs at general education institutions, general and initial vocational institutions by way of changing the education system in a non-revolutionary but a wholly evolutionary way. Informatization within the context of the project is understood as changing the content, method and organization of teaching/learning with the aim of preparing graduates of EI for life in an information society.

3. Priority National Project "Education" (PNPE), which was aimed at providing access and creating equal conditions for receiving an education, including by way of providing access to all schools to global information resources available on the Internet. From 2008 to 2010, within the framework of the PNPE, all schools were provided with licensed software for 36 popular and widely used programmes. At the same time as measures to legalize software, a large-scale project is being implemented within the framework of the PNPE to develop free software and use it at EI.

"It is necessary to create such a system of professional training which would meet the needs of today's labour market. We need to organize work at enterprises, while the latter need to contribute to professional training of those who are required by industry today and in the long run."

From the report of Vladimir Putin on the Government activities in 2010

4. In 2006, based on priority areas for the development of the education system in RF, the implementation began of the Federal Target Programme for the Development of Education (FTPDE) in 2006–2010, representing a range of events that were interlinked in terms of their resources and schedules, encompassing changes in the content, structure and technology of education, including the wide-scale use of ICTs at all levels of education. Within the framework of the programme, new e-Learning content was developed, and the specialized Federal Centre for Information Educational Resources started to operate. The main tasks of the centre are the formation of a unified educational environment across the entire country; improving the quality of education in all regions of the country through online access for teachers and students to modern learning technologies, scientific-methodical teaching materials and sources of knowledge, as well as the organization of effective feedback between participants in the learning process and representatives of educational science; the provision of opportunities for the acquisition of knowledge from both national and world education. Within the framework of the programme, hardware/software kits were supplied, including kits for children with special needs.

5. FTP "Research and Development in Priority Areas for the Development of the Scientific and Technological Complex of Russia in 2007-2012". Implementation of this programme (as a continuation of a similar programme implemented in 2002-2006) began in 2007. The main aim of this new programme is the strengthening of the scientific and technological potential of RF to achieve priority goals in the development of science and technology: the development of critical technologies; the implementation of major projects for the commercialization of technologies; the use of public-private partnership mechanisms for scientific R&D; ensuring an influx of young specialists into R&D; the development of leading scientific schools; the development of research activity in higher education; the promotion of small-scale enterprises in scientific and technical sphere; the development of an instrumental base at competitive scientific organizations involved in fundamental and applied research as well as institutions of higher education; and the development of effective elements of infrastructure for an innovative system.

6. FTP "Development of Nano-Industry Infrastructure in RF for 2008-2010". The main result of this programme may be considered to be the preparation of a regulatory base for the National Nanotechnology Network (NNN), the creation of its operating procedural rules, the development of a NNN thesaurus as well as various specific forms of data input/output for the development of nanotechnology industry infrastructure, enabling the use of current and constantly updated subject-specific databases in online mode with remote access.

7. The list of main regulatory and legal documents regarding the use of ICTs in TVET also includes: FTP "Electronic Russia", FTP "Informatization of Education", the UNESCO Medium-Term Strategy for 2008-2013, Education Informatization Development Strategy FTPDE for 2008-2010 (approved by the Scientific Coordination Council of the Ministry of Education and Science (Minutes No. 7 dated July 30, 2007)); decisions of the Board of the Federal Agency for Education "On Education Informatization Development Within the Framework of the PNPE" and federal target programmes dated May 29, 2008; the State Programme "Education and Development of Innovative Economy: Introduction of Modern Model of Education in 2009-2012"; the Strategy of Development of the Information Society in RF by 2011 (approved by the Presidential Council for the Development of an Information Society in RF), and the State Programme "Information Society (2011-2020)".

Currently, the infrastructure created within the framework of the aforementioned programmes represents an aggregation of information resources, global data transmission networks and computer and telecommunication hardware resources enabling teachers and students, researchers and scientists to gain access to practically any information sources, widely use new electronic information resources (including learning resources) in the teaching/learning process, including various methods of distance education.

Tajikistan

In 2000–2010, the Government took effective steps to improve the regulatory legal framework and reform the TVET system.

1. Law "On IVET" adopted on April 22, 2003. The law regulates the legal, organizational and economic foundations of IVET, as well as the activities of those involved in educational-industrial structures in RT with the aim of protecting citizens' rights in the course of acquiring a profession, training, retraining and professional development at IVET institutions.

The law stipulates the provision of IVET at different types of EI, the study of integrated IVET and SVET programmes based on the requirements of the labour market, retraining of unemployed and non-employed citizens, and provision of additional paid educational services to the public, etc.

2. State Concept for Reform of the IVET System in RT dated October 1, 2004;
3. National Action Plan for Reform of the IVET System in RT for 2006-2015 dated June 3, 2006.

It should be noted that, since 2000, the implementation of set tasks has been carried out based on extremely limited sources of financing. The essential changes stipulated by the National Strategy for Education Development (NSED) in 2010-2020 will form a basis for a review of financing priorities with regard to the switchover to a new (12 year) system of general secondary education.

Ukraine

During the recent decade over 300 regulatory documents were adopted at the highest level to regulate the activities of the TVET system in Ukraine including:

Notably, hardly any of these documents deal directly with the development of the TVET system based on the introduction and use of ICTs; however, this does not mean that there have not been any such documents.

The following were the main documents regulating the development process of the information society in Ukraine:

1. Law No. 537-V of Ukraine "On the Main Provisions for the Development of an Information Society in Ukraine in 2007–2015" dated January 9, 2007;
2. Decree No. 1102/2004 of the President of Ukraine "On Additional Measures to Improve TVET in Ukraine" dated September 18, 2004;
3. Decree No. 926/2010 of the President of Ukraine "On Measures to Ensure Priority Development of Education in Ukraine" dated September 29, 2010;
4. Order No. 10 of the Ministry of Education and Science of Ukraine "On Introduction of the Educational Programme 'Intel® Teach to the Future' with regard to teacher training at TVET institutions" dated January 13, 2006.

The introduction of computer hardware and ICTs in the teaching/learning process at TVET institutions took place within the framework of:

1. State Programme for Informatization and Computerization of Vocational Schools for 2004-2007;
2. Programme of Distance Education System Development for 2004-2006;
3. Programme "ICTs in Education and Science for 2006-2010".

Notably, none of these programmes received its full financing as outlined in the budget; as a result, their provisions were only partially implemented.

At a regional level work to introduce ICTs in the teaching/learning process of the secondary education system proceeded by way of the implementation of regional projects such as:

- "Formation and Development of ICT Competence of Teachers and Students";
- "Creation of an Electronic Database of Regional General Education Institutions";
- "Equal Access to Quality Education";
- "Information Society School";
- "Creation of a Uniform Regional Information and Education Environment".

At the moment, an independent area in the TVET system is a network of state specialized industrial training centres for professional development and retraining of staff, being developed by the Ukrainian State Employment Service. As of January1, 2011, eight such centres had been set up. Three of them have independent educational websites, and the other have information pages on the sites of the regional state employment services.

The independent purchase of computer hardware and development of software and pedagogical tools for general and specialized disciplines is a feature of state TVET institutions.
Non-state TVET institutions use another model of ICT integration into the educational process. As a rule, financial and regulatory support for computerization and informatization of their educational process is provided by the companies and corporations that created them.

Uzbekistan

1. With the aim of forming a national informatization system, the widespread introduction and use of modern information technologies, computer hardware and telecommunications in all the spheres of the society, satisfying the growing information needs of the public and creating favourable conditions for joining the world information community, Decree No. UP-3080 of the President of RU "On Further Development of Computerization and Introduction of ICTs" was issued on May 30, 2002.

The decree takes into account the priority tasks of developing and introducing modern systems of computerization and ICTs:

- Creation of modern reliable and secure national information databases, the development of the market for information resources and services, a consistent gradual transition to electronic forms of information exchange;
- Widespread use of computer and information technologies in sectors of the real economy, management, business, science and education, the creation of conditions for widespread access for different sections of the population to modern computer and information systems;
- Introduction of progressive teaching systems based on mastering using modern computer and information technologies during the teaching/learning process at schools, vocational colleges, high schools and institutions of higher education;
- Organizing the training of highly qualified staff to work with ICTs, in the first place – in the development of software, information databases, the formation of republican, regional and local information communication networks, the development of computer and telecommunications hardware;
- Accelerated development (across the entire country) of information and communications infrastructure, including mobile communications, IP-technologies, and other modern telecommunications and data transmission resources, taking into account the convergence of information and communications networks and services;
- Introduction of high-speed access to national and international information networks, the provision of access to these for populated areas (including rural);
- Creation of an effective mechanism to stimulate the development of domestic production of quality software products and their export;
- Assistance in organizing the development and production of domestic computer hardware and accessories.

2. The Coordination Council for the Development of Computerization and ICTs was founded and charged with elaboration of the following programmes:

- Programme for Development of the National Telecommunication and Data Transmission Network for the Period 2003-2010;
- Programme for Introduction of Electronic Technologies into State Government in 2003-2010;
- Programme for Introduction of Electronic Commerce up to 2010.

3. Pursuant to Decree No. UP-3080 of the President of RU "On Further Development of Computerization and Introduction of ICTs" dated May 30, 2002, and with the aim of providing practical measures for the implementation of strategic priorities in ICTs, Resolution No. 200 of the Cabinet of Ministers of RU "On Further Development of Computerization and Introduction of ICTs" was adopted on June 6, 2002. This Resolution approved:

- Programme for the Development of Computerization and ICTs in 2002-2010;
- Regulations on the Coordination Council for the Development of Computerization and ICTs.

The Ministry of Higher and Secondary Specialized Education of RU was instructed to:

- Extend the training of highly qualified specialists and technical personnel for the development and upkeep of software, information databases, multimedia, and computer hardware as well as users of computer and IT, at specialized higher EI, vocational colleges and academic lyceums;
- Ensure the widespread training of all students at general education schools in work with computer and IT, jointly with the Ministry of Public Education of RU.

4. On December 11, 2003, with the aim of regulating relations in the field of informatization, use of information resources and information systems, the law "On Informatization" (No. 560-II) was adopted. In accordance with this law, the main areas of state policy regarding informatization are:

- Guaranteeing the constitutional right of everyone to free acquisition and dissemination of information, ensuring access to information resources;
- Creating a unified information environment in RU based on the state, sectorial and territorial information systems as well as on the information systems of individuals and companies;
- Creating conditions for access to international information networks and the Internet;
- Forming state information resources, creating and developing information systems, and ensuring their compatibility;
- Organizing the production of modern IT tools;
- Assisting in the formation of a market for information resources, services and IT;
- Stimulating the development and production of software products;
- Supporting and stimulating entrepreneurship, creating favourable investment conditions;
- Training and retraining of staff, stimulating scientific research.

5. To equip vocational colleges operating in the sphere of ICTs with modern teaching and laboratory equipment, the Cabinet of Ministers of RU on December 1, 2004 adopted Resolution No. 563 "On Measures for the Implementation of the Project 'Assistance in the Development of Vocational Education in the Sphere of ICTs' using a preferential credit provided by the Government of Germany".

To implement this project, the German Development Bank (KfW) provided RU with a preferential credit amounting to 7,669,000 euro for 40 years, including a ten-year grace period at 0.75 per cent annually as well as a grant amounting to 1,023,000 euro.

Chapter 3
Development of Modern Educational Technologies in the TVET System with the Use of e-Learning Resources and ICTs and Provision of Access to Them for TVET Institutions

E-Learning materials (eLMs) or e-Learning resources are a basic component of the informatization process; so it is important to consider the stages of their development in each country as well as the specificity of their use. From the data provided by national experts it becomes clear that e-Learning resources, as multimedia interactive materials affecting all the main stages of the educational process (acquisition of information, practical classes and certification of knowledge and skills), exist only in Belarus and Russia. Even in these countries, however, application of e-Learning resources is not widespread, but patchy in nature. The reason for this is the fact that educational resources are frequently created for specific projects and there is almost no demand for them after their completion. So, work is required not only to create e-Learning resources but also to ensure the maximum compatibility of modular resources that have already been created.

TVET institutions in the countries studied mainly use electronic materials on CD that are handed out or resources disseminated via the Internet, but these are mainly texts and audiovisual files that are demonstrative in nature and do not give students an opportunity to practice the knowledge acquired or to be certified. A serious factor impeding the development of the use of e-Learning resources in the teaching/learning process is the low computer literacy of teaching staff. Most teachers are not only unable to participate in the development of new e-Learning resources but are even unable to use the existing ones.

Armenia

At the moment, there is no centralized organization of work to create eLMs for TVET, develop software and methodological complexes and technical training resources, and test e-Learning methodological materials and laboratory equipment. The reason for the poor development of eLMs is also the lack of a centralized server, which could contain all of the TVET informational and educational resources (with an open access provided for all EI). Gathering of information in this case should be carried out by the Centre for TVET Development and the Institute of Education of RA, based on their strategies and functions.

Azerbaijan

At the moment, 42% of the total number of TVET institutions in the country are connected to the Azerbaijan Educational Network (AzEduNet). AzEduNet creates a platform for the development of national educational resources and provides for access to knowledge and modern IT-instruments and services which meet the goals, tasks and concepts of building an "electronic state". One of the most important technological areas is the creation of a corporate network that will unite all the EI in the country and provide them with high-speed access to the e-Learning resources in the Data-centre of the Ministry of Education.

The Data-centre is the main resource base of electronic aids and systems that should be used in the education system. The resource base includes e-Learning materials, an EI management system, a centralized database on pupils' academic performance, an interactive map, etc.

Belarus

TVET institutions in RB mainly use digital materials on compact discs. The products are characterized by their lack of standardization and cross-platform solutions. It is difficult to calculate the total number of programmes used since TVET institutions purchase them independently, and as yet there is no practice of registering discs with e-Learning tools. It should be acknowledged that multimedia libraries have been created at more than a half of TVET institutions where discs and video cassettes with training materials are collected. In their work, teachers use separate elements of various forms of multimedia materials - graphics, photos, and video. During recent years TVET EI have started using complex solutions represented by virtual vocational training simulators to develop primary skills.

Before 2007 the republic mainly used e-Learning tools purchased from various sources. Currently, it is possible to identify three sources of e-Learning tools at EI. The first is orders from the Ministry of Education within the framework of a state programme; the second – developments made as part of scientific and innovative activity; the third – e-Learning tools created by teachers and students of TVET institutions.

Among TVET institutions a network of leading EI in methodical work in terms of the development and use of e-Learning tools in the educational process has been identified. During the last five years, as part of the experimental project "Development and Testing of e-Learning Tools in Subjects of General Vocational and Specialized Cycles" 17 e-Learning tools have been developed. These tools are available for free dissemination at TVET institutions.

Information on all e-Learning tools that have passed state testing can be found in special sections on the websites of the Chief Information and Analytical Centre of the Ministry of Education of RB (http://www.giac.unibel.by/) and the National portal "Vocational Education" (http://www.ripo.unibel.by/). The best training material in electronic form, classified by specialities and subjects, are published on the website of Methodological Support for Vocational Education (http://www.profedu.unibel.by/).

The Centre for Information Technologies at the Republican Institute for Vocational Education (or RIPO) has set itself the task of accumulating e-Learning tools created for use at TVET institutions. The tools collected (irrespective of whether they have passed testing) are entered in a data bank of e-Learning tools on the "Vocational Education" portal. Currently, there are over 3,000 of these resources registered.

Currently, all TVET EI and SVET EI have access to the Internet. An overwhelming majority of the republic's vocational EI have their own sites. According to a survey (2009) 70% of vo-

In 2007-2010, the development of 51 e-Learning tools was financed from budget funds (state programmes) (45 – for general education subjects, 6 – for vocational subjects) as well as 2 national Internet resources, 7 Internet sites on methodological issues. Electronic teaching aids developed using budget funds are supplied to all EI free of charge.

The following are the obstacles to the larger-scale use of eLMs at TVET institutions as viewed by a national expert: lack of high-quality e-Learning tools, insufficient training of teachers, organizational points such as insufficient number of personal computers required for a whole group (a computer class consists of 12 personal computers + a teacher's computer), and limited access to computer classes.

cational EI have e-Learning resourses on their sites to a certain extent. These are mainly curricula, programmes, and text materials. Not more than 10% of vocational EI publish e-Learning resources on the Internet. These materials are mostly placed on the internal networks (intranet) of the institutions in question and are used both for full-time and additional education.

Currently, not more than 40% of TVET teachers use e-Learning tools during their lessons. It may be concluded that, although workers at the republic's TVET institutions are creative and enthusiastic about the development of e-Learning tools, to create quality resources that meet modern requirements, it is necessary to have permanent and targeted work by all the structures in the education system of RB and to have sufficient financing for this. In its turn, RIPO coordinates the work of resource centres in the development and use of e-Learning tools at EI, and provides scientific and methodological support for this work.

Gas Welding Training on Computer Simulator.
RIPO Branch "Industrial Pedagogical College". © RIPO

Kazakhstan

In the field of e-Learning, RK has adopted the standards ST RK 34.016-2004 "Technical and Software Tools of Distance Learning. General Technical Requirements" and ST RK 34.017-2005 "Information technologies. Electronic Edition".

Within the framework of the Programme for the Preparation and Issue of Manuals and Teaching Aids in Special Disciplines for Initial and Secondary Vocational Education of RK in 2002-2005, 311 electronic manuals were published.

EI are taking measures to create educational resources in the form of electronic manuals, and multimedia educational programmes.

TVET institutions (mainly colleges) use electronic training materials that are characteristic for all stages of ICT introduction: digital materials on compact disks, digital (non-interactive) audio-visual materials as individual elements – graphics, photos, video on the Internet, multimedia interactive e-Learning resources dealing with all stages of the educational process: acquisition of information, practical classes, certification (virtual laboratories, vocational training simulators, systems for adequate assessment of knowledge, skills and competences on the subject and in simulated professional situations).

However, the electronic manuals, aids and programmes are distributed mainly on CD and DVD at the level of the EI; they are not web-oriented and are not intended for sharing and reuse via the Internet.

At some TVET institutions the e-Learning resources are differentiated by the degree of their application, and their use at advanced levels is envisaged: for students with medium or low abilities, or those with special needs. All e-Learning tools are placed on a special portal of the TVET EI and are available for use by teachers and students taking full-time and distance courses.

Within the framework of the State Programme of Education Development in RK for 2011-2020, it is planned to complete the provision of open access to digital learning content for TVET institutions. In addition, within the framework of the State Programme, e-Learning resources created by teachers will be developed (centralized creation and supply of libraries).

According to regional educational authorities, in general in the TVET system there are 48,000 e-Learning resources with 13,400 of them developed by teachers themselves (including 4,300 in special disciplines). When creating electronic training courses the developers have taken into account requirements concerning compliance with international standards to ensure their compatibility based on SCORM. E-Learning resources include lecture materials, questions for revision and self-check, practical assignments, tests, glossaries, graphs and tables. Used in the course of their development are hyperlinks, video, audio-video inserts, animated text, keyword search, use of filters in cascading style sheets (CSS), etc.

Kyrgyzstan

Use of electronic materials at TVET institutions in Kyrgyzstan is at a very low level. Taking into account the fact that most EI are not even connected to the Internet, there is no opportunity to use any digital materials.

The main software is confined to standard programmes: PHP, Turbo Pascal, Joomla, CorelDraw, Photoshop, Adobe, Linux, SP1, Pagemaker, MS Office 97-2003, 2007.

Separate note may be made of specialized EI that have training laboratories fitted out with modern computer equipment. This is connected with the profile of the professions for which training is being provided. So, for example, at Professional Lyceum No. 98 (Bishkek) students studying to become computer graphics designers have the opportunity to create advertisement booklets, edit videos, and model 3D images.

Moldova

In 2006, the Centre of Information and Communication Technologies in Education began operating. It provides continuous education of all information science teachers, including those in TVET. Additionally, the Centre carries out scientific research in this area. Annually, the Centre trains approximately 465 local trainers for the republic's regions, over 200 teachers (with the aim of using educational software) and approximately 200 managers and information science teachers. In addition, in 2010 35 teachers in general education, TVET and higher learning institutions in the country took training and passed certification as instructors in integration of e-Learning platforms.

By order of the Minister of Education requirements for the pilot introduction of ICTs in the education system were developed and approved, and this was begun at four theoretical lyceums and one TVET school. Educational software in four subjects was used at these establishments: mathematics, physics, chemistry and biology. Besides, additional educational software for these subjects was purchased to be provided to over 200 EI (including five vocational technical schools). In the 2011-2012 academic year it is planned to extend the experimental development and use of software programmes in training disciplines for specialities in construction and agriculture.

Russia

An important area of education informatization is the creation and development of an "educational content industry". Within the framework of FTPDE, a new generation of e-Learning resources is being developed – interactive modular multimedia training products covering all the main components of the educational process: information acquisition, practical classes and certification (control of academic achievements).

Further development of e-Learning resources is being carried out within the framework of the project "Development of New Generation Electronic Educational Internet-Resources (Including Cultural and Informative Services), General and Professional Distance Learning Systems (e-Learning), Including those for Use by Special Needs Students" of the Presidential Commission for Modernization and Technological Development of Russia's Economy. This is a comprehensive project that includes the creation of e-Learning resources for all levels of education, software tools and services for distance learning organizations as well as the development of a new generation of socio-cultural resources aimed at meeting the educational, cultural, informational and social needs of citizens, including those with special needs, compatriots abroad and Russians in remote regions.

However, it should be noted that a great number of electronic resources, created outside centralized projects, based on one's own ideas and software of distance learning, remain in poor demand after the completion of these projects. For this reason, the Ministry is busy developing solutions to ensure the maximum compatibility of all modular electronic resources being created.

Example of eLMs. Federal Centre for Information Educational Resources. ©2012 Informika

The Unified Collection of Digital Educational Resources (http://www.school-collection.edu.ru/) has been created and is currently operational. The Collection contains over 110,000 digital learning resources in practically all the subjects of the basic curriculum; it includes sets of digital resources for a great number of textbooks recommended by the Ministry of Education for use at EI.
Federal Centre for Information Educational Resources (http://www.fcior.edu.ru/) provides over 17,000 interactive multimedia e-Learning resources in the main subjects of the general curriculum (including those for students with special needs). Projects are also being implemented to create e-Learning resources for the most popular professions in IVET and SVET.

Tajikistan

There is currently no centralized organization of work to create eLMs in TVET in Tajikistan, develop curriculum kits and technical training complexes, and test electronic educational and methodic materials and training laboratory equipment. The reason for the poor development of electronic educational and methodical materials is the lack of a centralized server on which TVET informational and educational resources could be stored, with free access to this server for all EI. In this case, gathering of information must be carried out by the Republican Centre for ICTs, the Tajikistan Academy of Education and the Institute of Pedagogical Sciences, based on their strategies and functions.

Ukraine

From 2007 to present day 11 e-textbooks for specialized TVET institutions have been developed, tested and introduced in teaching practice, financed by the budget funds allocated within the framework of state programmes, and ultimately approved by the Ministry of Education and Science of Ukraine (present day Ministry of Education, Science, Youth and Sports of Ukraine). The development and introduction of these textbooks was carried out within the context of the practice established in the TVET system of using software and pedagogical tools on CD. At the same time, an analysis of the informational and educational sites of TVET institutions in Ukraine reveals that when developing educational resources (financed out of their own pockets), TVET EI tend to use web design technologies that make it possible to create so-called e-textbooks and complexes, which are placed on local networks.

Problems identified by a national expert in the use of eLMs in the TVET system are as follows:

- Regulatory legal base governing the introduction of ICTs in the teaching/learning process at TVET institutions that is not fully appropriate;
- Weak regulation of the introduction of ICTs in the teaching/learning at TVET institutions on the part of regional and local educational authorities;

An analysis of electronic software and pedagogical tools used in the teaching/learning process at general and higher EI, and TVET schools reveals that an information and education environment created and supported with the help of freely available Moodle software (the didactic basis of which is content focused on independent assimilation by students) is most typical for the education system in Ukraine. The use of this information teaching system fully complies with the main paradigm of training in modern conditions – the formation among students of independence and creative approach to the learning process during the course of study and practical application of the knowledge acquired.

- Lack of understanding on the part of TVET EI directors regarding the peculiarities of administrative functions when constructing organizational-pedagogical and didactic-psychological processes with the use of ICTs;
- Ill-founded copying and transfer of educational ICTs of higher EI into the TVET teaching/learning process;
- Insufficient depth of applied research within the context of problems in organizational-pedagogical and didactic-psychological processes with the use of vocationally-orientated educational ICTs;
- Low level of training of staff at TVET institutions for the creation and use of electronic software and pedagogical tools in the teaching process;
- Focus of the main content of programmes for training and retraining of TVET teachers on the use of commercial software in the teaching process to the extent of using office packages.

Uzbekistan

As part of foreign investment projects and grants it is planned to carry out a range of work to develop and publish new generation textbooks and teaching aids that comply with world standards.

With the aim of modernizing the teaching process, and introduction of new pedagogical and information technologies, EI are actively being fitted out with multimedia computer systems and language laboratories; didactic materials are being created: training videos, multimedia programmes, electronic mini-posters and many others.

In addition, seminars and teacher professional development courses are being arranged. Over 1,100 teachers took internships and upgraded their qualifications abroad, financed by foreign investments. Within the framework of investment projects by ADB, JBIC, KfW, and GTZ, courses were organized for 3,708 SVET teachers (to study and master new educational standards, and state-of-the-art pedagogical and information technologies).

In 2008, over 3,500 graduates of project groups at 24 pilot colleges received diplomas in newly introduced professions and certificates from the German Society for Technical Cooperation (GTZ) within the framework of the joint project "Assistance in the Development of Vocational Education in the sphere of ICTs". Within the framework of this project, 32 ICT vocational colleges were fitted out with four laboratories (electrical engineering and electronics lab, IT lab, computer lab, and labs for programming and computer network maintenance), one training workshop for repair and maintenance of computer hardware, and one server room.

Pursuant to Resolution No. 341 of the Cabinet of Ministers of RU "On the Creation of a New Generation of Textbooks and Training Literature for SVET" dated August 16, 2001, in 2001 - 2010 1,357 new generation textbooks and training aids were issued, their total circulation amounting to 7.17 mln copies, with 131 electronic textbooks developed.

Chapter 4
Provision of Equal Access to Socially Important Educational Services for Different Groups of TVET Users

Provision of equal access to socially important educational services for different groups of users is one of the necessary conditions for the informatization of education; which is why an analysis of this parameter is very important. Within this section it was necessary not only to determine the rate of reduction in the digital divide in the countries studied, but also the current level of provision of secure and productive training with the use of ICTs at TVET institutions. The analysis revealed that, on average, these figures are quite low. Today, in all the countries being considered, the availability of electronic libraries is more the exception than the rule. Traffic filtration systems are used only in Azerbaijan and Russia. The question of developing a "Student Profile" to record all individual educational and extra-curricular achievements has been raised only in Russia.

Armenia

In Armenia there are no principles in place for the organization of electronic libraries that provide the opportunity to accumulate, store and present various resources, from texts to multimedia. The instrumental software and hardware kit is not accompanied by software and methodological support, which is especially important for the development of ICT use in TVET in regions remote from the cultural and information environment of the capital.

The lack of scientific methodological and training literature in the Armenian language is very acutely felt, especially as work on electronic materials is very labour-intensive, particularly the digital conversion of books in the Armenian language.

Most TVET institutions do not have websites; the TVET sites that have been developed frequently fail to have a convenient navigation system with unified design principle in place.

Azerbaijan

Within the framework of the State Programme for the Informatization of the Education System in Azerbaijan in 2008-2012, with the support of the Heydar Aliyev Foundation and the Ministry of Education of Azerbaijan and the Baku Main Department of Education, a project has been prepared with the name "Electronic Education System". Within the framework of this programme, distance home learning of schoolchildren is being used for the first time in the country. In connection with this, the Ministry of Education of Azerbaijan and the Heydar Aliyev Foundation have provided laptop computers for distance learning to 30 pupils requiring special state care.

Also noteworthy is the project "Strategy for the Development of Specialized Technical Schools in the Republic of Azerbaijan". Since 2009, the Ministry of Education of Azerbaijan and "Azersun Holding" have been implementing a project for the training of technical personnel in the framework of cooperation between the "Natural Green Land" factory, which operates in Bilәsuvar, and the Bilәsuvar Technical Lyceum. This involves the creation of a vocational training school in the field of agriculture at a settlement for displaced migrants. Similar project, launched in cooperation with the Hilfsverk Company in the Djebrail district, has contributed to the creation of favourable conditions for TVET development in the field of agriculture.

To ensure secure Internet access at EI, a centralized system of web-traffic filtration has been installed based on the data-centre, blocking access to malicious web-resources at educational establishments. The Web-Filtration Council was created under the Ministry of Education, based on a ruling from which, access to 30 out of more than 100 categories of web-resources is blocked at EI. These include pornography, racism, fascism, promotion of war, promotion of drugs, etc. Apart from web-filtration, the Cisco IronPorta system has also been installed on the network, filtering e-mail for spam and viruses to detect potential threats. On the whole, the network has a multi-level and multi-phase system of protection against unauthorized access, malicious software and viruses both within the network proper and from the outside.

AzEduNet is the only Azerbaijani registered member of the European society CERT (Computer Emergency Response Team).

Belarus

As of March 2011, all the TVET institutions in the republic were connected to the Internet. Approximately 40% of TVET EI use broadband connection, with the rest using dial-up connections. 89% of TVET EI have official sites.

Most TVET EI have only a few points of access to the Internet within the institution proper, and these are available, as a rule, only to the administration and teachers. Currently, no more than 15% of TVET EI have computer classes or several computers with access to the Internet in their libraries.

Access to scientific materials is provided via the Internet portal of the National Library of Belarus (http://www.nlb.by/). Over 1 mln bibliographic records for books, dissertations and theses are presented in the consolidated catalogue of the three largest libraries (National Library of Belarus, Yakub Kolas Central Scientific Library of the National Academy of Sciences of RB and the Republican Scientific and Technical Library).

Training materials are published on TVET EI sites and on the site for methodological support of professional education. The republic has introduced distance TVET (Education Code, Article 17, Article 130 Clause 2). In connection with this, various learning and methodical materials are published on TVET EI websites to help distance learning students.

The information network PROFNET was created, uniting all the TVET institutions of the republic in a unified information environment. This is still a cluster network but individual segments are constructed based on a hierarchical principle, enabling adequate virtual display of the organization with a strict chain of command.

The experience of the republic's regions (Minsk, Minsk Region, Mogilev Region) that use a standard platform for the publication of EI sites, a standard education management portal, a file server, statistical data collection and processing systems: electronic passports, databases, is indicative.

The corporate information environment ensures a standardized information milieu in the region, standard services, vertical and horizontal structures of regional educational management. All the participants in the educational process (specialists in the education system, students and parents) have the opportunity to access not only national and world educational resources but also the databases and information systems of their educational establishment, district, and region. In most cases ADSL technology is used for connecting to the corporate educational network, which enables simultaneous use of one and the same telephone line for telephone conversations and access to the corporate network's resources.

Ensuring the information security of personal data is regulated by Law No. 455-z of RB "On Information, Informatization and Information Protection" dated November 10, 2008.

Kyrgyzstan

Access to computers and information resources is available to all students at EI that have the required equipment. Recently TVET institutions have extended work for the vocational training of the adult population: the unemployed registered with employment services, migrants, persons willing to acquire a profession on a short-term basis (within six months). Annually, 10,000 – 14,000 adults undertake training at TVET institutions, 40% of them – in ICT-related professions.

Since 2002, training of hearing-impaired children has been carried out at the Professional Lyceum No. 27 (Bishkek). Primarily, only boys were involved; however, since the 2008-2009 academic year training of girls as "PC operators" has begun. For this a class was fitted out with 12 computers. Use of ICTs in the training process involving hearing-impaired children helps make it more efficient and effective.

Moldova

Priorities for equal access of various user groups to relevant social services are determined in the Action Programme of the Government of RM "European Integration: Freedom, Democracy, Welfare. 2011-2014". So, in accordance with European principles, the main conditions for the provision of equal access to the relevant social services of an educational nature for various user groups are:

- Development of an information culture, training the entire population that needs information society services for their work and everyday life;
- Democratization and use of information to ensure citizens' rights to free access to information, and information and communications resources;
- Introduction and development of information and communication infrastructure in public administration to improve services provided at affordable prices;
- Growth in public confidence in information systems by ensuring security, protection of personal data and privacy;
- Providing citizens with equal access to information, services and knowledge based on the needs of each.

In connection with this, in recent years the provision of equal access to the relevant services of an educational nature for various user groups in Moldova has consisted of growth in the density of mobile and fixed telephone communications, extended access to information resources, provision of reliable international fiber optic and satellite connections, raise in the number of Internet-providers and users of these services. Despite this, the use of information technologies by the population is still at a low level.

There are 20.5 computers per 100 residents in Moldova, and 37% of citizens use the Internet. As compared to 2008, the level of Internet use increased by 19%.
In recent years, Internet access by way of mobile broadband has gained in popularity in the country, with 80,000 subscribers to this service in 2009.
The most popular type of Internet access is broadband fixed communication, to which every tenth family in Moldova is connected. Most of the global network users are connected at home, and every fourth user surfs the Internet while visiting friends or acquaintances.

Russia

At the moment, the federal segment of the access restriction system (ARS) on average processes 250 mln requests a day with approximately 1.5 mln requests filtered out as failing to comply with the goals of education.

Implementation of projects to ensure broadband access to the Internet at EI has made it possible to create a level playing field for EI, and eliminate digital divide and social inequality. In addition, EI have received new, unique opportunities for teachers in terms of professional development, search for new techniques and teaching tools, additional teaching and visual aids and their use in the teaching process, which has led to a significant increase in the accessibility of quality education.

However, apart from useful and necessary information, students may acquire access to resources with offensive or aggressive content. Pornography, terrorism, drugs, nationalist extremism, marginal sects, and offensive advertisements are examples of the content of the websites, access to which is frequently unrestricted.

With the aim of limiting students' access to these Internet resources, in 2006-2007 a system restricting access to Internet resources that fail to comply with purposes and goals of education was developed and introduced at the EI, regional and federal levels.

The ARS is being constantly developed, which needs also to be done in the future due to the development of information technologies and the appearance of new threats on the Internet. In addition, it is planned to reconsider approaches to resolving this issue based on the need to protect students not only at EI but also at home, as well as at public Internet access points. These measures will make it possible to create a unified state policy on secure Internet access in the educational process.

As regards the development of socially important services, the Ministry of Education and Science of RF, jointly with the Russian Federal Education and Science Supervision Agency, is working on creating the unified information solution "Student Profile", the introduction of which at EI in RF will, apart from anything else, make it possible to provide the state service "Provision of Information on Current Academic Performance of the Student, Maintenance of an Electronic Diary and an Electronic Academic Performance Register". This solution will, in addition to providing information on educational and extra-curricular achievements, make it possible to improve education quality and achieve an individual approach to teaching through the teacher's access to the student's history at all levels of education.

In addition, in line with a directive from the President of RF, the Ministry of Education and Science of RF is preparing a range of measures to introduce electronic library systems in education and science aimed at providing wide access to teaching and scientific materials for students in higher education and specialists.

Tajikistan

Access to computers and information resources is available to all students at EI that have the necessary equipment. Since 2007, short courses lasting one, two or six months have been organized at IVET EI for citizens and labour migrants, basic training establishments were determined in cities and districts of the republic. Upon completion of the courses, the labour migrants receive state certificates that are recognized in CIS countries. TVET institutions have expanded their work for the vocational training of the adult population: annually, approximately 9,000 adults undergo training in the TVET system, 26% of them – in ICT-related professions.

Ukraine

Currently, almost all TVET institutions have access to the Internet using at least e-mail, and most of them have their own sites. As of January 1, 2011, the number of TVET EI with computer classes with Internet connection was 930 (91%), and 709 (69%) TVET EI had their own websites. However, the fact that the sites exist does not mean they are actively used and supported by the TVET EI.

The main instrument for the organization of educational services and communication of educational information to the end user are the sites of EI, with the help of which one can organize personalized access to educational resources and services for all user groups, including people with special needs. High-speed broadband Internet-access with the current level of technology can be provided in practically any spot in Ukraine. The only factor currently restricting use of high-speed access is the financial opportunities of the users.

The social significance of the process of transforming the traditional libraries of EI in Ukraine into electronic ones currently consists of the prompt provision of as much information as possible to participants of the educational process, by using new information and telecommunications technologies as well as the creation of a qualitatively new information culture among users (both students and teachers).

Nevertheless, practice shows that at TVET EI electronic libraries are still an unusual, rather than a regular element of the education system. There are actually very few vocational schools with a considerable quantity of digitalized or e-Learning tools involved in the teaching/learning process.

As regards the "automation" of the learning process, the development and use of electronic student diaries and electronic registers to record individual educational and extracurricular achievements, not to mention the maintenance of personal sites, blogs, electronic portfolios and other online services by students and teachers (which is a habitual teaching practice in European countries), the authors of the survey failed to find any real examples indicating the existence of this practice in the TVET system.

Uzbekistan

The Uzbek Agency for Communication and Informatization is taking measures to create a National Information Search System, and to put together information resources of a sociocultural nature.

A corporate computer network uniting all the higher educational institutions in the country in a unified information network has been created by the Ministry of Higher and Secondary Specialized Education of RU.

Based on Resolution No. PP-191 of the President of RU "On the Creation of a Public Educational Information Network in RU" dated September 28, 2005 the ZiyoNET unified information network was created. Its aim is to create the conditions required to fully meet the information needs of the country's college students. Currently, 1,536 SVET institutions are connected to the ZiyoNET educational information network.

In the SVET system an electronic passport programme has been developed for EI where information is placed on the organizational structure, subjects, teaching process, material and technical base, student contingent, teaching staff as well as other necessary information on the EI.

Chapter 5
Creation of Conditions for the Gradual Transition of TVET Institutions to a New Level of Education Based on the Wide Application of ICTs. Implementation of Distance Learning Opportunities

In connection with the development of information technologies and the appearance of new ways of transmitting information, distance learning technologies will play a greater role in the acquisition of knowledge, practical skills and new competencies. Moreover, the development of the e-Learning resource industry, the emergence of a sufficiently large number of training modules in various disciplines and areas of training lead to the need to develop complex systems for their storage and classification, the standardization of search engines for required educational resources as well as the development of educational content management systems – distance learning systems (DLS). Despite the theoretical awareness of the need to create all the necessary conditions to provide distance learning opportunities to students at TVET institutions really working DLS exist only in Russia. And even these are "patchy" in nature. To address specific tasks, specific DLS are created; and after they have achieved their intended results, their content is not in high demand. This situation suggests that countries that are just planning to develop a DLS should, at the initial stages of this development, create conditions and systems to standardize their content and ways of working with it.

Armenia

Some initiatives in the introduction of e-Learning have been noted, but the general distribution of this concept is at the early stages. These initiatives are not structured and, as practice shows, are generated quickly and disappear within a short period of time. E-Learning or elements of ICT use in TVET include the creation of electronic publications or documents, which can be stored on a computer or on the Internet.

The existing level of teachers' and students' awareness of teaching methods and the degree of online interactivity is low. Most are not familiar with the concepts of "blended learning", "e-Learning platforms", and "academic web portals". The level of awareness is especially low in the regions.

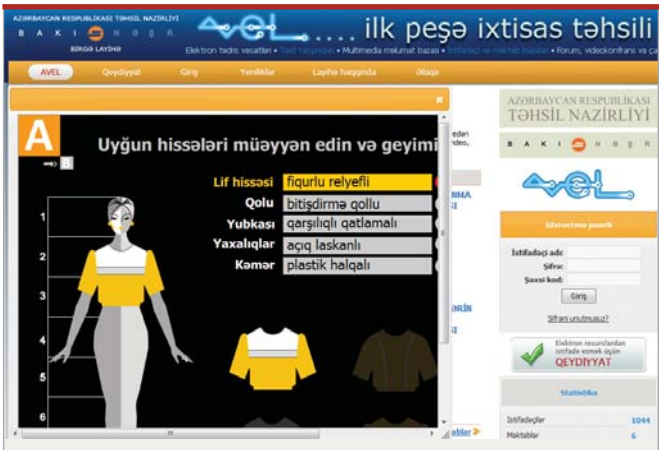
In particular cases preference is given to Moodle - software enabling the creation of Internet-based courses and websites and based on the theory of social constructivism.

Azerbaijan

In the Republic of Azerbaijan the use of distance education in different areas is only just beginning. Information resources of educational portals are currently in the process of being formed, and the EI websites have been created and are functioning. With the aim of extending access to TVET, as well as reducing gap between work and studies, the Ministry of Education and Baku Publishing House have jointly initiated the project "Electronic Vocational Education".

The State Programme for the Development of Vocational Education in the Republic of Azerbaijan (2007-2012) sets the following tasks for the provision of distance education:

- To develop a distance TVET concept;
- To develop and launch an Internet page on distance education;
- To prepare printed materials on various subjects based on multimedia technologies;
- To develop an Internet page on electronic and other resources available to Internet users;
- To ensure continuing vocational education through the use of network technologies;
- To prepare a database for students, teachers and schools in general;
- To create an electronic testing system;
- To create a distance education monitoring system.



Example of multimedia learning resources at the Vocational Education Portal of Azerbaijan.
© BakıNəşr 2010

The portal contains e-textbooks, video lessons, means of self-assessment (tests, questions, assignments). In the future it is planned to expand distance learning opportunities via the portal.

Belarus

In accordance with the Educational Code of RB, distance learning is regarded as a form of extramural education. The defining characteristic of the DL system being created in RB is the fact that it is in the development stage.

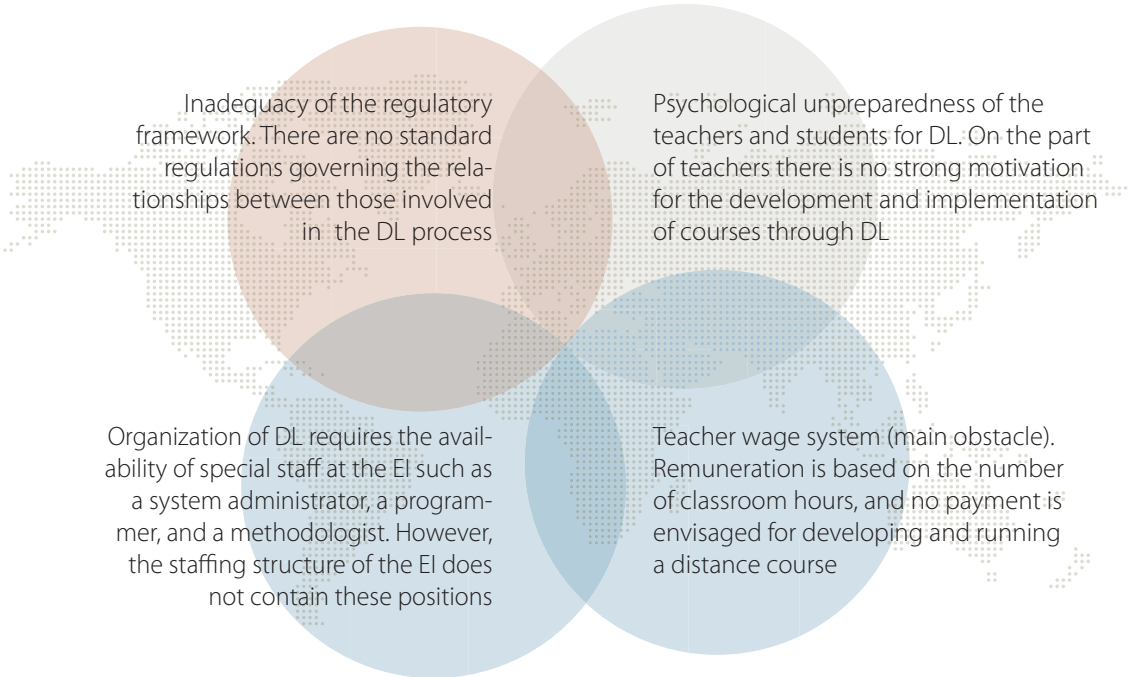
At TVET institutions of the republic elements of DL are implemented for extramural education. Most establishments, in order to teach, create packs of educational and methodical materials (cases). The case is based on publications on compact disks, on which textual teaching materials and knowledge testing systems are widely represented with the information and reference parts of courses provided.

Distance learning technologies are used during the organization of contests as well. In 2007, the Republican Institute for Vocational Education, for the first time in Belarus, held a distance competition in computer technology for students of SVET institutions. Approximately 400 students participated in the contest.

The experience of the Higher State College of Communications is of interest – where distance technologies are used to organize extramural training. Extramural students obtain all the information they require on the college site, learning materials are provided to each student on a disc. A department was created at the college that is in charge of preparing eLMs. A compact disc is able to contain materials for an entire academic year, which reduces expenditures, cuts the burden on the publishing centre, and makes it possible to provide more varied sources of knowledge.

At a number of EI in the republic modern information technologies are effectively used for the provision of educational services. At these EI teaching materials in a number of disciplines are placed on the college's intranet-network with both full-time and distance students having access to them. The experience of online consultations with specialists from sectors of industry in the course of vocational lessons is of interest. Distance testing helps students to fill in some gaps in their knowledge and adjust their educational requirements.

OBSTACLES TO THE DYNAMIC DEVELOPMENT OF THE DLS:



However, in spite of all the existing problems, the place of distance learning in vocational education in Belarus has been established – this consists of a reasonable combination of theoretical material posted on the network and accessible for the students and those in full-time practical training. In the teachers' professional development system - this consists of organization of training for the taking of a qualifying exam, while in the system of adult retraining it implies following various courses enabling the acquisition of a new profession. By finding the appropriate balance between educational quality and accessibility it is possible to implement e-Learning for vocationally-oriented courses.

The communications basis for the development of DLS is education and science computer networks: Unibel (http://www.unibel.by/), BasNet (http://www.basnet.by/), the multiservice network of Belarus State University. The BASNET network provides offline access to world computer networks through the European scientific network GEANT. The bandwidth capacity of the BASNET network access channel to GEANT and the Internet is currently equal to 1 Gbit/s. The BASNET network is based on fifteen basic net points, most of them connected with high-speed fiber optic channels with total length of over 30km, which provides transmission of data across the network at a speed of 100 – 1000 Mbit/s. Users are connected to the BASNET network via xDSL technology.

Regional points of the BASNET network, connected to the central hub in Minsk via Ethernet, operate in Gomel, Brest, Vitebsk, Grodno and Mogilev.

Network interaction with all the organizations connected to the scientific information network of RB and the BASNET network is on a free-of-charge basis with the data exchange speed limited only by the capacity of the connection. The following services are available on the BASNET network on a free-of-charge basis: software repository (150 GB); library repository and consolidated electronic catalogue; download and file exchange service; provision to users of tools to monitor the channel and traffic; back-up electronic messages (e-mail); remote antivirus update.

The Unibel network has seven main points of connection in Minsk that are interconnected with 100 Mbit/s bandwidth channels to form the backbone of the system, as well as three regional channels connected to the backbone network with digital channels and (or) FrameRelay channels. The speed of international connection to the Internet is 75 Mbit/s.

In 2010, the National Educational Portal of Belarus (http://www.edu.by/) was created and began operating within the framework of a comprehensive programme for the informatization of education. The EDU.BY educational portal was created as a universal national educational resource that aims to provide free access to the integrated catalogue of educational Internet-resources, educational and methodical, regulatory and reference materials for pre-school, general secondary, SVET, higher and post-graduate education.

The main Internet-resource in the system of technical and secondary vocational education is the national portal "Vocational Education".

To organize DL, the Moodle distance learning system is mainly used. However, some EI use PROMETEY, WebCT, JoomlaLMS and others.

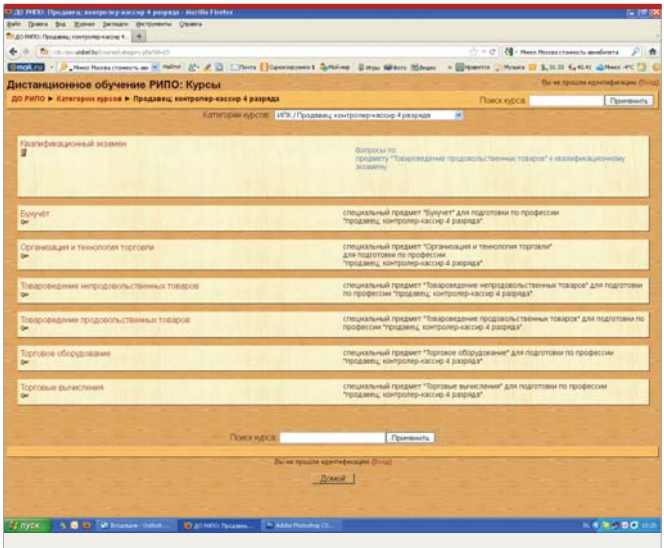
National Educational Portal of Belarus. © National Educational Portal of Belarus

In vocational education where practical knowledge and skills are valued above all, distance education is regarded as a supplement to full-time education. However, for continuing education and the acquisition of new competencies and qualifications, distance education gives learners the opportunity to build the educational path that best meets their educational and professional requirements, regardless of their location.

The prospects for developing DL in a vocational school are based on the real state of informatization at technical and secondary vocational EI. This means, first of all, connection of EI to the Internet and availability of sufficient computer hardware. An important factor is the computer literacy of teachers, their willingness to use IT in their practice of both traditional and distance teaching.

RIPO, by way of implementing priority tasks for the development of modern educational technologies, focuses its work on organizational, methodological, and information support for the integration of DL into technical and secondary vocational EI.

RIPO provides a range of resources for remote consultation between teachers and students following professional development or retraining courses on its portal "Vocational Education". On the forum it is possible to put questions to the teacher, an advisor or fellow students.



RIPO Distance Learning. National Portal "Vocational Education".
© PROFNET Web Team 2004-2012

Kazakhstan

The further development of modern educational technologies in TVET is associated with the use of distance learning, virtual laboratories, virtual training simulators and the systematization of all e-Learning resources with the aim of facilitating access to them.

The Ministry of Education and Science is carrying out certain work to introduce credit and DL technologies at TVET institutions. The Rules for the Organization of the Teaching Process via Credit and Distance Learning Technologies have been approved.

In general, the following elements (forms) of DL can be identified:

- Mailing of printed materials (characteristic of traditional extramural education);
- Sending audio- and video-cassettes, floppy disks, CD-ROM;
- Audio-graphic resources (interactive disks as well as training films and television);
- Interactive online conferences;
- Skype video-conferences;
- E-mail and mailing lists;
- Web-pages.

An analysis of the credit and DL technologies being used demonstrates their certain advantages: the development of independence and an interest in e-Learning among college students; the development of ICT-competence and problem solving skills.

On the whole, education based on modern information technologies will make it possible to develop in youth competencies to obtain and effectively use information for maximum professional self-realization. Experience shows that students able to independently obtain knowledge with the use of modern IT will always be in high demand as specialists and will successfully find employment. In the event of changes in technology or the updating of production processes, these graduates are better prepared to timely acquire the required professional skills, and master a whole range of related and additional professions and qualifications.

The State educational standards for TVET specialities stipulate both linear and credit-based training systems. In the republic the standard ST RK 34.016-2004 "Hardware and Software for Distance Learning" was adopted.

Kyrgyzstan

Distance learning in the TVET system has not been considered until recently. Within the framework of the ADB project "Vocational Education and Skills Development" as well as an agreement with Microsoft, it is planned to develop distance education, create an electronic library, provide Internet-assisted access to modern learning materials, and information on cultural and economic achievements.

Moldova

The development of distance education as a new form of training and professional retraining of specialists was predetermined by the approval of Government Resolution No. 632 "On Policies for Building an Information Society in RM" dated June 8, 2004. Within the framework of the Tempus programme, the project "Introduction of Distance Learning Modules and E-Textbooks at Pilot Higher and Continuing Education Institutions" was implemented by the State Institute of Continuing Education (SICE). The MicroC@MPUS system was installed and adapted to local conditions at SICE. MicroC@MPUS is a DL programme that combines "classical" learning opportunities with modern IT based on interactive collaboration between teachers and students.

In this respect the situation in TVET is less satisfactory. The first step towards progress in this area was the formation of the Republican Centre for Vocational Education and Training Development, which was opened by Order No. 835 of the Ministry of Education dated December 17, 2008 with support from the technical aid project "Improvement of Vocational Education and Training System" implemented by Hifab International on the basis of the Institute of Pedagogical Sciences.

The centre is meant to provide a theoretical and methodological base for the vocational education system in RM; among other things, it aims to create conditions for a gradual switchover to a new level of education based on ICTs. Over the past two years the Centre has developed and placed on its site three modular curricula and materials for the modules (for specialities of "Plasterer", "Welder" and "Cook"), a textbook on entrepreneurship, a database and modules for short-term courses for adult vocational education.

Russia

The growing popularity of distance learning in Russia is due to the following:

1. To learn, it is not necessary to leave one's place of permanent residence or incur the associated expenses for travel, accommodation, etc.;

2. In large countries like Russia this form of learning is practically the only one for remote cities where other educational opportunities are unavailable;

3. The practicality of learning. This is achieved through the fact that the student is offered a greater choice in the sequence of study of subjects, a flexible pace of study, direct communication with a teacher to whom one can address questions on topics that are most of interest;

4. High mobility. World experience shows that DL is less conservative with regard to new areas of human activities than conventional education.

To date, "patchwork informatization" has prevailed in the field of DLS in Russia with specific DLS being created to resolve specific tasks. Upon the completion of the project, demand remains low for the content created for them. For new DLS projects in most cases content is created anew. So, the current agenda includes not only the unification of content but also the standardization of ways of working with it, i.e. the issue of distance learning support systems, e-Learning resources management systems, and systems for creating an educational communication environment.

The federal system for support of DL technologies that is currently being put into operation consists of the following modules:

E-Learning platform	Designed to manage the educational environment and provide the software (platform) for DL courses.
Centralized repository of e-Learning resources	Designed for centralized storage and structuring of e-Learning resources as well as management of access to them by users and external applications.
Educational Internet portal	Designed to organize unified access to the system's services, and to ensure communication and collaboration between users.
Report module	Software product enabling management and assessment of learning activities, as well as the consolidation and preparation of various types of administrative reports.
Set of additional tools to provide enhanced communication opportunities	Tools for interactive remote management of training and certification; tools for fast online communication as well as for integration with multimedia devices used in the learning process (including ways of ensuring equal opportunities for students with special needs).

This solution will make it possible to implement large-scale federal projects for the professional development of those working in education, and flexibly adjust teaching technology and content to meet the specific needs of users.

Tajikistan

Discussion of distance learning in the TVET system began as early as 2008. Within the framework of the State Programme "Development of Vocational Education for 2008-2015", it is planned to develop distance education, create an electronic library, provide Internet-assisted access to modern learning materials, information on cultural and economic achievements. Limited financial resources are considerably impeding developments in this area of reform. It is planned to develop and implement a targeted programme to technically equip TVET institutions with the aim of creating favourable conditions for the development of distance education.

Ukraine

Basic secondary education is compulsory for all students; after which the student chooses a direction for further study: acquisition of complete secondary or technical and vocational education. In any case further enrolment in education is associated only with a formal competitive selection process that is not regulated by official regulatory documents. The results of this process are more recommendatory in nature.

As a rule, most students enrolled in TVET institutions have a lower level of knowledge of the secondary school programme. Their further high-quality professionally-oriented training requires the maximum individualization of teaching, which is difficult when the learning process is constructed in traditional classroom teaching form. Current regulations on the organization of training in TVET fail to promote an individualized approach to teaching, since splitting the group into smaller units is prohibited for most disciplines. Reliance on the students' ability to independently acquire knowledge and skills meeting the modern requirements for a qualified worker fails to yield positive results. That is why employers' dissatisfaction with the quality of the professional training of TVET graduates is justified.

To achieve maximum individualization of teaching in the TVET system, it is necessary to return to the old, time-honoured paradigm of tutorship. In this case the teacher is more of a mentor than a teacher, the main rule of education being personal example ("do as I do" not "do as I say"). The creation of professional independence of a qualified worker is a long process that only begins at TVET institutions; most of it takes place directly at work. Some companies and corporations have the right approach, and when they hire TVET graduates, they assign them an experienced mentor with good supervisor qualities.

The implementation of the approaches described in the information and education environment may be successful if they are constructed upon a different didactic model where all didactic principles prevail without exception, and the content component is strictly algorithmized for structural-logical, interdisciplinary and cause-and-effect links. Such an environment could lay claim to being an "information and education environment". Only such an environment can guarantee the effective (non-declarative) application of individualized approaches, individually-oriented specialized and professional training into the teaching/learning process.

Uzbekistan

To reduce the resource intensity of the educational process and provide greater accessibility of education, training technology must become as effective as possible, that is, offer a high degree of efficiency of the learning process in combination with higher quality of education. The broad application of innovative teaching methods and ICTs is required to intensify the teaching process.

In this regard in Uzbekistan work is being carried out to introduce DL technology into the educational system.

Application of ICTs pursues the following aims:

- First, ICTs create new opportunities for business and education, and are a way to reduce the cost of transactions effected between market participants;
- Secondly, ICTs eliminate barriers related to access to required information, and reduce the cost of information exchange;
- Thirdly, ICTs help attract investments into the country, and promote progressive technologies in production and management;
- Fourthly, ICTs enhance the effectiveness of the economy and significantly accelerate the rate of globalization, etc.

To strengthen the DLS in RU, it is necessary to develop: e-Learning platforms designed to manage the educational environment and provide the software (platform) for DL courses, a server for e-Learning resources, an educational Internet portal, conditions for access to training in different languages.

DL technology is regarded as having great potential for use in creation of a system to train staff for a market economy. The teaching community in Uzbekistan has also become aware of the world trend towards the informatization of education. A number of programmes are being prepared for the development of distance education.
All this makes further use of ICTs a necessary condition for the success of socioeconomic reforms in RU and for the country to occupy its rightful place in the international community. Taking this into account, the Government of RU has identified this area as a strategic priority for economic development and increasing the wellfare of the population.

Chapter 6
Developing the ICT Competencies of Teachers, Mentors, Administrators and Auxiliary Personnel at TVET Institutions, Organization of Networking Between Experts

The rapid development of ICTs orients the teacher training system towards the development of professional ICT skills, which means the willingness of the teacher to solve professional tasks in an information society. It should be noted that in nearly all the countries studied a great number of effective decisions were taken on the issue of developing teachers' ICT skills, leading to real results. Perhaps the reason for this is close cooperation with western countries, which are more knowledgeable and more experienced in the computer sphere. For example, Azerbaijan and Ukraine participate in the "Teach to the Future" programme jointly with Intel. Employees of TVET institutions in Kyrgyzstan have taken professional development courses within the framework of the InWent project. However, not all the countries analyzed are implementing a policy of developing the ICT literacy of employees at TVET institutions solely within the framework of foreign projects. Intrastate projects are being implemented in Belarus and Russia, thanks to which the number of TVET teachers has multiplied during recent years.

Armenia

In Armenia there is no networking between TVET institutions. There are individual cases of interaction between several colleges but this is not permanent in nature.

Final seminar in the framework of the project "Institution Building and Human Resource Development for e-Learning in the Caucasus". November 2009. © Yulia Stakyan

Azerbaijan

One of the most important components of the State Programme for the Informatization of the Education System in 2008-2012 is the training of staff in ICTs. Within the framework of the training programmes of Intel ("Teach to the Future") and the organization "Schools Online", teachers acquire practical knowledge in the creation of e-Learning resources for everyday lessons in various subjects, as well as training in the use of digital cameras, projectors, and special computer software, etc. In 2008, these hands-on sessions were taken by 10,000 teachers, in 2009 – by over 20,000 teachers and administrative workers in the education system. After completion of the training sessions teachers can independently create electronic courses in their subjects.

Belarus

In RB the professional development of TVET specialists occurs at three levels: at TVET institutions themselves, at regional professional development institutes, at the Republican Institute for Vocational Education.

A system for the certification of teachers as IT users has been put into operation in the republic. The software used is the Moodle learning management system, which operates based on standard hypertext technologies (http://www.moodle.academy.edu.by/). After testing, a certificate is issued. Testing will continue until 2013.

Scientific and methodological support for teachers and auxiliary personnel in the field of ICTs is provided through various channels:

- Topical seminars on the introduction of advanced ICTs in the educational process;
- Republican and regional methodological information science associations;
- Creative contests;
- Interactive services of the "Vocational Education" portal;
- Coordination of work at regional educational and methodical centres and methodical services at educational institutions by the Ministry of Education and RIPO;
- Virtual methodology departments at EI.

Interactive teacher consulting services are organized on the Republican Portal "Vocational Education". On average, dozens of requests are received weekly and responded to by specialists. Responses that may be of interest to teachers are published on a special page on the portal.

During the past five years the number of TVET teachers using computer technologies in their work has increased from 10% in 2006 to 50% in 2011.

To attract teachers to take part in discussing issues related to improving the scientific and methodic basis of the educational process, as well as content of learning and teaching, the Republican Methodological Association (RMA) of teachers for the informatization of the educational process was set up.

The RMA unites workers from RIPO, regional educational and methodical TVET centres and teachers. At RMA annual sessions, participants discuss issues related to the supply to TVET institutions of computer and office hardware, telecommunications equipment and educational and administrative software, and the sharing of front-line teaching experience in the use of new technologies in education in the republic.

With the aim of accumulating and sharing experience in the creation of new educational technologies and their use in the educational process, in 2006 a network of leading institutions in terms of methodical work (creation of e-Learning tools) was created in the republic, comprising several EI from each region. All the electronic teaching aids created during

"It is necessary to raise the quality of vocational training to the level of international standards. Material resources of the concerned industry should be increasingly used in the training process; and resource centres equipped with the up-to-date technologies should be established on the basis of the best lyceums and colleges."

President of RB Alexander Lukashenko at the Meeting with the Nation's Leading Pedagogical Staff. August 19, 2011

At the level of EI, courses in information technology are arranged. As a rule, these courses are taught by a computer science teacher. The courses cover general issues of computer literacy or familiarization with new specialized software packages used in the sector of the economy for which the institute's students are being prepared.

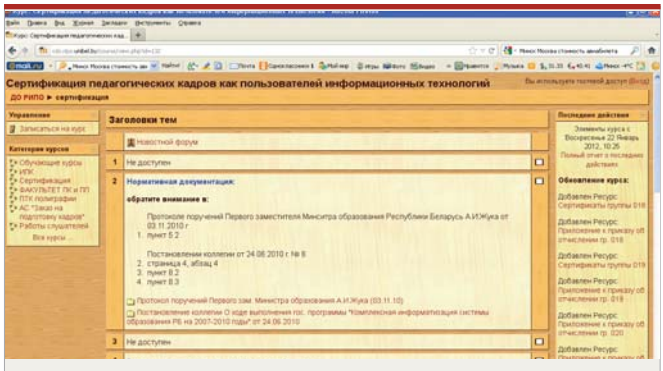
At the level of regional development institutes, various target courses to develop computer literacy are arranged, but in the context of a specific topic related to a particular technology.
Offering professional development services at the republican level are universities, the Academy for Postgraduate Education, the Republican Institute for Higher Education, and sectorial professional development institutes. It should be noted that only RIPO structures its professional development programmes in ICTs on the scientific approaches to the development of TVET and specialized training courses developed and recommended by the UNESCO Institute for Information Technologies in Education (UNESCO IITE).
Targeted courses developed by RIPO focus on priority areas of implementation of state programmes and aim to enhance the ICT skills of engineering teachers in TVET. During the past five years, over 30 courses have been organized; at RIPO alone over 1,500 people have received training through these courses. Over the same period at RIPO alone, over 260 people have acquired a second degree and the qualification of "Information science teacher".

these five years were discussed and analyzed at meetings of republican teaching associations.

With the aim of stimulating teaching staff and students to use modern ICTs, professional skills contests in "Applied information science" are organized on an annual basis, in addition to the republican contest "Computer. Education. Internet". Their main aims are: to identify and develop the creative and intellectual potential of teachers and students, to popularize ICTs in education, to develop interest in research and scientific activities among TVET students. Annually, about 500 projects are entered in the contest, 30% of them are TVET projects. After the contest, disks with the winning projects are provided to regional institutes for development of education and regional educational and methodical centres for further distribution among EI.

Most well-prepared and creative teachers, together with their students, participate in international contests and competitions, and win diplomas and certificates.

The allocation of grants for innovative projects in the field of ICTs in education is practiced in the republic on a regional basis. Administrators at EI interested in implementing innovative ICT-based training programmes pursue a policy of constantly stimulating their workers materially and in other ways.



Certification of pedagogical staff as IT users. National Portal "Vocational Education".
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Kazakhstan

There are 45,700 engineering teachers working in the TVET system, including 6,000 production trainers, 36,600 teachers and 3,100 managers.

Systemic training and retraining of teachers, administration and auxiliary personnel at TVET institutions in the intensive use of ICTs is carried out by way of:

- Courses and refresher training at the Republican Institute for Development of Leading and Research-Pedagogical Staff of Education (RIPKSO), Regional Professional Development Institutes (RPDI), and Interregional Professional Development Centres for TVET teachers;
- Implementation of the State Programme on Reduction of Information Inequality;
- Computer literacy courses at TVET institutions;
- Seminars and scientific-practical conferences on ICTs, trainings within the framework of international projects with the participation of international experts;
- Training of teachers and trainers abroad.

RIPKSO mostly deals with the professional development of leading and research-pedagogical staff, and methodologists, directs and coordinates the activities of RPDI, while the regional institutes deal with the professional development of teaching staff in the region. RIPKSO and RPDI consult on issues of scientific and teaching methodology in the field of ICT use in TVET.

Training of teachers in ICTs is carried out in several areas:

- Training in the use of ICTs in the educational process;
- Training in teaching technologies for the construction of digital learning resources using ICTs;
- Training in Microsoft Windows and Office software;
- Training in line with Intel models using Linux technology and Open Source office software packages;
- Training in the use of DLS;
- Training in the use of network technologies;
- Carrying out scientific research into the problems of informatization of education using modern ICTs.

With the aim of modernizing training plans and professional development programmes, the course "Creation of Teacher ICT Competency" was developed at RIPKSO.

In addition, the National Informatization Centre, within the framework of the Programme on Reduction of Information Inequality, initiated the development of a portal for public computer literacy training (http://www.compobuch.kz/), that can also be regarded as methodological support in computer literacy and ICT competency for teachers.

With the aim of organizing TVET teachers professional development, Interregional Professional Development Centres were created by Order No. 6 of MOS RK, dated January 10, 2008, in the following cities: Almaty, Karaganda, Schuchinsk, Shymkent and Uralsk. In these Centres, the professional development of TVET teachers is carried out in various areas including the use of interactive learning equipment.

In 2007-2010, over 2,600 engineering teachers upgraded their qualifications, including in the use of interactive learning equipment (600 engineering teachers).

Annually, 300 heads of TVET institutions upgrade their qualifications at RIPKSO. Since 2005, over 9,700 TVET teachers have passed professional development courses at RPDI. Within the framework of the Programme on Reduction of Information Inequality, over 11,200 teachers and trainers upgraded their qualifications.

"A brand new model of professional training will be introduced in TVET. It will be based on three pillars: close cooperation with the labour market and satisfaction of its needs for highly qualified specialists; active involvement of employers into the TVET system management and support; studying and adaptation of international best practices."

From the intervention of Bakytzhan Zhumagulov, Minister of Education of RK, at the Conference "Intellectual Nation: Education, Science, Innovations". April 22, 2011

In addition, in 2007 183 trainers and teachers in special disciplines attended refresher courses and received international certificates as a result of training provided by teachers representing foreign companies including: PASCO, BOXFORD, PROMETHEAN, and LG with sponsorship support from TOO NURECOM LTD.

Since 2007, training centres in the use of interactive learning equipment have been created in 16 regions of the Republic, and over 800 engineering teachers have upgraded their qualifications on their basis.

Within the framework of promoting the professional development of TVET specialists and management workers in 2006-2010 and in accordance with the Protocol on Cooperation with InWent, 18 trainers received training (10 motor vehicle mechanics and 8 trainers completed one year professional development courses in Germany in ICT use in the training process).

Within the framework of the Rogaland Kurs og Kompetansesenter (RKK, Norway) project "Assistance in the Development of Vocational Education", over 50 engineering teachers completed professional development courses in the management and organization of the learning process and ICT application in Stavanger (Norway).

In order to systematize work to provide methodological support for TVET institutions, the Republican Education and Methodology Cabinet was created.

An analysis of engineering teachers' readiness for the use of ICTs shows that Deputy Principals for IT work at 96 TVET EI (10.8% of the total number of EI), the number of TVET information science educators and IT service personnel is 2,700 (which is 9% of the total number of teachers) and 900 respectively; that 33% of engineering teachers (15,100 people) have certificates in the use of ICTs, 2.5% of engineering teachers (1,200 people) are the authors/developers of electronic textbooks at a regional and institutional level.

With a view to distributing the front-line teaching experience of trainers, teachers in special disciplines and managers of TVET establishments, the professional contests "Best Trainer", "Best Teacher" and "Best Educational Institution" have been organized.

ON THE WHOLE, IN 2005–2010 WITHIN THE FRAMEWORK OF THE INTERNATIONAL PROJECTS RKK ROGALAND (NORWAY), INWENT (GERMANY), AND GTZ (GERMANY) 600 TEACHERS IN SPECIAL DISCIPLINES AND TRAINERS AT TVET INSTITUTIONS UPGRADED THEIR QUALIFICATIONS, INCLUDING 151 TEACHERS – AT LEADING FOREIGN TRAINING CENTRES.

The number of persons that upgraded their qualification during on-site courses by international experts:

GTZ
164 people

PKK
168 people

InWent
82 people

Over 900 engineering teachers upgraded their qualifications at seminars within the framework of international projects, with the participation of international experts.

To identify the best information science teachers among teachers at vocational lyceums and colleges, the annual national contest "Altyn Disk" is organized.

In addition, teachers and trainers give online classes in professional skills. A database of online lessons was created on the portal "e-Learning Kazakhstan" (http://www.elp.kz/).

© e-Learning Portal Kazakhstan

A separate issue is the development and promotion of electronic materials produced by teachers. At present, there are no unified requirements regarding the distribution of these resources, and there are no operational mechanisms to incentivize teachers to distribute eLMs. The best developments are not ranked.

In connection with this, the State Programme of Education Development in RK for 2011–2020 stipulates centralized content creation for e-Learning resources produced by teachers.

Kyrgyzstan

From 2006 to 2007, 18 persons from 13 TVET institutions took 7-month professional development courses in information technology and motor vehicle engineering in the Federal Republic of Germany as part of the InWent project.

In 2006-2010, as part of the same project, 44 employees engaged in motor vehicle engineering and information technology, and vocational education administrators and planners took professional development courses (off-site professional development courses in Germany, Kazakhstan and Tajikistan).

Within the framework of the project to introduce the European Computer Driving Licence (ECDL), a training seminar was organized and testing of teachers was carried out. The average computer literacy level revealed was 46.5%.

One of the components of the GTZ project "Regional Network for Teachers Training in Central Asian Countries (vocational pedagogy/didactics)" is work to create and equip a multimedia room based on the Centre for Professional Development of TVET Staff, operating as a resource centre. Training equipment was supplied to organize work at the Centre (16 computers, printers, multimedia equipment: TV screens, video projectors), at a cost of 1,978,380 som (32,973 EUR), and a local network was set up.

In accordance with the consolidation plan set forth in the Memorandum of Understanding of the ADB Review Mission (Grant 0074-KGZ: Project "Vocational Education and Skills Development", February 2010), it is planned to rationalize the IVET system by creating 18 regional resource centres on the basis of EI selected for this purpose. With this Project, the Government plans to create national and regional resource centres. The National Resource Centre is to be a central mechanism for the collection, review and distribution of resources created in the IVET system. Infrastructure is to be improved; training materials provided and EI administrators trained in managerial skills. Teaching methods will also be improved in accordance with the established curriculum.

On January 24–28, 2011, while achieving the set tasks, computer literacy hands-on sessions were held for employees of IVET institutions of the northern region (accountants, deputy principals, etc., 30 persons in total). In future, this trained staff will manage the Information Management System implemented within the framework of the Project.

Moldova

As of the beginning of the 2010-2011 academic year, 2,257 workers were employed in the TVET system.

In order to ensure continuous vocational education, the Ministry of Education took certain steps, including the opening of new centres for the professional development of teachers and managerial personnel. In 2011, 13 centres were created throughout the republic. SVET teachers in technical disciplines and trainers take special courses in the Centre for Continuing Education at the Technical University of Moldova. The analytical programmes, approved by the Ministry of Education for all categories of teaching staff, contain ICT modules.

According to Order No. 790 "On Approving Plans for Continuing Vocational Training of Teaching and Managerial Staff in the Education System for 2011" dated November 1, 2010, the Centre of Information and Communication Technologies in Education organizes the following courses: Information Science Teaching Methodology, Level 1; Information Science Teaching Methodology, Level 2; Use of e-Learning Platforms, ICT Integration Course; Basics of ICT use, ICT Introductory Course; Adaptation and Development of Educational Resources, Intermediate ICT Course .

The courses are taught in the Romanian and Russian languages.

Continuing vocational education (including further development of ICT competencies) for SVET teachers and managerial personnel is regulated by the Law on Education No 547-XIII dated July 21, 1995, and Government Resolution No. 1224 dated November 9, 2004.

Russia

In total, 32,400 people graduated from SVET institutions in 2009 with a speciality in "Information science and computer technology".

Annually, approximately 250,000 teachers upgrade their qualifications at the Academy of Professional Development and Retraining of Education Workers and regional institutes for professional development and retraining.

However, not all of them put this knowledge into practice, which is why it is necessary to motivate teachers to use ICTs in the educational process. In connection with this, requirements concerning the availability of information and education environment at EI have appeared in new educational standards, with the necessity of mastering and using modern IT in the educational process included in the teachers' certification requirements.

Tajikistan

The staff composition in the pre-university vocational education system should correspond to objectives and principles of educational programmes organization. Practice-oriented education and the modular competency-based organization of programmes require the training of specialists in relevant spheres of activity. The hiring of specialists from real sectors of the economy to teach is the best way to resolve the staff problem.

Within the framework of the National Strategy for Education Development until 2020, it is planned to create conditions to make teaching at TVET institutions attractive. In addition, it is planned to modernize the system of teacher professional development; for this purpose:

- Conditions will be created for teachers to select a set of educational services for their professional development;
- Mechanisms will be created to promote competition in the provision of modern high-quality educational professional development services;
- Mechanisms will be created for supporting teachers in their professional growth and development through the formation of a three-level professional development system: at a regional, national and institutional level;
- Mechanisms will be created to introduce a credit-modular system for professional development;
- Conditions will be created to make the professional development system adaptable, so it can quickly respond to changing qualification shortages in connection with the introduction of new educational standards, educational technologies, etc.;

Professional development programmes will be able to use ICTs and distance learning methods. Training of staff for vocational schools will take place at leading enterprises of the republic and at foreign universities.

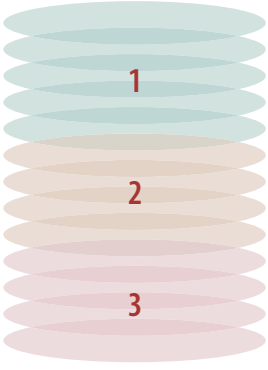
Ukraine

The Ukrainian Scientific Centre for Development of Information Technologies has developed a comprehensive Educational Programme for Professional Development and Additional Vocational Education of Specialists in the Use of ICTs in the Educational Process that takes into account UNESCO requirements, with educational and methodical materials annexed: "Fundamentals of the Didactic Design of Computer-Oriented Learning Systems", which was approved by the Ministry of Education and Science of Ukraine. This programme-methodical complex is recommended to post-graduate teacher training institutes for the organization of teacher professional development courses.

As of January 1, 2011, teacher training courses had been organized in seven regional post-graduate teacher training institutes (in Kiev, Sumy, Zaporozhye, Chernigov, Lugansk, Donetsk and Rovno); based on the Zhitomir post-graduate teacher training institute courses have been organized for the professional development of teachers in secondary EI.

At the moment, given the effectiveness of the teacher training courses that have been arranged at regional institutes and the keen demand for the organization of teacher professional development courses under this programme, the Institute of Innovative Technologies and Education Content of the Ministry of Education, Science, Youth and Sports of Ukraine, the Institute for TVET of the National Academy of Pedagogical Sciences of Ukraine and the Ukrainian Scientific Centre for Development of Information Technologies of the State Agency for Science, Innovation and Informatization have put forward an initiative to implement two national innovative projects: "Integrated Computer-Oriented Educational Technology to Support the Professional Competency of Teachers and the Development of an Information and Education Environment in the Secondary Education System" for the general secondary education system and "Open Information and Education Environment for the TVET System" for the TVET system.

THIS INNOVATIVE PRODUCT CONTAINS:



1. Technology for the didactic design of an information and education environment
2. Programming techniques for organizational-pedagogical and didactic-psychological processes
3. Software and instrumental platforms for the creation and support of an information and education environment

The basis of the didactic design technology is represented by new methodological solutions for the algorithmization of educational processes as well as computer-oriented didactics theory. The basis of the programming technique for organizational-pedagogical and didactic-psychological processes consists of linear, branched, adaptive and person-oriented didactic programming of the information and education environment. The principles of freely distributable, open code software provide the engineering and technological solutions for the software and instrumental platform to create and support the information and education environment.

Any other approach to organizing work related to the formation of an information and education environment may be of little effect. An information and education environment cannot be formed locally (at a local or regional level), and so it requires the united efforts of all the participants in the TVET system.

The launch of the two national projects, which are planned over five years, is very important since it encompasses the whole of the national secondary education system, involving all postgraduate teacher training institutes without exception, and the maximum number of creative and enthusiastic teachers.

Organizational work to prepare for the launch of the projects has already begun in the Donetsk, Zaporozhye, Zhitomir and Vinnitsa regions. But the most difficult issue in their implementation is the organization of financial support.

An improvement noted recently in computer, telecommunications and projection equipment at TVET EI has thrust into the spotlight the issues of effective ICT use in the learning process. By analyzing the condition of ICT use by TVET teachers, we can see a technological imbalance between teacher and pupil. Most educators still operate classical, traditional methods and forms of organizing educational activities, and many of them lag behind their pupils in terms of ICT use.

To resolve this problem, in accordance with the Memorandum of Understanding and Further Cooperation between the Ministry of Education and Science of Ukraine and Intel, the Department for TVET of MES of Ukraine introduced the educational programme Intel® "Teach to the Future" aimed at training teachers to effectively use ICT in the TVET teaching process (Order No. 10 of MES dated January 13, 2006). Within four years, 12,000 TVET teachers are to learn to effectively use ICTs in the training process. The programme was launched in all the regions of Ukraine. The training of TVET teachers is performed by trained regional supervisors, picked from among TVET teachers, based on core training schools in the regions. As of January 1, 2010, 350 hands-on training sessions had been arranged under the programme. The total number of TVET teachers that trained under the programme from 2004 to the first half of 2010 is nearly 10,000, which is 65% of the total number of TVET teachers.

Another additional source for improving the skills of teachers, administration and auxiliary personnel at TVET institutions may be the project "Partnership in Education" of MES of Ukraine and Microsoft Ukraine, the launch of which was announced by Executive Letter No 1/9-902 of MES of Ukraine, dated December 14, 2010.

Uzbekistan

In accordance with resolution No. 25 "On Further Improvement of the System of Teacher Retraining and Professional Development" of the Cabinet of Ministers of RU dated February 25, 2005, a transition to a case-by-case system for the professional development of teachers was put into effect in the SVET system.

A total of 114 curricula of the Institute for Professional Development and Retraining of Staff in the SVET System, and relevant centres and faculties of 45 higher EI have been reviewed and adjusted.

Over 16,000 SVET teachers annually take professional development and retraining courses at 45 higher educational institutions in the republic. At nine vocational colleges in the republic fitted out with funds from the Japanese government, 514 teachers of special PC disciplines upgraded their qualifications in 16 areas of teacher training.

In order to successfully adapt to a new educational environment, 2,664 recently hired teachers upgraded their qualifications at short-term professional development courses.

The technical professional development of 256 teachers was undertaken as part of the project "Assistance in the Development of Vocational Education in the Field of ICTs" jointly with Tashkent University of Information Technology. As part of technical cooperation, professional development courses are arranged for teachers and principals at pilot colleges. A monitoring and evaluation system has been developed for SVET in the republic, with the participation of local and international specialists.

A total of 115,836 teachers are working in the SVET system, including 6,663 Information Science and Information Technology teachers. Of these, over 2,500 teachers took professional development courses, 1,100 teachers took courses in the use of IT in the teaching process at international training centres for foreigners in Germany and South Korea. Over 50 teachers have been trained in the creation of multimedia tools for vocational training in Germany and Australia.
With the help of international organizations and involvement of foreign specialists, 250 teachers have been trained in IT at the Tashkent Vocational College of Information Technology.

Chapter 7
ICTs at TVET Institutions Level

Analysis of ICT use in TVET in the countries under the survey demonstrates that for the majority of countries this practice is in the developing state and often "patchy" in nature. Thus, the immediate objective for a number of countries is to provide all EI with free Internet access. Moreover, all countries with no exceptions are facing the challenge of organizing effective methodological and technical support and consulting for TVET EI, as well as of creating and introducing information systems to forecast demand for specialists and to create an order system for staff training by sector and region.

The question of integrating industry and education is being gradually solved. For instance, the national expert from Azerbaijan in her report gives examples of successful partnership of TVET institutions and private companies.

At the same time, all governments recognize an acute need to develop and test technological solutions aimed to support introduction of new education management models. First initiatives in this direction have already been undertaken; for example, a switchover to electronic document management in the education system is in full swing in Belarus.

Armenia

Introduction of ICTs into educational process remains at the stage of individual initiatives, which means that progress has been made towards the creation of a concept and laying a foundation.

The questions of licensing and accreditation of distance learning programmes remains open for EI, which brings up a number of problems related to the issue of state-approved diplomas. The results of a poll show that only at 3 EI (out of 40) a real strategy for the development of e-Learning is in place. As a rule, all advances are the result of international cooperation or participation in international projects.

Information science lesson.
State college of information science.
© State college of information science

Educational content is also a problem in Armenia. Currently, teachers are ready to create materials themselves and active efforts are being taken to progress towards modular learning system. However, a lack of proper teaching equipment is a major cause for concern among teachers.

Brainstorming contest. State college of information science.
© State college of information science

Azerbaijan

During the past three years the level of broadband Internet use in the education system in Azerbaijan has increased by 19%. Currently, 44 technical and vocational lyceums have broadband Internet access. During 2010 alone, 80 computers, 1 copier and 9 projectors were provided to EI within the framework of the State Programme for the Development of TVET.

Another noteworthy achievement in TVET is the construction of the Centre for Vocational Education and Advanced Technologies by Daewoo International of South Korea. The Centre will promote training of staff in the field of electricity, automation, IT, motor vehicle repair and electronics.

A positive development was the expanding of mutual ties between local companies and TVET institutions. Close ties were established between vocational education institutions and companies such as LLC Azercell, Azersun Holding, Kyur, Titan Group and others. A new laboratory was opened at Baku Professional Lyceum No. 7 with the financial support of Kyur. On the premises of Baku Vocational Lyceum No. 12, with support of the Ministry of Communications and Information Technologies, a workshop was created specializing in communications. A new laboratory was opened at Baku Professional Lyceum No. 17 (with the support of LLC Azercell) that enables the training of highly qualified staff in the field of mobile communications.

Belarus

The administration of TVET institutions is based on the use of communication technologies (e-mail, instant messaging, Internet-conferencing), automation software packages for administration (the Belarusian PARAGRAPH-COLLEGE package has been installed at most TVET institutions, enabling the automation of document management, from admissions to graduation; staff policy planning, from professional development to planned staff replacements; provision of information to parents through automated generation and dispatch of letters on students' academic performance, cases of non-attendance; the organization of Internet teacher-parent meetings, etc.).

The main function of TVET institutions is the training of highly qualified staff for the country's economic complex. This is a multi-faceted process with ICTs playing a major role. In training it is the use of e-Learning tools – electronic textbooks, virtual simulators, electronic instructional charts for industrial training, virtual laboratory work, personal development and extra-curricular activities. In TVET, e-Learning tools make it possible to save resources (energy, fuel, materials and others), especially in the industrial training process. Every year the percentage of teachers using e-Learning tools at their lessons increases. Now every open event (open lessons, master classes) is arranged using presentation hardware and the corresponding e-Learning tools.

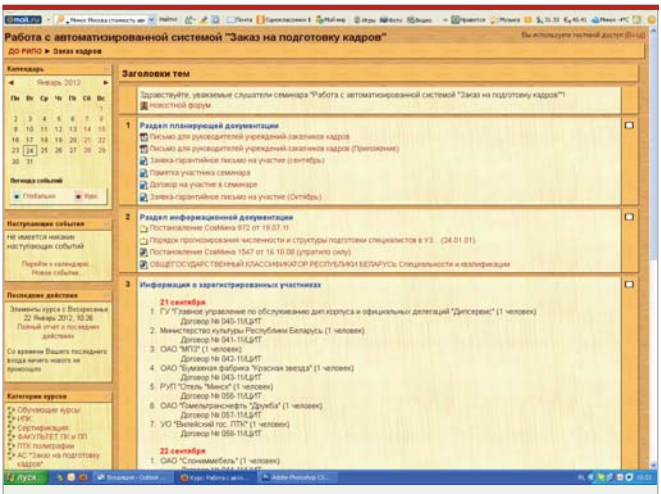
In the republic conditions have been created for a switchover to electronic document management. In individual regions there are unified databases on students, teachers, students' medical passports, etc. at all levels of education.

An important role is played by computer support for the methodical service. Over 80% of TVET institutions have computers and Internet access in the methodical departments, 45% of EI carry out methodological work via virtual methodology departments, which teachers can excess either while at EI or from their homes.

Rogachev Vocational Technical College of Constructors. Theory Class.
© RIPO

During the organization of professional development work practically all the available interactive technologies are used: Skype-conferencing, consulting, chat-seminars. On the "Vocational Education" portal there is a distance learning help service dealing with personal development, as well as an electronic "family club", and an electronic magazine "Personal Development. Personality. Profession" is published.

Since 2010, an automated system "Staff Order" has been in operation. This system, on the one hand, enables customers requiring staff to place an order for qualified people, and on the other hand, enables the Ministry of Education to obtain guideline figures for admissions to TVET institutions based on the needs of companies in terms of specialities and the required qualification level.



Automated Staff Order System. National Portal "Vocational Education".
© PROFNET Web Team 2004-2012

Worthy of particular mention is the role of ICTs in the education of people with special needs. In the republic there are approximately 80 TVET EI that train people with special needs. In some cases ICTs are indispensable since they enable learning at home, while use of special computer appliances makes it possible to organize training for eyesight and hearing impaired people. This area is still under development; scientific research is being carried out to develop recommendations and methodologies for the reasonable organization of ICT-based education for people with special needs. There is experience of certain EI in organizing learning at home using ICTs but this practice has not yet gained wide currency.

Kyrgyzstan

Only eight EI currently have Internet access. At four EI web sites are being developed.

A programme of professional training in over 120 professions and specialities is being implemented at TVET EI in KR. One of the most sought after areas of training is professions related to information technologies. Professional training in this area is carried out at 30 EI out of 110 (27%). There are specialized EI preparing specialists in ICTs. These are Professional Lyceum No. 93 (equipped with 57 computers and a computer hardware repair laboratory equipped within the framework of a World Bank project) and Lyceum No. 98 in Bishkek.

Training of specialists in ICTs. Professional lyceum № 98 in Bishkek.
© Professional lyceum № 98

Training of specialists in ICTs. Professional lyceum № 98 in Bishkek.
© Professional lyceum № 98

The situation was expected to radically change by the end of 2011, with computer hardware to be upgraded by at least 30% and Internet connection to be provided to 32 EI. From 2012 this work will be carried out at all the EI with the assistance from EU.

Within the framework of an ADB project, a model is being developed for per capita financing based on minimum standards of budgetary allowances. The following should be the main components of the per capita financing model:

- Minimum budget financing standards per student and a formula for calculating a categorical grant for local education budgets;
- Optimized curricula and programmes aimed at reducing the teaching load and the release of funds to generate an Additional Wage Fund;
- Additional educational services on a paid basis that are provided over and above the basic curriculum on a voluntary basis;
- Administrative and professional autonomy of vocational lyceums aimed at optimizing the internal school structure, the number of staff and the school expenses in general;
- New remuneration system enabling the formation of an Additional Wage Fund and its distribution based on a Labour Participation Coefficient.

The following issues are to be addressed within the project:

- Introduction of technologies for modular training programmes on a competency-based approach;
- Development and introduction of technological solutions aimed at integrating education and industry (virtual project teams, remote practical training, technology to commercialize developments);
- Development and testing of technological solutions aimed at supporting the introduction of new management models, inter alia - to make EI academically and financially independent;
- Creation and introduction of information systems to forecast demand for specialists and to create an order system for staff training by sector and region.

Moldova

Currently, the network of SVET EI consists of 23 trade schools (including 6 establishments at prisons) and 52 technical and vocational schools.

Vocational training is mainly provided at state institutions (approximately 99% of the total number of students). The training process in formal and informal education is provided for by about 2,200 teachers.

At the moment, for vocational education in RM, the evolution of new technology in the learning process is at the early stage of development, if we take the systems in place in Western Europe and the USA to be the top level. Use of ICTs at technical and vocational schools is still not included in the teaching process for the main disciplines, including subjects for vocational training.

Though practically all technical and vocational schools have computer classes and are connected to the Internet, the discipline "Information and Communication Technologies" is not included in the curriculum yet. At most technical and vocational schools and trade schools, classes for general subjects and speciality subjects are not equipped with computers.

As of the beginning of 2004, computer classes were equipped at only 54% of pre-university level institutions and 28% of vocational education institutions, i.e. twice as few. There were 56 pupils per computer. Computers were used exclusively at information science lessons. Only 72 institutions (including 15 technical and vocational schools) were connected to the Internet.

Moldova has reached certain progress in the provision of TVET EI with computer equipment. Currently, the computer equipment level at TVET EI is characterized as 16.9 students per computer which exceeds the average rate across the educational system in Moldova by 3 units. If in 2006 in TVET EI Pentium I-based computers, purchased as early as in 1997-1998, prevailed (86,7%) over Pentium IV-based PC counting for only 2,2% , at present Pentium II, III and IV predominate. By 2010 10% of TVET EI were equipped with new generation computers by the Ministry of Education. However, the best part of EI use sponsorship opportunities, funds from international projects and grants and their own means to purchase necessary computer equipment.

Based on the available data we can calculate that every TVET pupil has access to a computer once a week for no more than 20 minutes. All TVET EI connected to the Internet mainly use broadband (over 256 Kbits/s) and narrow band connections.

Russia

In 2009, an information system to support the implementation of a Strategy for Modernization of Vocational Education System in RF and Programmes to Modernize Vocational Education Systems in the Russian regions, was developed and test launched. This information system is used to monitor progress in the implementation of vocational education modernization programmes, including collection and consolidation of accounting documents, the calculation and publication of ratings of EI participating in modernization programmes, generating and publishing analytical reports. A separate part of the programme evaluates graduates' competencies based on employers' actual needs.

Based on statistical data and forecasts from the Russian Ministry of Economic Development and the Ministry of Healthcare and Social Development using different methodologies (mathematical modeling, foresight, etc.) a short-term detailed prognosis of demand for specialists in Russian regions is generated in terms of sectors, specialities and training programmes. These information systems make it possible to quickly react to changes in the market by training the required specialists in the required number, as well as organizing effective programmes of advanced vocational training and professional development in conditions of economic crisis or demographic decline.

"It is obvious that without radical improvement of vocational education we will not achieve any modernization and will live in the technologically backward society."

President of RF Dmitry Medvedev at the joint meeting of the State Council and Commission for Modernization and Technological Development of Russia's Economy. August 31, 2010

Through the formation of a federal network of methodology consulting centres located all across the country, the provision of targeted methodological and technical support for EI is ensured (teaching supervisors and methodologists, subject teachers, school administration) with the aim of forming a standardized educational environment, and ensuring equal student access to modern pedagogical technologies and educational resources.

The main aim of creating these centres is the formation of a technological basis for a unified federal policy in education. These centres combine the functions of methodological support for the introduction of new educational technologies and technical support for regional EI; they are centres for exchanging state-of-the-art pedagogical experience, disseminating best practices, and are points of public access to high-speed transmission channels of educational information.

Tajikistan

A rapidly changing labour market requires constant adaptation of vocational education programmes at all levels to cope with these new circumstances. In accordance with the National Strategy for Education Development in Tajikistan until 2020, the task will be resolved by a professional intermediary between the educational services and the labour markets. This should appear as a permanent structure resolving a number of tasks to reduce the imbalance between supply and demand on the labour market. For this purpose, it is planned to establish vocational education resource centres fulfilling the objectives outlined above, and promoting wider use of ICTs at TVET institutions.

Ukraine

"Future of our State depends on the people who realize the importance of continuing professional and personal development."

President of Ukraine Viktor Yanukovych at the opening ceremony of the Odessa TVET Centre of the State Employment Service. February 17, 2011

Further informatization and computerization of TVET institutions are to be continued by implementing the Programme of TVET Development for 2011 – 2015.

The opening of the Odessa TVET Centre of the State Employment Service by the President of Ukraine on February 17, 2011 may serve as a good example of how to resolve vocational training problems under new economic conditions at the regional level. The centre was created to ensure the satisfying of regional demand for qualified workers in professions relevant to the local labour market, and to meet employers' needs and provide opportunities to become engaged in self-employment and entrepreneurial activities. In addition, the training centre will address the issue of advanced training in professions that may in the future become relevant in the region. Its objectives are:

- Introduction of front-line domestic and international experience in adult education;
- Training, retraining and professional development for the unemployed, to increase the manpower competitiveness and resolve the issue of supplying the labour market with workers;
- Extending the scope of modular training, individual training, and the introduction of open and distance learning.

Uzbekistan

To introduce broadband communication networks and Internet technology in the learning process, the construction of the national network "Electronic Education" is being completed. In addition, in 2011 it is planned to connect all higher education institutions (in the future – all the academic lyceums and vocational colleges) in the republic to the unified computer information network.

At the Institute of Professional Development and Retraining of Personnel of SVET system JADAS software has been installed for the electronic registration of attendees taking professional development and retraining courses, and to monitor the training process.

Future plans for the SVET system include:

- Development and introduction of modular training programmes, technological solutions aimed at integrating education and industry;
- Creation and introduction of information systems to forecast demand for specialists and draw up an order for staff training by sector and region.

Chapter 8
Shift to e-Government

The use of information technologies by state agencies is a necessary condition for the construction of an information society. To simplify communications between state agencies and citizens as well as to reduce bureaucratization to zero, as many state services as possible should be converted to electronic form. In this area, measures should be taken in the education system to create information systems for the independent accreditation, management and evaluation of the quality of education, to guarantee transparency, integrity and accessibility of information on the activities of TVET institutions and education management agencies. Obviously, in order to ensure a stable base for the implementation of this initiative a number of preliminary steps are required (the elimination of the digital divide in society, improving computer literacy among state employees, etc.). So, the provision of state services in electronic form requires a sufficiently high information society developmental level.

In general, in the countries studied, the conversion of state services into electronic form is currently mainly at the planning stages. However, there are several positive examples. In Azerbaijan, admission documents for educational institutions are accepted online, and a national electronic signature system has been introduced. In Belarus and Ukraine, work is underway to update educational web portals, including those dedicated to TVET. In Russia, the Ministry of Education ensures the provision of electronic public services by federal agencies in the sphere of education and science.

Armenia

Currently, the system of vocational education of RA fails to meet the requirements of the labour market. It results from an imbalance between the skills of TVET graduates and those required by the market, as well as from a surplus of graduates with certain professions and specialities. Among the multiple causes of this phenomenon, the most noteworthy is the low level of communication between employers and vocational training institutions.

TVET institutions and the National Centre for Professional Education Quality Assurance (NCPEQA) began a dialogue on the creation of information systems for quality assessment and control of education in December 2010. The NCPEQA is responsible for the creation of an information base for TVET institutions. Currently, the NCPEQA and administrators of the TVET system are discussing procedures to improve electronic questionnaires at TVET EI. As a result, the creation of a reliable official database on TVET EI will provide a comprehensive picture of the conditions at TVET institutions and their objectives, and will promote the clear and transparent organization of state accreditation of these institutions.

Improving the quality of vocational education will involve:

- Resolving the main issues concerning vocational education, including: developing educational standards, creation of a system to forecast demand for specialists, contract-based training;
- Optimizing the list of specialists, the structural and institutional reorganization of vocational education, the development of different models for the integration of initial and secondary, and secondary and higher education;
- Complete upgrade of training facilities at vocational EI;
- Ensuring state support for leading scientific and creative schools;
- Creation of conditions for ongoing professional growth;
- Improving the effectiveness and transparency of EI financial activities;
- Creation of conditions to raise extra funds for EI;
- Providing tax breaks;
- Creation of cultural-and-educational, on-site training and health-and-recreational centres based at EI (especially in rural areas).

Azerbaijan

In order to implement The National Information and Communication Technologies Strategy for the Development of the Republic of Azerbaijan (elaborated in 2003), the State Programme on Development of Communications and Information Technologies in the Republic of Azerbaijan in 2005-2008 ("e-Azerbaijan") was adopted in 2005.

The realization of the Programme has considerably contributed to the extension of nomenclature of electronic services provided to the population. E-government is an integral part of a more comprehensive idea of electronic government and it mostly covers national administration. Formation and development of the e-government in RA aim to extend productive activity of government bodies, improve their transparency, and decrease the level of bureaucracy.

AS REGARDS THE E-SERVICES DEVELOPMENT IN THE SPHERE OF TVET, THE FOLLOWING ACHIEVEMENTS SHOULD BE MENTIONED:

1. A unified electronic database on teacher-student composition of all TVET institutions of the country was created in the TVET Department of the Ministry of Education.

2. In 2008, the State Students Admission Commission and the Civil Service Commission started implementing online reception of applicantions.

Belarus

In 2011, a new National Programme of Accelerating Services Development in the Sphere of Information and Communication Technologies in 2011–2015 was adopted in RB, following a directive from the Head of State and based on the Information Society Development Strategy of Belarus up to 2015. The Programme includes the "Electronic Government" subprogramme, dealing with information security as well as subprogrammes in the field of electronic education and healthcare. Their implementation will ensure a significant step forward from the point of view of the society informatization, the creation of e-government based on the development of a national information and communication infrastructure, and improving the quality and efficiency of information exchange between the public, business and the state, and the formation of a state system for the provision of electronic services.

The State Informatization Programme "Electronic Belarus", which was completed in 2010, has stimulated the use of IT at 48 government and administrative bodies, local councils and other state organizations. The implementation of the Programme's 107 projects created data analysis and functional systems for the Presidential Administration, the National Assembly, the Council of Ministers and the State Control Committee. Departmental projects were implemented to promote informatization in the real sector of the economy, healthcare, education, culture, trade and other vital spheres of society. An important result of the State Programme "Electronic Belarus" is the increased interaction between the public, business and the state using ICTs and the provision of information services, all of which promotes a reduction in red tape.

Currently, information on activities of TVET EI and education management bodies can be obtained from their official websites. Head of a particular organization is responsible for the information published on its official site.

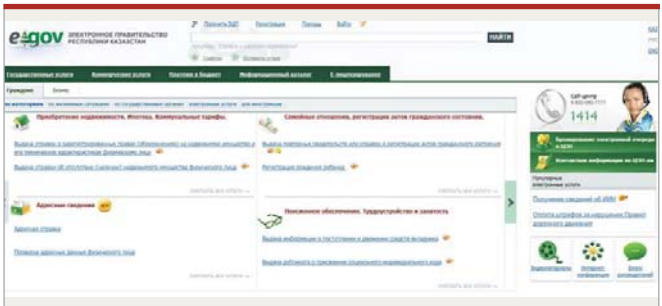
The subprogramme "E-Learning and Human Capital Development" will ensure the further conversion of educational services into the electronic form. The creation of a national e-Learning resources system, and the facilitation of access to national and world educational resources, including for people with special needs, will continue. The subprogramme includes measures to improve the system of professional development in the field of ICT usage, and the modernization and extension of the range of specialities that meet the requirements of an information society. The main aim of the subprogramme is to create conditions to promote the development of human capital.

In addition, the implementation of this range of subprogrammes is expected to result in a decrease in the administrative burden on the public and business due to improved interaction based on ICTs; accelerating development in the sphere of IT services aimed at attracting orders for the development of IT products; improving mechanisms for monitoring the labour market; enhancing the quality of social welfare administration; ensuring the accessibility of educational services, including by expanding distance learning technologies as a basis for improving the vocational and general educational level of the public; and the expansion of state, business and NGO representation on the Internet through the development of national content.

Kazakhstan

Since 2006, there has been functioning the e-Government Web Portal of RK (http://www.egov.kz/wps/portal?lang=ru/) that became a practical mechanism for accessing information and interactive services of the government bodies. To solve the main task of the web portal, which is providing electronic state services, there have been developed software integration modules with Uniform system of electronic document circulation (USEDC) and state databases, including "State Land Cadastre", "Integrated Tax Information System", "Natural Persons", "Legal Entities", "Address Register", "Real Estate Register", the State Pension Payment Centre's database.

To reduce information inequality in RK, an Educational Portal of Kazakhstan was created in 2007-2009. It aims to make information and education resources accessible to broader population strata from a primary school pupils to Doctorate holders, and everybody who is interested in receiving educational services of high quality. A lot of functions are available on the educational portal. For example, there is a directory of educational institutions. One can find any information concerning EI, such as contact information of higher schools, colleges, schools, etc., including an unofficial rating determined by an academic community. Besides, there is a list of educational resources by using which one can find essays, scientific publications, reports, articles and theses. Also, there has been implemented a DL catalogue on the web portal, where one can register and complete any training course as well as to find legal and regulatory information in the sphere of education. An important module of the portal is a module of statistical reporting.



e-Government Web Portal of RK.
© e-Government of the Republic of Kazakhstan

Today every citizen of RK can access e-Government Web Portal of Kazakhstan and in the shortest time receive e-services without direct contact with the state bodies. For this purpose, one should register on the web portal, receive an electronic digital signature and send a request for necessary information signed with the electronic digital signature.

Kyrgyzstan

As part of an ADB project, work was begun on the introduction of information management systems (IMS) to a number of EI. A server centre will be created at the Agency for TVET to which information from EI included in the project will be forwarded. Other EI will be connected to the centre at a later date.

THE FOLLOWING BUSINESS PROCESSES OF PROFESSIONAL LYCEUMS AND THE AGENCY WILL BE AUTOMATED SUBJECT TO THE AVAILABILITY OF EQUIPMENT:	
Electronic Document Management	Conversion of all "hardcopy" documents into electronic form (incoming/outgoing correspondence, orders, guidelines, instructions, etc.). This process will enhance the efficiency of work, executive discipline, and organizational management in general and provide executive personnel with tools for monitoring the condition of specific business processes, etc.
Automated Accounting	The automation of all financial and accounting operations. This will ensure the transparency of financial operations, control the expenditure of cash and other resources, and improve the efficiency of financial decision-making.
Electronic Library	The creation of electronic copies of existing educational and methodical materials (books, manuals, etc.). This will ensure easy access to training materials for all interested parties, and reduce expenditure on purchasing and printing of books and other materials.
Communications	The submission of monthly, quarterly, and annual reports to the Agency for TVET in electronic form; the creation of a database of assets and financial flows across the Agency system.

Problems are currently being resolved with the procurement of equipment and the hiring of specialists, etc. The IMS are to be launched by the end of 2011.

Moldova

An important step in the conversion of public services into electronic form is the creation of the website of the Ministry of Education of RM as well as the development of training modules for TVET teachers in the field of ICTs at TVET institutions and general education schools in the republic.

The website of the Ministry of Education currently provides electronic know-how to store shared data of interest to all levels of education in RM, and to ensure access to it. All vocational training schools have at least one computer connected to the Internet, from which it is possible to visit the website of the Ministry of Education and obtain the required information. Communication between the Ministry and TVET institutions is carried out via e-mail.

The Government of RM intends to accomplish a large-scale digital overhaul of the management system. The immediate aim of this is to arrange an audit of all state enterprises providing paid services to entrepreneurs and citizens to improve their work efficiency by quickly updating all processes using ICTs. The next stage will be the prospect of using the Internet for different state registers as well as ensuring safe Internet access for registers containing personal information.

The Government plans to:

- Develop a unified management and organization structure in the public sector in order to introduce ICTs at state institutions;
- Develop and introduce "Government – Business" and "Government – Public" service portals;
- Extend the provision of online and mobile services to the public and entrepreneurs.

Currently, citizens of Moldova have access to the electronic database of the Information Technologies Department, the Statistics and Sociology Department, the Customs Service Department, the State Tax Inspectorate and other state institutions. However, the current level of development does not allow access to and usage of data at all levels of government and civil society. Even though many state institutions (Parliament, some ministries and agencies) provide public access to certain information on their sites, this is not interactive.

So, common standards for the integration of all departmental data into a unified system have not yet been developed.

As part of one of the projects (supported by the World Bank) it is planned to create an information system to map training institutions in Moldova to improve the efficiency of education management.

Russia

Within the framework of the Federal Target Programme of Education Development for 2011-2015, the efforts shall be focused on the development and implementation of information and communication services which aim to increase the quality of services in the sphere of education and science and provide new forms of integration of different levels of education; as well as on the development and implementation of models and mechanisms of network organization of educational activities, informatization of EI, implementation of systems of support for lifelong learning and self-learning.

Concerning the conversion of state educational services to electronic form, in Russia there are services for the licensing of educational activity, admission of citizens to higher and secondary specialized EI and provision of information on education documents.

Currently, the Ministry of Education and Science of RF is implementing the following activities:

- Provision of state services in electronic form by the federal bodies of state authority in the sphere of education and science;
- Assistance in organizing works on the provision of state services in electronic form by the bodies of state authority in the regions of RF and by local government bodies in the sphere of education and science.

Concerning the subjects of RF, the Ministry of Education and Science of RF is planning to draw up an inventory of information systems functioning in the regions and providing state services in electronic form in the sphere of education and science, that have been approved by the Order of the Government of RF No 1993-r dated December 17, 2009; to make an analysis and selection of a typical solution necessary for efficient work of the bodies of state authority in the regions and the municipal structures, including drafts of normative legal acts that are necessary for its implementation.

A joint solution of the problems by the federal and local bodies of state authority would allow the creation of a normative legal base and a technology platform, necessary for the effective transition to the provision of a full range of state education services in electronic form.

Tajikistan

Concept of Development of Vocational Education in RT, State Programme "Development of Vocational Education for 2008-2015", Programme for Education Development in RT for 2012-2015 provide for the creation of a single TVET information portal. At present information on regulatory legal base concerning TVET EI activities and on services provided (list of specialities, duration of studies) is placed on the website of the Ministry of Education of RT.

Ukraine

The Institute for TVET of the National Academy of Pedagogical Sciences of Ukraine (http://www.ipto.kiev.ua/index.php) was created on April 20, 2006, to resolve issues with the coordination of TVET management reform, quality assessment, and ensuring the transparency, completeness and accessibility of information on activities of TVET institutions and education governing bodies under new economic conditions. The Institute is involved both in improving scientific support for TVET, and performing certain functions in terms of organization and methodology aimed at the professional development of engineering educators at vocational training institutions and companies' training units, organizing the work of expert teams, seminars, meetings at an interregional and national level, experimental work, raising awareness and putting the results of research into practice.

To ensure maximum transparency, effective reforming and modernization of TVET, vocational institutions are actively engaged in the implementation of international projects on Ukraine education reform, contributing to its gradual integration into the European educational space.

So, within the framework of implementing the EU-Ukraine Association Agenda, the Department for TVET of the Ministry of Education, Science, Youth and Sports of Ukraine has established priority areas for the further development of TVET in the context of European integration, specifically:

- Accession to international treaties, ratification of international documents concerning professional training, retraining and upgrading qualification of workers, taking national interests into account;
- Studying and using other countries' experience of application of vocational education quality standards for training and assessing its results;
- Preparation and implementation of joint international projects to ensure the efficient operation of the TVET system and that it meets the requirements of the labour market;
- The organization of foreign internships for students, trainees, TVET teachers, and employees of different enterprises, organizations and institutions.

The realisation of these objectives is envisaged in a State Target Programme for TVET development in 2011-2015.

Since 2005, the Department has been contributing to the implementation of the Ukrainian-Canadian project "Decentralization of the Management of Professional Education in Ukraine", which will last until 2012. A total of 57 TVET institutions from 15 regions are involved in international cooperation with partners from 19 countries around the world.

The Project aims to provide help in exploring priority areas for the development of TVET, such as:

- Modernization of the TVET management system;
- Development of conceptually novel approaches to the formation of a quality control system for TVET;
- Updating the existing regulatory framework governing TVET;
- Increasing the autonomy of TVET institutions, expanding the authority of school principals, and raising their personal responsibility for the quality of training.

With support of the project activities are being undertaken to improve and update with quality content the National Educational Portal "TVET in Ukraine", which not only contributes to the popularization of vocational education, but is practically the most important web resource in the field of TVET in Ukraine. As of today, the portal contains a system of interactive multilevel data bases, facilitating collection and promotion of information on TVET EI, and giving opportuni-

ties to policy makers of different levels to analyze and plan the development of TVET.

This cooperation resulted in broader application of new technologies in educational and training process, teacher traineeships, organization of practical training for Ukrainian students at foreign enterprises, and exchange programmes for education system workers, parents and students, providing leisure opportunities and arranging cultural and sport events, international seminars, workshops, language courses, and participation in joint educational projects, etc.

Educational Portal "TVET in Ukraine".
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The Department for TVET is cooperating with the European Education Foundation – an EU expert centre supporting TVET reforms within the framework of EU external relations programmes.
So far the terms of reference have been elaborated for the implementation of the Twinning project, conceived to improve the national qualifications system based on international experience, as well as for introduction of new legislative and regulatory mechanisms providing for gradual and continuous integration of Ukrainian vocational education into the European educational space.

Uzbekistan

Information on TVET EI activities is placed on the website of a SVET Centre of the Ministry of Higher and Secondary Specialized Education of RU, where it is periodically updated.

Chapter 9
Recommendations

This section is dedicated to national experts' recommendations for the further development of ICT use in TVET (summary). It is of special value since all the specialists' recommendations are based on an analysis of current problems in the countries studied. Based on the fact that the main problems with the introduction of ICTs in TVET in the countries studied are the same, it can be assumed that this material may be used by other countries as a practical guide in order to avoid the problems outlined.

It is logical to present the recommendations from national experts in two groups: countries more developed in the use of ICTs in the TVET system (Belarus, Kazakhstan, Russia, Ukraine) and countries just beginning to work in this area (Armenia, Azerbaijan, Kyrgyzstan, Moldova, Tajikistan, Uzbekistan).

Belarus, Kazakhstan, Russia, Ukraine

Based on an analysis of the experts' suggestions for the development of ICTs in the TVET system, it is possible to generate the following recommendations for all the above countries.

1. Improving the regulatory and legal base for informatization and strict observance of all the previously adopted executive documents related to the effective introduction of ICTs in the TVET system.
2. Organizing a system of planned targeted professional development and retraining of engineering, teaching and managerial staff in the TVET system in the effective use of ICTs in their professional activities.
3. Ensuring integrated efforts of TVET teaching staff in terms of the development and introduction of e-Learning tools based on modern ICTs with pedagogical orientation.
4. Improving the TVET monitoring and management system, ensuring unified approaches and solutions for the automation of managerial activity at all levels (institutional, regional, national).

In addition to the recommendations listed above that are common for all the countries in the group, the expert from Belarus has identified the following conditions required for successful informatization:

1. In terms of supplies of computer hardware to TVET EI preference shall be given to mobile computer classes based on laptop computers which will support organization of training at industrial workshops.
2. Creation of resource centres on the basis of leading TVET EI for e-Learning tools development. The provision of quality national e-Learning tools for all the subjects in the general vocational cycle.
3. Achieving a level of "1 projector per classroom" in TVET EI.
4. Creation of vocationally-oriented multimedia libraries at every TVET EI.
5. Use of DL in extramural vocational education, conversion of adult additional education into DL.
6. Bringing the percentage of TVET EI connected to broadband Internet to 100%.
7. Formation of extranet-communities by education profile.
8. Creating resources for the national methodological support site.

The expert from Kazakhstan proposes the following high priority measures to be taken for further stimulation of ICT use in TVET:

1. Development of an e-college model.
2. Development of framework requirements for TVET e-textbooks.
3. Organization of joint professional development courses in the field of ICTs for TVET teachers.
4. Creation of an interstate fund to support joint projects for the development of educational resources in the field of ICTs.
5. Introduction of multilateral ICT student exchange programmes based on mutually acceptable conditions.
6. Systematic organization of international comparative surveys of the state of ICT application, using agreed criteria.
7. Creation and maintenance of information resources for common use, and of a unified information educational portal.
8. Organization of joint conferences, seminars and round tables.

Armenia, Azerbaijan, Kyrgyzstan, Moldova, Tajikistan, Uzbekistan

The national experts from the above countries (which are at an approximately identical level of development of ICT use in the TVET system) agree on the need to implement the following steps to quickly achieve positive results:

1. Provision of Internet access for all TVET EI.
2. Supply of TVET EI with equipment and materials (100% computerization of TVET institutions and updating of existing equipment).
3. Systematic organization of professional development courses for TVET pedagogical and managerial staff.
4. Introduction of ICT-based training aids and textbooks in the TVET process.
5. Incentivize TVET teachers to use ICTs in the teaching process.

The expert form Armenia noted that students must be taught to commercialize and capitalize on their knowledge, and know how to price it, and how to convert knowledge into money. Finally, people should be familiar with electronic money, e-commerce and be able to effectively work and communicate in networks. They should be able to work in companies and teams whose members are located in different countries and continents, and communicate in different languages. This provision is of special relevance for Armenia due to its close ties with the expatriate community living in various countries outside Armenia.

The expert from Kyrgyzstan presented a full list of recommendations including the following:

1. Development of a targeted programme for the use of ICTs in the teaching/learning process that should stipulate, among other things:
   - Development of the computer literacy of TVET teachers and students;
   - Development and introduction of educational standards for information science teaching at TVET institutions;
   - Creation of ICT-based distance learning systems, e-textbooks and computer training systems including those for teacher professional development and retraining;
   - Development of information consulting and career-oriented activities.

2. Necessity to ensure strict control and monitoring of international projects and plans related to ICT use (a Supervisory Council may be created as an independent structure for this purpose).

3. Developing the possibility of using ICTs not only in the teaching/learning process but also for the conversion into electronic form of most state services, including financial accounting, and the accreditation and certification of EI.

4. Inclusion of the issues on ICT development, introduction and use at all TVET EI in all long-term strategic and programme documents developed within the TVET system.

5. Developing the possibility of using ICTs to improve the situation in the labour market: establishing ties with employers, studying and analyzing staffing requirements, providing new jobs forecast to assist in employment of TVET graduates.

6. Studying the experience of ICT use in the teaching/learning process of other structures in RK, as well as international experience in this area.

National experts have also made suggestions to:

1. Appoint the UNESCO Institute for Information Technologies in Education as a main Resource Centre and Coordinator of the CIS regional UNEVOC Network, providing its members with technical, informational and analytical support in introducing ICTs in TVET in CIS countries.

2. Recommend the Republican Institute for Vocational Education (RIPO), the Republic of Belarus, as a Resource Centre in the field of TVET teachers' professional development.

3. Recommend the Institute of Innovative Technologies and Education Content of the Ministry of Education, Science, Youth and Sports of Ukraine as a Resource Center in the field of ICT use in TVET.

Conclusion

The history of ICT use in the TVET system in Belarus, Kazakhstan, Russia and Ukraine is at least 10 years old. As a result, a base has currently been established for the further sustainable development of ICT use in TVET. In Armenia, Azerbaijan, Kyrgyzstan, Moldova, Tajikistan and Uzbekistan significant steps have been taken towards the development of ICT use in TVET only in recent years. In these countries, initiatives to expand ICT use in the TVET system are being developed and implemented, but there are a number of objective problems impeding the modernization process.

The authorities in all the countries under analysis understand the need and prospects for ICT development, and have identified informatization as one of the most important national priorities. However, the main danger lies in the fact that all the planned initiatives, which have been comprehensively outlined in detail in documents may never get off the ground due to insufficient and unstable financing.

E-Learning resources, as multimedia interactive e-Learning resources that affect all the stages of the educational process (acquisition of information, practical classes, certification), are widely used only in Kazakhstan and Russia; however, Belarus and Ukraine have enough experience and all the prerequisites required to switch over from using CD-based teaching resources and individual audio-visual materials on the Internet to a fuller use of e-Learning resources such as virtual laboratories, professional simulators, systems for adequate assessment of knowledge, skills and competencies. In Armenia, Kyrgyzstan, Tajikistan and Uzbekistan the development and introduction of eLMs at TVET institutions are very limited (still at the planning stage). Azerbaijan and Moldova are at an intermediate level, having been developing and using ICTs at TVET institutions on a gradual basis since 2008.

In Armenia, Azerbaijan, Kyrgyzstan and Moldova, the question of the introduction of a DLS at TVET institutions had not even been raised until recently; DLS is still only at the development stage, DLS initiatives are not always structured. Meanwhile, in Belarus and Russia there is already some available know-how in this area, the first results have been achieved, and the obstacles to the wide usage of this form of teaching and planned measures to resolve them have been analyzed.

Almost all the countries studied are taking great effort to enhance TVET teachers' ICT competencies (in Tajikistan the teacher competencies development system is still at the development stage). In most of the countries studied, the development of teacher computer skills is

achieved through international cooperation with partners from technologically more developed countries. However, in Belarus and Russia there are also intrastate programmes in this area; and thanks to these the number of TVET teachers has multiplied during recent years.

In recent years, the level of ICT use both in the teaching/learning process and in TVET school management has increased. In Belarus, Russia and Ukraine there are systems in place to forecast demand for specialists, enabling TVET institutions to quickly respond to changes in the market in terms of the need for staff training. In Azerbaijan, close cooperation between local companies and TVET institutions for the joint training of specialists needed in the labour market is becoming standard practice. However, in Armenia, Kyrgyzstan, Moldova, Tajikistan and Uzbekistan ICTs are still not sufficiently included in the learning process at TVET institutions.

In Azerbaijan, Belarus and Ukraine the governments are taking steps to equalize the equipping of TVET institutions, although the figures for the development of progressive technologies (virtual simulators, simulation software) are still very low. In Kyrgyzstan and Moldova the equipping of TVET institutions, which is carried out mainly at the expense of private sponsors and international projects, is at a lower level; consequently, EI in these countries cannot turn-out enough specialists skilled in ICTs, in spite of the demand in the labour market.

In Belarus and Russia real steps have been taken to improve interaction between the public, government, TVET institutions and business through the use of ICTs: many services are already available in virtual form and information on TVET institutions' activities can be obtained on the relevant sites and portals. Azerbaijan has started the gradual conversion of state services into electronic form, while in Armenia, Kyrgyzstan, Moldova and Uzbekistan it is still at the planning phase.

So, by analyzing the information provided by national experts on the use of ICTs in TVET and its prospects, we can say that Belarus, Kazakhstan, Russia and Ukraine are ahead of the other countries in all the parameters considered. Of course, in these countries many issues still remain unresolved but there is an understanding of the potential for the development of ICTs in TVET, and recognition of existing problems, and as a result ways are being developed to resolve them. Most of the major initiatives involving the use of ICTs in TVET in Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan and Uzbekistan are still at the development stage. In almost all the countries this is due to financial and economic problems, technological backwardness, lack of qualified personnel and experience in solving similar problems (in Azerbaijan – this is explained by lack of experience and qualified personnel in this field, and to a certain extent by technological lag).

Resuming the analysis of the current situation in the countries studied, comparing it with UNESCO priorities and summarizing the recommendations made by national experts we can make a list of recommendations that are relevant to any state that has set itself an objective of building a functioning information society with the informatization of all its spheres (including education) in the near future:

1. Development of modern educational technologies, taking advantage of electronic (digital) learning resources and ICTs and providing access to them.

2. Creating conditions for a gradual transition to a new level of education based on ICTs; implementation of knowledge acquisition opportunities both within the national education system and the world educational environment.

3. Adoption of special programmes to provide TVET institutions with informatization and communications equipment, the development of minimum requirements for the configuration of hardware supplied from the point of view of equalizing conditions for the provision of ICT-based educational programmes.

4. Creation of e-Learning resources making it possible to learn a profession or professional skills not only at educational institutions but also informally; creation of a system for the recognition of knowledge and skills acquired informally.

5. Introduction and development of ICTs to ensure equal access to quality education for all participants of the educational process. Special attention should be paid to students with special needs.

6. Enabling the implementation of students' individual educational paths based on the introduction and use of ICTs; differentiation of educational materials based on the individual student, to increase the effectiveness of knowledge assimilation and to reveal the potential of every person.

7. Introduction of distance technology in TVET, expanding access to this technology, especially for students with special needs.

8. Development of education quality assurance technology, including by providing teachers and students with online access to modern educational technology, scientific and methodological materials and sources of knowledge as well as organizing effective feedback between participants of the educational process, government bodies and research communities.

9. Introducing ICTs and innovative educational technologies in TVET, taking into account a necessity to develop and use open educational resources as well as different software/technology platforms, tools and IT solutions, conforming to international standards, "green" and environmentally-friendly requirements and level of ICT "maturity" of TVET institutions.

10. Widespread introduction of information technology for the storage, development and effective use of the scientific and educational potential of the country (digital libraries, electronic databases, reference systems and methodological support, etc.).

11. Professional development of teachers in ICTs in accordance with existing international standards, and the development of special recommendations and training courses targeted at special groups within the educational process - administration, general education and engineering teachers, teachers in professional disciplines.

12 Identifying (with help from IT companies and potential employers) requirements for ICT competency of TVET teachers on the basis of the UNESCO ICT Competency Framework for Teachers (ICT CFT). Development of mechanisms of certification of teachers' ICT competencies, including instruments of multilevel testing.

13 Development of technological tools to analyze and forecast demand for specialists in sectors of the economy, to organize professional development and retraining, as well as to develop information systems to monitor the effectiveness of investment in education and science.

14 Elaboration of a framework of cooperation with potential employers in the context of ICT use in TVET.

15 Paying special attention to ICT use in TVET to train qualified and skilled personnel for high-tech sectors of economy.

16 Increasing international cooperation in the field of educational ICTs (joint contests, competitions, projects).

17 Improving the regulatory framework and creating legal mechanisms for the development of the TVET system in an information society.

18 Elaboration of mechanisms for popularization and improvement of competitiveness of TVET institutions through using effective incentive systems, rebranding, reputational management and PR; supporting competitiveness of TVET institutions of different patterns of ownership to improve quality of education.

Acronyms and Abbreviations

ADB	Asian Development Bank
AeL	Electronic Lessons Administration
ARS	Access Restriction System
CERT	Computer Emergency Response Team
CSIRT	Computer Security and Incident Response Team
CSS	Cascading Style Sheets
DL	Distance Learning
DLS	Distance Learning Systems
DUEIE	Federal Target Programme "Development of the Unified Educational Information Environment"
ECDL	European Computer Driving Licence
EIS	Education Information System
EI	Educational Institution (s)
EL	e-Learning
EU	European Union
eLMs	e-Learning Materials
EMIS	Education Management Information System
FISCT	Foundations of Information Science and Computer Technology
FSP	Free Software Package
FTP	Federal Target Programme
FTPDE	Federal Target Programme for the Development of Education in 2006–2010
GTZ	German Society for Technical Cooperation
HR	Human Resources
ICI	Information Communication Infrastructure
ICTs	Information and Communication Technologies
IFESCCO	Intergovernmental Foundation for Educational, Scientific and Cultural Cooperation of the CIS
IMS	Information Management Systems

IT	Information Technologies
IVET	Initial Vocational Education and Training
KR	Kyrgyz Republic
MCI	Ministry of Communications and Information
MES	Ministry of Education and Science
NCPEQA	National Centre for Professional Education Quality Assurance
NED	National Education Database
NNN	National Nanotechnology Network
NSED	National Strategy for Education Development
OER	Open Educational Resources
PNPE	Priority National Project "Education"
R&D	Research and Development
RA	Republic of Armenia
RB	Republic of Belarus
RF	Russian Federation
RIPKSO	Institute for Development of Leading and Research-Pedagogical Staff of Education
RIPO	Republican Institute for Vocational Education
RK	Republic of Kazakhstan
RM	Republic of Moldova
RMA	Republican Methodological Association
RPDI	Regional Professional Development Institute
RT	Republic of Tajikistan
RU	Republic of Uzbekistan
SCORM	Sharable Content Object Reference Model
SES	State Educational Standard
SICE	State Institute of Continuing Education
SVET	Secondary Vocational Education and Training
TVET	Technical and Vocational Education and Training
UNESCO IITE	UNESCO Institute for Information Technologies in Education
USEDC	Uniform System of Electronic Document Circulation

Useful links

ARMENIA

http://www.mkuzak.am/	National Centre for Vocational Education and Training Development

AZERBAIJAN

http://ict.edu.az/	State Programme for the Informatization of the Education System of the Republic of Azerbaijan in 2008–2012
http://www.edu.gov.az/view. php?lang=ru&menu=279/	Administration for Informatization of Education, Ministry of Education of Azerbaijan
http://www.avel.edu.az/	Vocational Education Portal of Azerbaijan
http://www.azedunet.az/	Azerbaijan Educational Network AzEduNet
http://www.portal.edu.az/	National Education Portal
http://ict.edu.az/az/layiheler/elektron-mekteb. html	Management Programme (ASM) "Electronic School"
http://www.madad.net/	Organization "Madad"

BELARUS

http://www.ripo.unibel.by/	National Portal "Vocational Education"
http://www.giac.unibel.by/	Chief Information and Analytical Centre of the Ministry of Education of RB
http://www.profedu.unibel.by/	Website of Methodological Support for Vocational Education
http://www.edu.by/	Belarusian National Educational Portal
http://www.unibel.by/	Education and Science Computer Network Unibel
http://www.basnet.by/	Education and Science Computer Network BasNet
http://www.nlb.by/	Internet portal of the National Library of Belarus
http://www.moodle.academy.edu.by/	Moodle Learning Management System

KAZAKHSTAN

http://www.egov.kz/wps/portal? lang=ru/	e-Government Portal of Kazakhstan
http://www.compobuch.kz/	Portal for Public Computer Literacy Training, Programme on Reduction of Information Inequality
http://www.elp.kz/	Portal "e-Learning Kazakhstan"

RUSSIA

http://www.school-collection.edu.ru/	Unified Collection of Digital Educational Resources
http://www.fcior.edu.ru/	Federal Centre for Information Educational Resources

UKRAINE

https: //proftekhosvita.org.ua/uk/	Educational Portal "TVET in Ukraine"
http://www.ipto.kiev.ua/index. php/	Institute for TVET of the National Academy of Pedagogical Sciences of Ukraine
http://www.ostriv.in.ua/	Scientific and Educational Portal "Island of Knowledge"

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From year to year member states of the Commonwealth of Independent States (CIS) devote greater attention to the promotion of the use of Information and Communication Technologies (ICTs) in vocational education, which fully corresponds to the national priorities for modernization of the education system, building of an information society and sustainable improvement of the citizens' standard of living.

This analytical report on the current situation and major tendencies in ICT use in the Technical and Vocational Education and Training (TVET) was prepared in close cooperation with national experts from Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine and Uzbekistan, and is aimed to provide assistance to CIS member states in formulating effective policies in this sphere.

The report seeks to address a wide range of questions related to ICT use in TVET, including, among others, relevant national legislation, advantages of the use of electronic educational resources, e-Learning and continuous development of teacher ICT competencies, as well as the prospects of a gradual shift to e-government. In the report a special attention is paid to a chapter comprising recommendations on further promotion of ICT use in TVET, building of the information society in CIS countries and informatization of all its spheres.

The book is addressed primarily to state authorities and architects of national education policy. It will also be useful to all those involved in the TVET system – from administrative and pedagogical staff to the students themselves.

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