UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

BASIC ICT USAGE INDICATORS IN SECONDARY EDUCATION IN THE BALTIC AND CIS STATES

Statistical Report

UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION
MOSCOW 2002

UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION

PROJECT COORDINATOR

B. Kotsik

WORKING GROUP

N. Listopad
K. Miniukovich
T. Shavrova

Basic ICT Usage Indicators in Secondary Education in the Baltic and CIS States

IITE, Moscow, 2002

This report presents results of a study carried out under the *Indicators of ICT Usage in Education* project.

For further information, please, contact:

UNESCO Institute for Information Technologies in Education

8 Kedrova St. (Bld. 3), 117292 Moscow
Russian Federation
tel. (7-095) 129-2990
fax (7-095) 129-1225
e-mail: info@iite.ru
web site:www.iite-unesco.org

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FOREWORD

UNESCO's major long and short-term objectives envisage the implementation of a series of key programmes. The tasks faced by UNESCO **Major Programme I *Education***, in particular, include the provision of basic education for everyone as well of an informational system, which is to be created by using high-quality education and by renewing educational systems. The goals of **Major Programme V *Communication and Information*** include the promotion of equal access to information and knowledge, the elaboration of principles, policies and strategies in order to expand access to information and knowledge as well as the development of infrastructures in order to expand the role of knowledge in society and enhance potential for communication.

These objectives are of extremely high priority, especially considering current education conditions. These goals focus on social processes, economic relations, culture and technology in order to make education the center of all efforts to mobilize, coordinate and exchange information at the international, regional and national levels. Those that take part in the processes must agree on education policies in general and on improving educational programmes in particular. In this case, effective results can only be achieved via special research, advanced information and a systematic study of the most efficient practices. High-quality education for all can be made a reality by taking the necessary measures to achieve the stated goals for education. It will require the creation of specific conditions, the identification of standard educational texts, improvements in methodology, creation of a sound learning environment, training teachers, shaping the relations between all participants in the educational process and monitoring the educational system. Primarily, the creation of an informational system depends on a joint process of knowledge utilization as well as on the techniques used by educational systems and institutions to perfect current and future methods of generating, analyzing and proliferating knowledge and information. This poses challenges related to the adaptation and restructuring of the educational system, which will be subject to continuous monitoring for reports on the state of education worldwide.

These goals can be achieved by taking the following steps:

- application of information and communication technologies; consideration of national, sub-regional and regional policy, planning and simulation issues; budget development; education programmes cost evaluation;
- acquisition, analysis and dissemination of the latest data and statistics on the educational status-quo in the UNESCO Member States; attracting various data sources and conducting specialized investigations, which contribute to regular data collection systems;
- circulation of scientific and research results, information on efficient policies, innovations and advancements, securing access to such data.

Actual ICT usage in education and this field's dynamics are so high that, in addition to the annual Eurostat report, which presents major data on education in Europe, the independent Eurydice report on ICT usage in education has also been in publication since 2000. These materials are used as reference data here.

Soon after its foundation in 1998, the UNESCO Institute for Information Technologies in Education (IITE) has been dealing with this topic. The *OrbIt 2000* report on information and communication technologies in education in G-8 member countries was published in 1999-2000 with help from IITE. In March 2000, the Institute organized and hosted an international expert meeting on ICT usage indicators in education. In 2001, IITE conducted statistical study on information and communication technologies in secondary education in the Baltic and CIS states. This work is the next in the series of IITE program activities on *ICTs in Education: State-of-the-Art, Needs and Perspectives* and presents the intermediate results of the Institute's efforts in this field.

This statistical report reveals the project's results.

ABBREVIATIONS USED IN THE REPORT

IT – information technologies
ICTs – information and communication technologies
EI – educational institutions
OS – operational system

International Abbreviations for Participating Countries	
AM	Armenia
AZ	Azerbaijan
BY	Belarus
GE	Georgia
KG	Kyrgyzstan
KZ	Kazakhstan
LT	Lithuania
MD	Republic of Moldova
RU	Russian Federation
TJ	Tajikistan
UA	Ukraine
UZ	Uzbekistan

Note: Microsoft Windows™, MS DOS™, IBM, Apple and Macintosh are registered trademarks.

Basic Indicators. List of Symbols	
D1	The list of official documents on IT/ICTs in secondary education that are valid until 2002
D2	The list of official documents on IT/ICTs in secondary education currently in use
PR	Indicator characterizing a government curriculum's availability for Informatics/Information Technologies
SI	Indicator characterizing Informatics/Information Technologies as a separate subject
SS	Indicator characterizing ICT usage in support of other subjects implied in the curricula of said subjects
S	Total number of EI
S(C)	Percentage of EI equipped with computer classrooms

Abbreviations Used in the Report

Basic Indicators. List of Symbols	
CSC	Total number of computers in computer classrooms
NC	Average number of students per one computer in EI offering computer classes
C	Total number of computers used in EI
C(A)	Percentage of computers compatible with IBM and Apple models
SCM	Total number of EI equipped with at least one multimedia system
SC(M)	Percentage of EI equipped with at least one multimedia system
SCL	Total number of EI equipped with local network
SC(LAN)	Percentage of EI equipped with local network (to total number of EI equipped with computer classes)
OSD	Total number of computers in computer classrooms with DOS™ OS installed
OS(D)	Percentage of computers with installed DOS™ OS (to total number of computers in computer classrooms)
OSA	Total number of computers in computer classrooms with Microsoft Windows™ or Apple Macintosh OS installed
OS(A)	Percentage of computers with installed Microsoft Windows™ or Apple Macintosh OS (to total number of computers in computer classrooms)
OSO	Total number of computers with other OS installed
OS(O)	Percentage of computers with other OS installed
SEP	Total number of EI with available educational software for elementary schools
SE(P)	Percentage of EI with available educational software for elementary schools (to total number of EI equipped with computer classrooms)
SEN	Total number of EI with available educational software for natural sciences
SE(N)	Percentage of EI with educational software for natural sciences (to total number of EI equipped with computer classrooms)
SEH	Total number of EI with available educational software for humanities
SE(H)	Percentage of EI with educational software for humanities (to total number of EI equipped with computer classrooms)
SEI	Total number of EI with available educational software for Informatics/Information Technologies
SE(I)	Percentage of EI with educational software for Informatics/Information Technologies (to total number of EI equipped with computer classrooms)

Basic Indicators. List of Symbols	
P; N; H; I	Total number of educational software programmes for elementary school, natural sciences, humanities, Informatics/Information Technologies, respectively
INP; INN; INH; INI	Total number of educational software programmes developed by domestic specialists for elementary school, natural sciences, humanities, Informatics/Information Technologies, respectively
EXP; EXN; EXH; EXI	Total number of educational software programmes developed by foreign specialists for elementary school, natural sciences, humanities, Informatics/Information Technologies, respectively
IN(P); IN(N); IN(H); IN(I)	Percentage of educational software programmes developed by foreign specialists for elementary school, natural sciences, humanities, Informatics/Information Technologies, respectively
IO	Total number of EI without Internet access
I(O)	Percentage of EI without Internet access (to total number of EI equipped with computer classrooms)
IL	Total number of EI with e–mail only
I(L)	Percentage of EI with e–mail only (to total number of EI equipped with computer classrooms)
IC	Total number of EI with Internet access via dial–up channel
I(C)	Percentage of EI with Internet access via dial–up channel (to total number of EI equipped with computer classrooms)
ID	Total number of EI with Internet access via dedicated channel
I(D)	Percentage of EI with Internet access via dedicated channel (to total number of EI equipped with computer classrooms)
IW	Total number of EI with web pages on the Internet
I(W)	Percentage of EI with web pages on the Internet (to total number of EI equipped with computer classrooms)
UP; US; UI; UD	Total number of teachers of elementary school subjects, other subjects, Informatics/Information Technologies, administration, respectively
U_1(P); U_1(S); U_1(I); U_1(D)	Percentage of teachers of elementary school subjects, other subjects, Informatics/Information Technologies and administration who have taken a computer literacy course of up to 50 hours, respectively
U_2(P); U_2(S); U_2(I); U_2(D)	Percentage of teachers of elementary school subjects, other subjects, Informatics/Information Technologies, administration who have taken computer literacy course of 50 to 100 hours, respectively
U_3(P); U_3(S); U_3(I); U_3(D)	Percentage of teachers of elementary school subjects, other subjects, Informatics/Information Technologies, administration who have taken computer literacy course of over 100 hours, respectively

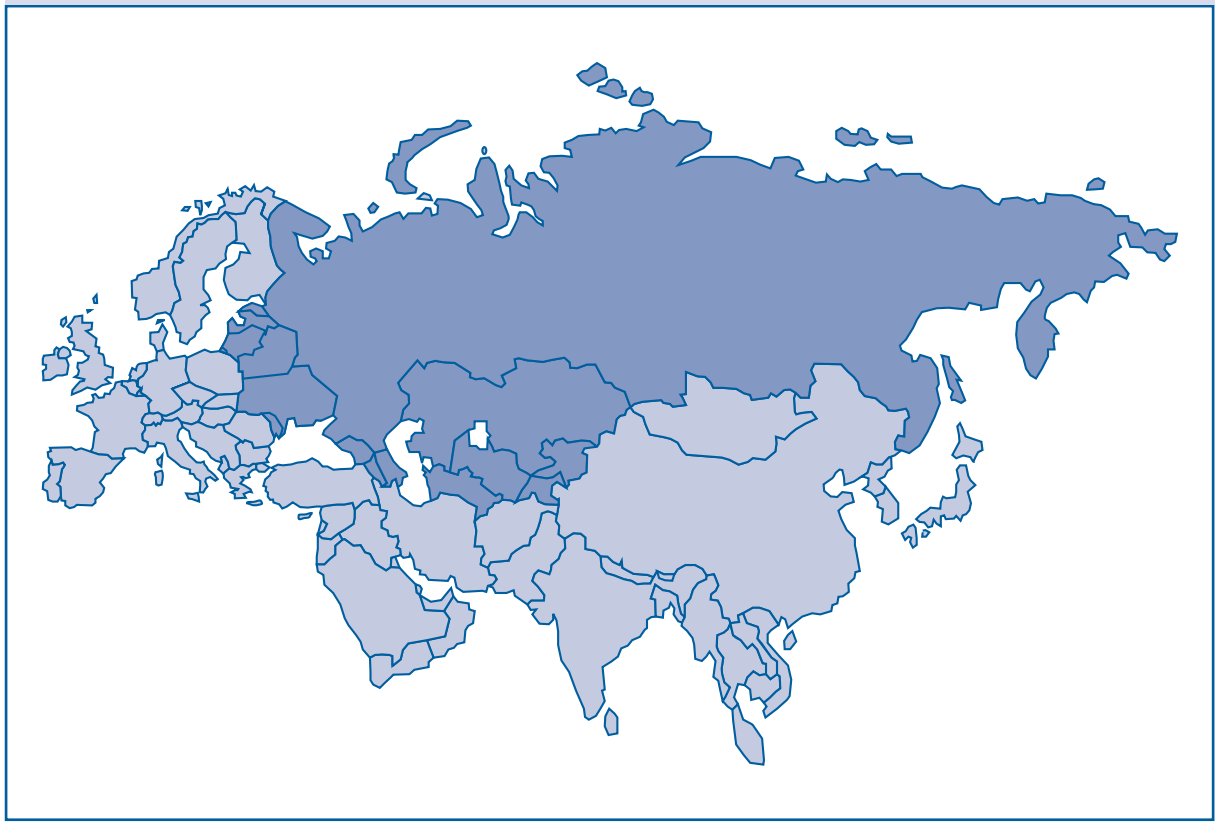
Basic Indicators. List of Symbols	
UPC; USC; UIC; UDC	Total number of teachers of elementary school subjects, other subjects, Informatics/Information Technologies, administration with elementary computer skills, respectively
L_1(P); L_1(S); L_1(I); L_1(D)	Percentage of teachers of elementary school subjects, other subjects, Informatics/Information Technologies, administration with elementary computer skills, respectively
L_2(P); L_2(S); L_2(I); L_2(D)	Percentage of teachers of elementary school subjects, other subjects, Informatics/Information Technologies, administration with ICT proficiency, respectively

PROJECT DESCRIPTION

The *ICT Usage Indicators in Secondary Education of the Baltic and CIS States* project's goal is to study basic factors, identify tendencies and trends revealing common problems and their solutions, elaborate on relevant recommendations for shaping of a national ICT usage policy in education for the participating countries.

In order to reach this goal, a questionnaire was developed and later reviewed by a group of international experts. Almost all of the participating countries submitted comprehensive and informative answers to the questions on the survey. Figure1 shows general information on the project's geography and data flow.

Fig 1. Participation in the *ICT Usage Indicators in Secondary Education of the Baltic and CIS States* Project



Throughout the course of indicator data collection, contacts were established with leading specialists in school ICT usage in the participating countries.

This report was prepared based on an analysis of the acquired data. The information reflecting indicators of educational ICT usage is shown in tables and diagrams.

Study Organization

Statistics were collected and studied in two stages. During the first stage the questionnaire was compiled and some changes were made based on the recommendations from international experts (Appendix 1) .

Education Ministers of the Baltic and CIS states appointed specialists (Appendix 2) responsible for submitting of the project's indicator data (Appendix 3) via official letters. Consequently, the data gained the status of official information. The experts involved expressed their interest in the project and actively participated in the collection and submission of material.

The questionnaire for the survey *Indicators of ICT Usage in Secondary Education in the Baltic and CIS States* was faxed and e-mailed to addresses provided by the ministries.

Once all parties were familiar with the questionnaire and preliminary data, a working meeting *Indicators of ICT Usage in Secondary Education in the Baltic and CIS States* was held on 23 November 2001, IITE, Moscow.

At said meeting, participants discussed specific features and details of submitted information on certain sections of the questionnaire in addition to methods for unifying and simplifying data collection. Some of the representatives from participating education ministries were actively involved, as were international experts (who analyzed the questionnaire), data submission specialists and IITE hosts and project's managers. The methods used for the project's data collection, extrapolation and analysis were discussed. Participants noted the importance of the work in shaping national educational systems and expressed interest in continuing the project (Appendix 4).

The second stage included applying the working meeting's recommendations regarding the questionnaire while data submission specialists collected and transferred information on educational ICT usage indicators from their respective locations. The information was put into table form and illustrated with diagrams. Some inconsistencies were revealed during work in the second stage. In some cases, specialists changed the initial data three or four times. As a result, additional proposals for modifying the questionnaire's content and recommendations for its completion were drafted. These proposals were integrated with working materials to produce results that will be used for future work.

The Indicator System

The questionnaire was based on the indicators which best reflected the main factors determining the efficiency ICT usage in education, as in similar studies and recommendations from the international IITE expert meeting (Appendix 5) (see List of Symbols, pp. 5-8). They are as follows:

- Indicator Group 1. Official documents on ICT usage in education (D1, D2)
- Indicator Group 2. ICTs in EI curricula (PR, SI, SS)
- Indicator Group 3. Equipment (S(C), NC, C(A), SC(M), SC(LAN))
- Indicator Group 4. Software (OS(D), OS(A), OS(O), SE(P), SE(N), SE(H), SE(I), IN(P), IN(N), IN(H), IN(I), EX(P), EX(N), EX(H), EX(I))
- Indicator Group 5. Global communication means (I(O), I(C), I(L), I(D), I(W))
- Indicator Group 6. Personnel (U(P), U(S), U(I), U(D), L(P), L(S), L(I), L(D))

Refer to Appendix 6 for a detailed list of the data indicators, conventional symbols and calculation methods.

These indicator groups determined the content of the questionnaire's main sections for the Survey *Indicators of ICT Usage in Secondary Education of the Baltic and CIS States* (see Appendix 7).

In Section 1, *Government Documents Regulating Educational ICT Usage*, information on Indicator Group 1 is given as is a description of the official documents on current and future application of ICT in education.

Section 2, *ICTs in EI Curricula*, contains data on Indicator Group 2, which shows current government curricula that include Informatics/Information Technologies subjects. This section also includes data on teaching informatics as a separate subject in elementary, basic and secondary schools as well as on ICT usage in other subjects, as per the curricula.

Section 3, *Computer Equipment at Educational Institutions*, includes the figures for Indicator Group 3, which covers equipment at schools equipped with computer classrooms, the average number of students per one computer, computers compatible with IBM and Apple models, and equipment with multimedia systems and local networks.

Section 4, *Software*, gives data on Indicator Group 4, which shows different types of operational systems and educational software programmes installed at computer classrooms.

EI Access to Internet is denoted by Indicator Group 5 and is presented in Section 5 along with information on the type of access to and speed and availability of the Internet at schools.

Section 6 gives information regarding Indicator Group 6, which deals with advanced training and improvement of computer literacy skills among school personnel.

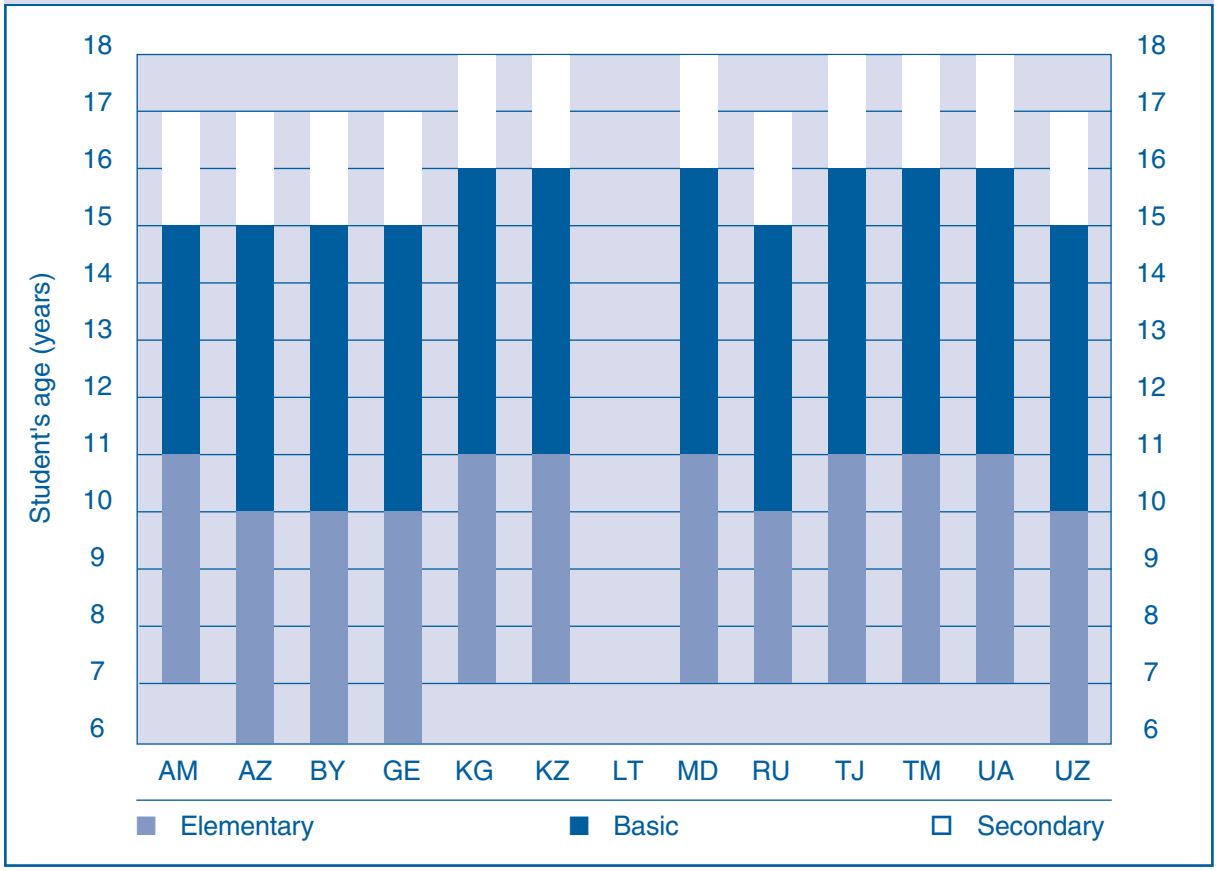
The questionnaire included both open and closed questions depending on the question and type of data. In order to provide verification, expert estimates were differentiated.

STUDY RESULTS

The Structure of Secondary Education in the Countries Participating in the Project

To specify classes, student ages and stages of education, a comparative table was composed on the structures of secondary education systems in the countries that participated in the project. Diagram 1 shows these materials. Data included in the statistical report is based on grouping secondary education systems into elementary, basic and secondary stages.

Diagram 1. Structure of general education system of participating countries



Indicators of ICT Usage in Education

Indicator Group 1. Official ICT Usage in Education Documents

Currently, ICT development is an integral part of educational policy. Consequently, all European governments possess official documents (laws, decrees, recommendations, plans and programmes) in this field. In most European countries, these documents were issued beginning in 1990 and deal with at least mandatory (elementary and secondary) education levels, in some cases, they cover pre-school through higher education. Everywhere in Europe, special bodies are established to monitor the implementation of official recommendations, practical activities and joint initiatives. The number of these bodies differs from country to country, but the duties and responsibilities stipulated all include the following:

- determination of goals, solutions and programmes;
- selection of hardware and software;
- organization of teacher training;
- organization and development of training software;
- tracing and coordination of local and outside initiatives;
- sharing the responsibilities under agreements and solutions;
- collection of information and assessment of solutions and programme accomplishments.

The list of government documents regulating ICT usage in secondary education in the Baltic and CIS states that are valid until 2002 and prospective programmes for development in and after 2002 covering indicators D1, D2 (see List of Symbols, pp. 4-7) can be found in Appendix 8. Note that this issue was thoroughly discussed in Belarus, Kazakhstan, Russian Federation and Ukraine and less so in Azerbaijan, Lithuania and Republic of Moldova.

Indicator Group 2. ICTs in El Curricula

In almost all European countries, ICTs have become a mandatory component of secondary education content and many countries have incorporated ICTs into elementary school curricula. Education content is approximately similar in all countries. In some areas educational goals are defined not by a list of applications and tools to be studied, but by computer literacy skills and the qualifications acquired throughout the educational process. Usually, secondary education goals of ICT studies include:

- the development of programming skills;
- the use of word processors, spreadsheets, and other applications;
- searching for information on a network, CD-ROM, etc.;
- network communication.

Some European curricula also include the history of technology, copyrights and the application of computer skills in professional activities. In some schools, the role of ICTs in society and the problems of information reliability are also examined.

Secondary school programming skills are not usually defined in the curricula, as programming is not among the most popular goals of ICT studies in European countries. Nevertheless, in more than half of these countries, programming is included in curricula for advanced secondary education. In some countries, programming is an elective course.

In elementary schools, ICTs are used to provide either educational content or project activity.

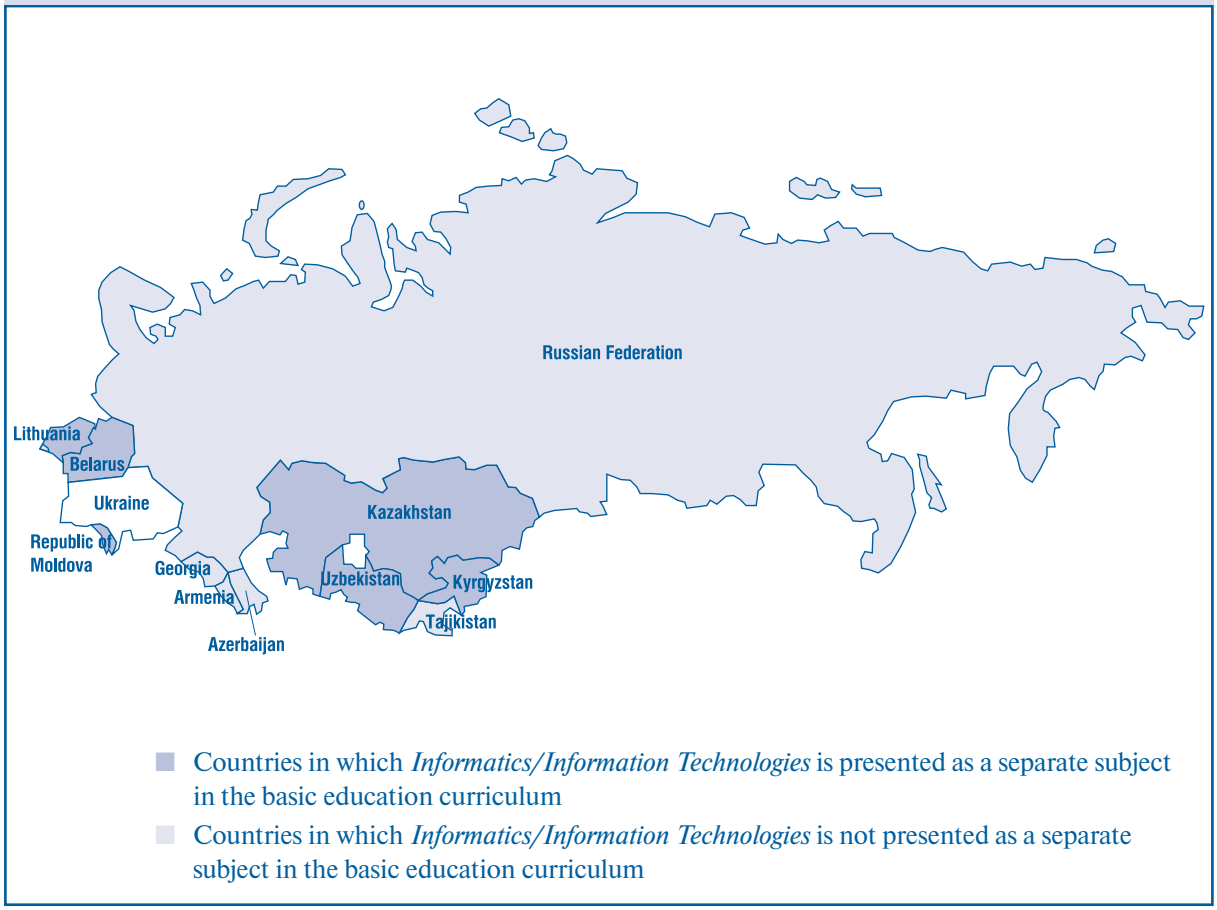
In the majority of Europe's secondary schools, ICTs are taught as a separate subject, although teachers often consider it as a means to study other subjects and a tool for interdisciplinary projects. The number of obligatory ICT lessons at the final phase is officially recommended at 10-60 hours per year in various countries. Moreover, the duration of educational projects and the study of educational content must be added to those hours. However, this factor is hard to measure in practice.

Official documents showing the analysis of the amount of time devoted to ICT study as a separate subject in secondary school must also account for additional factors, such as the duration of secondary education in different countries, the number of years devoted to ICT study, the number of lessons per year and the duration

of each class. To simplify the analysis, the notion of a "conditional" academic year is introduced in complete secondary education. In different countries, 20-40 academic hours per year are devoted to ICT study. Note that in countries such as Germany and Lithuania, the secondary education is completed in 6 years.

All of the countries participating in this study possess a government curriculum on *Informatics/Information Technologies* (indicators PR, SI, SS – see List of Symbols, pp. 5-8). Almost nowhere are ICTs expected to be used as support for other subjects, with the exceptions of Uzbekistan and elementary education in the Russian Federation. Figure 2 shows the situation concerning *Informatics* as a separate subject in basic education curricula.

Fig. 2. Informatics in basic education curricula



Indicator Group 3. Hardware

The majority EU elementary and secondary schools are equipped with computers. In certain cases, the equipment is used to solve auxiliary, service and management problems. When determining the number of students per one computer, only the computers that are used for educational purposes are considered. However, in this case, it is unclear whether computers used by teachers for lesson preparation are also included. When analyzing this indicator, the education level and communicational capabilities of equipment with Internet access were considered.

In European countries, 2-30 students at elementary level have access to one computer, and 5-80 students have access to one computer equipped with Internet connection capabilities.

In the secondary education, those figures are 1.5-16.4 and 2-40 students per computer, respectively.

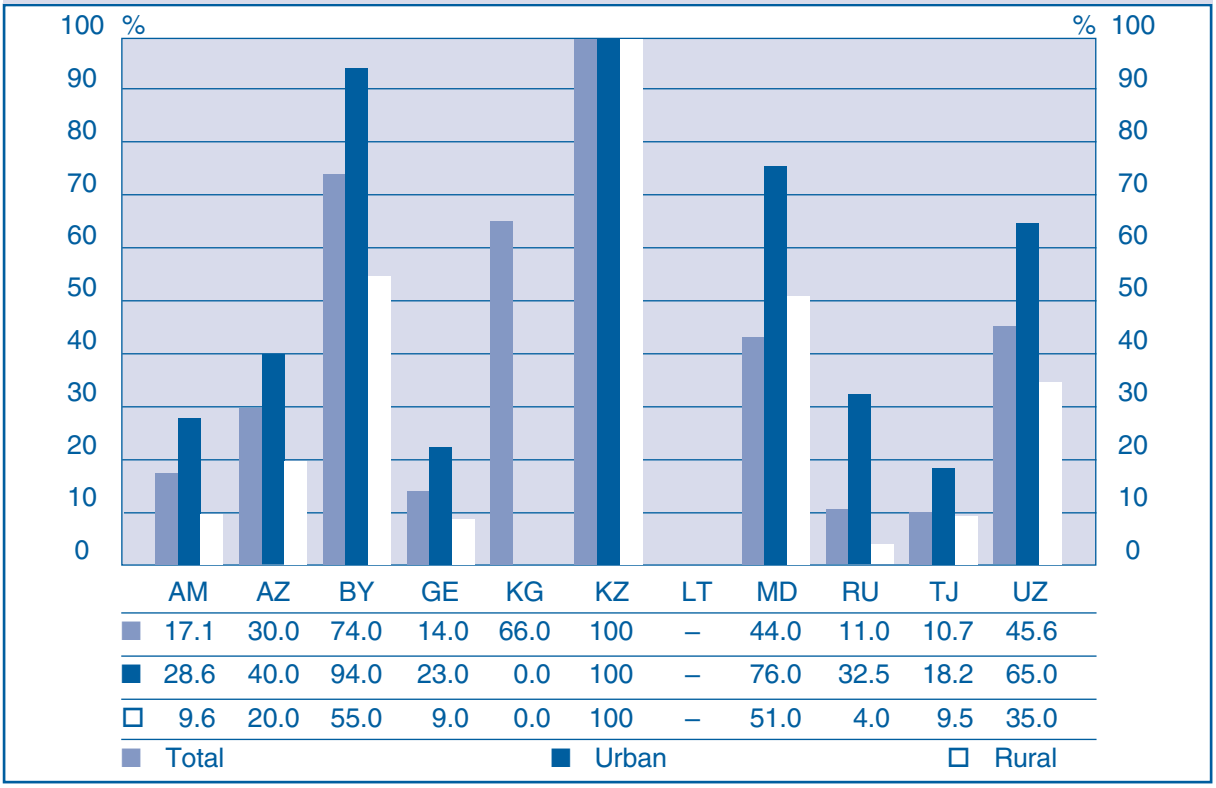
Data reflecting the quantity and quality of ICT equipment in educational institutions of the Baltic and CIS states is shown by indicators S(C), NC, C(A), SC(M), SC(LAN) (see List of Symbols, pp. 5-8) and are calculated using the following formulas:

$S(C) = \frac{SC}{S} 100\%$	$NC = \frac{USC}{CSC}$	$C(A) = \frac{CA}{C} 100\%$	$SC(M) = \frac{SCM}{SC} 100\%$	$SC(LAN) = \frac{SCL}{SC} 100\%$

This data is shown in Diagrams 2-5.

Diagram 2 presents data on computer equipment used in classrooms in urban, rural and total number of schools.

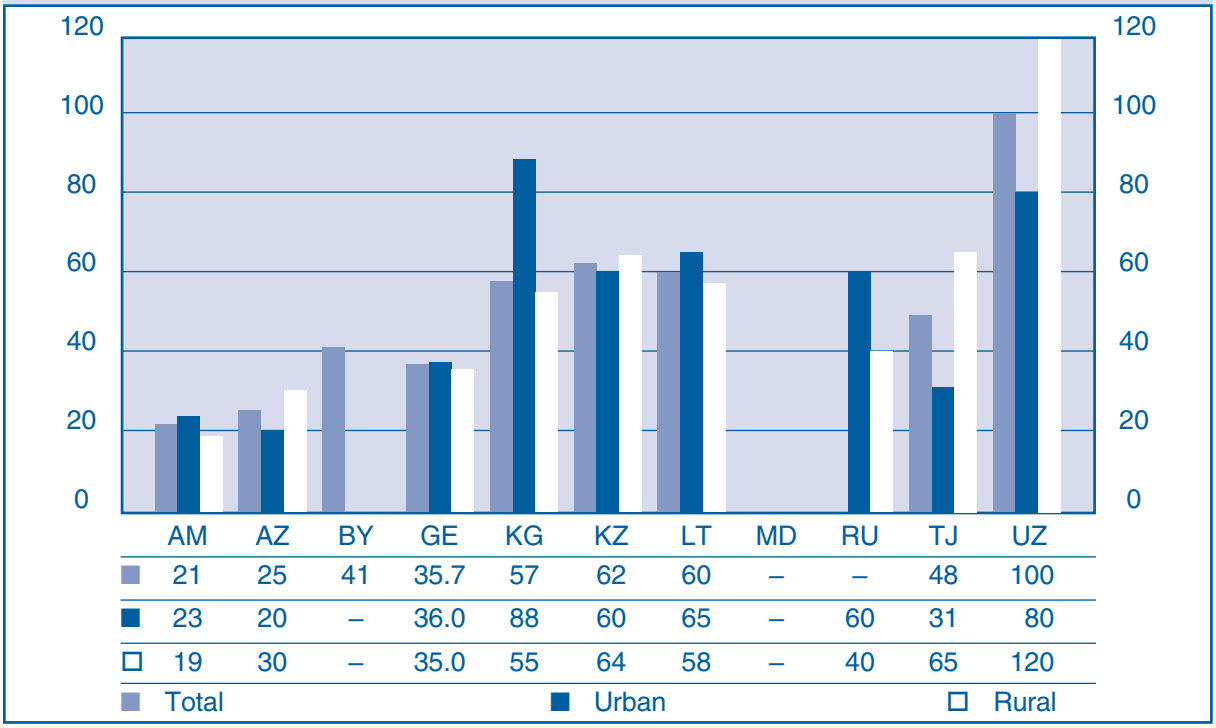
Diagram 2. EI persentage equipped with computer classrooms



	AM	AZ	BY	GE	KG	KZ	LT	MD	RU	TJ	UZ
Total	17.1	30.0	74.0	14.0	66.0	100	–	44.0	11.0	10.7	45.6
Urban	28.6	40.0	94.0	23.0	0.0	100	–	76.0	32.5	18.2	65.0
Rural	9.6	20.0	55.0	9.0	0.0	100	–	51.0	4.0	9.5	35.0

The highest numbers are for Kazakhstan (100% / 100% / 100%) (see Fig. 3) and Belarus (94% / 55% / 74%). Low figures are for Georgia (23% / 9% / 14%), the Russian Federation (32,5% / 4% / 11%) and Tajikistan (18% / 9% / 11%).

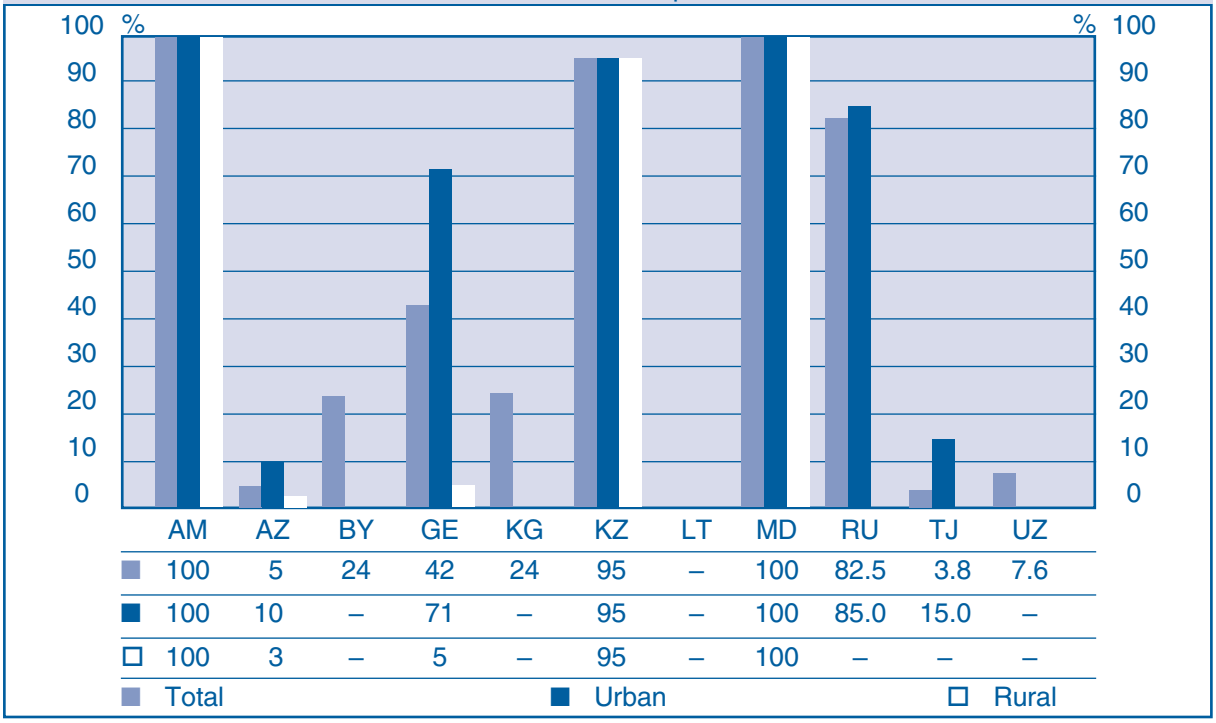
Diagram 3. Everage number of students per one computer in EI offering computer classes



	AM	AZ	BY	GE	KG	KZ	LT	MD	RU	TJ	UZ
Total	21	25	41	35.7	57	62	60	–	–	48	100
Urban	23	20	–	36.0	88	60	65	–	60	31	80
Rural	19	30	–	35.0	55	64	58	–	40	65	120

Diagram 3 shows the average number of students per one computer in schools equipped with computer classrooms. The lowest result is 120 students per one computer in Uzbekistan's rural schools, while the highest was recorded at 19 students per one computer in Armenia's rural schools.

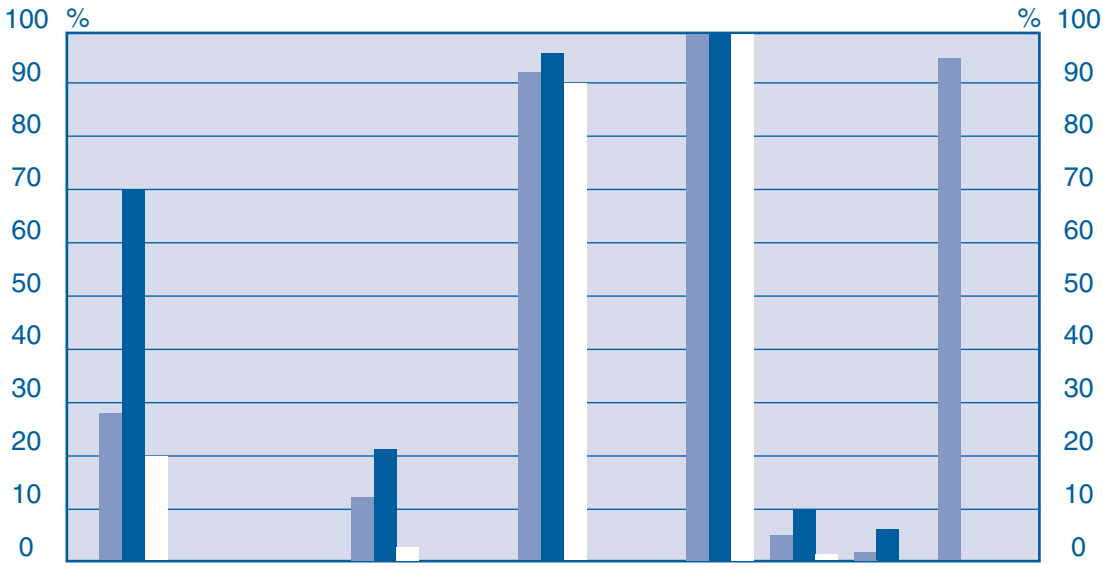
Diagram 4. Percentage of computers compatible with IBM and Apple models to total number of computers in EI



	AM	AZ	BY	GE	KG	KZ	LT	MD	RU	TJ	UZ
Total	100	5	24	42	24	95	–	100	82.5	3.8	7.6
Urban	100	10	–	71	–	95	–	100	85.0	15.0	–
Rural	100	3	–	5	–	95	–	100	–	–	–

Diagram 4 shows the percentage of computers compatible with IBM and Apple models to the total number of computers in EI. The highest numbers were recorded in Armenia (100%), the Republic of Moldova (100%), Kazakhstan (95%), the Russian Federation (82% / 85%) and the lowest were found in Tajikistan (4%), Azerbaijan (5%) and Uzbekistan (8%).

Diagram 5. Percentage of EI equipped with local network to total number of EI equipped with computer classrooms



	AM	AZ	BY	GE	KG	KZ	LT	MD	RU	TJ	UZ
Total	29	0	0	13	0	93	–	100	5	1.53	95
Urban	70	0	–	21	0	96	–	100	10	6.20	–
Rural	20	0	–	3	0	90	–	100	1	–	–

Diagram 5 displays equipment of computer classrooms with access to a local network. Here, the Republic of Moldova (100%) Kazakhstan (93%) and Armenia's urban schools (70%) showed the highest results.

Indicator Group 4. Software

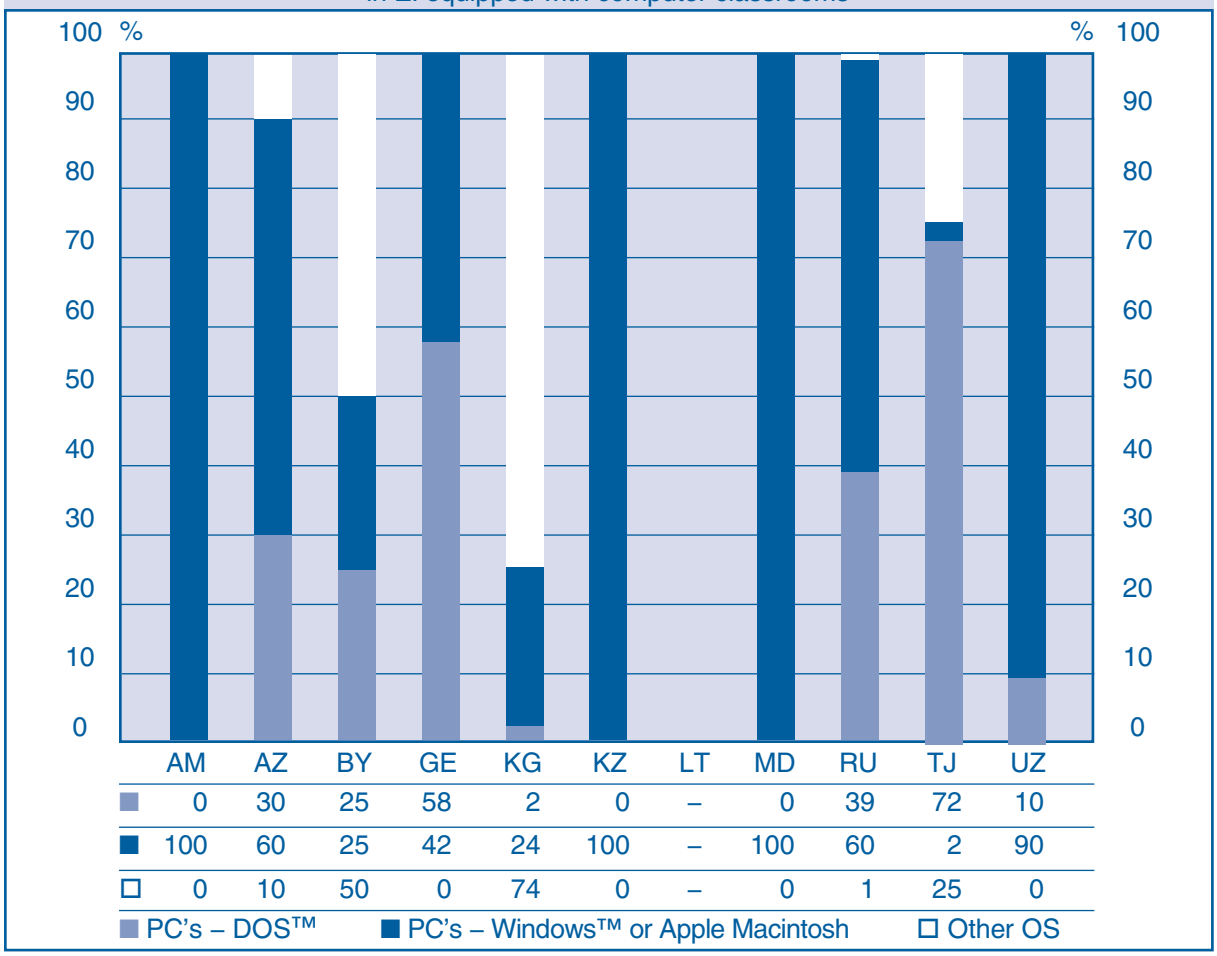
In order to analyze software programmes, data was collected on the distribution of different types of operational systems and educational software available for various subjects (indicators OS(D), OS(A), OS(O), SE(P), SE(N), SE(H), SE(I), IN(P), IN(N), IN(H), IN(I), EX(P), EX(N), EX(H), EX(I) (see List of Symbols pp. 5-8). Note that the analysis of European educational ICT projects does not devote enough attention to the development and acquisition of software support.

Computer distribution and OS types in Baltic and CIS schools were calculated according to the following formula:

$OS(D) = \frac{OSD}{C} 100\%$	$OS(A) = \frac{OSA}{C} 100\%$	$OS(O) = \frac{OSO}{C} 100\%$

This data is shown in Diagram 6. Provided that the quality criterium is the available graphic user interface (OS Windows and Apple), the highest numbers were recorded in Armenia (100%), Kazakhstan (100%) and the Republic of Moldova (100%). Uzbekistan (90%) and the Russian Federation (60%) fell in slightly lower. A great number of computers with OS DOS were recorded in Georgia (58%), Tajikistan (72%), the Russian Federation (40%) and Azerbaijan (30%), which indicates that the machines are over 10 years old. A lot of nonstandard equipment that fell into the "Other OS" category was found in Kyrgyzstan (74%), Belarus (50%) and Tajikistan (25%).

Diagram 6. Computer percentage with OS of certain type installed, to total number of computers in EI equipped with computer classrooms



Note that the majority of computer classes in Uzbekistan are equipped with educational software programmes for elementary classes, in the Republic of Moldova and Uzbekistan for informatics, natural sciences and the humanities. Also note that in almost all countries that submitted information for this part of survey, the majority of educational software was developed by domestic specialists.

Indicator Group 5. Global Communication Means

Despite the fact that the number of computers used for educational purposes with Internet access is twice as less in European countries than the total number of computers used in education, the majority of educational projects based on ICT usage focus on communication and searching for information on the World Wide Web.

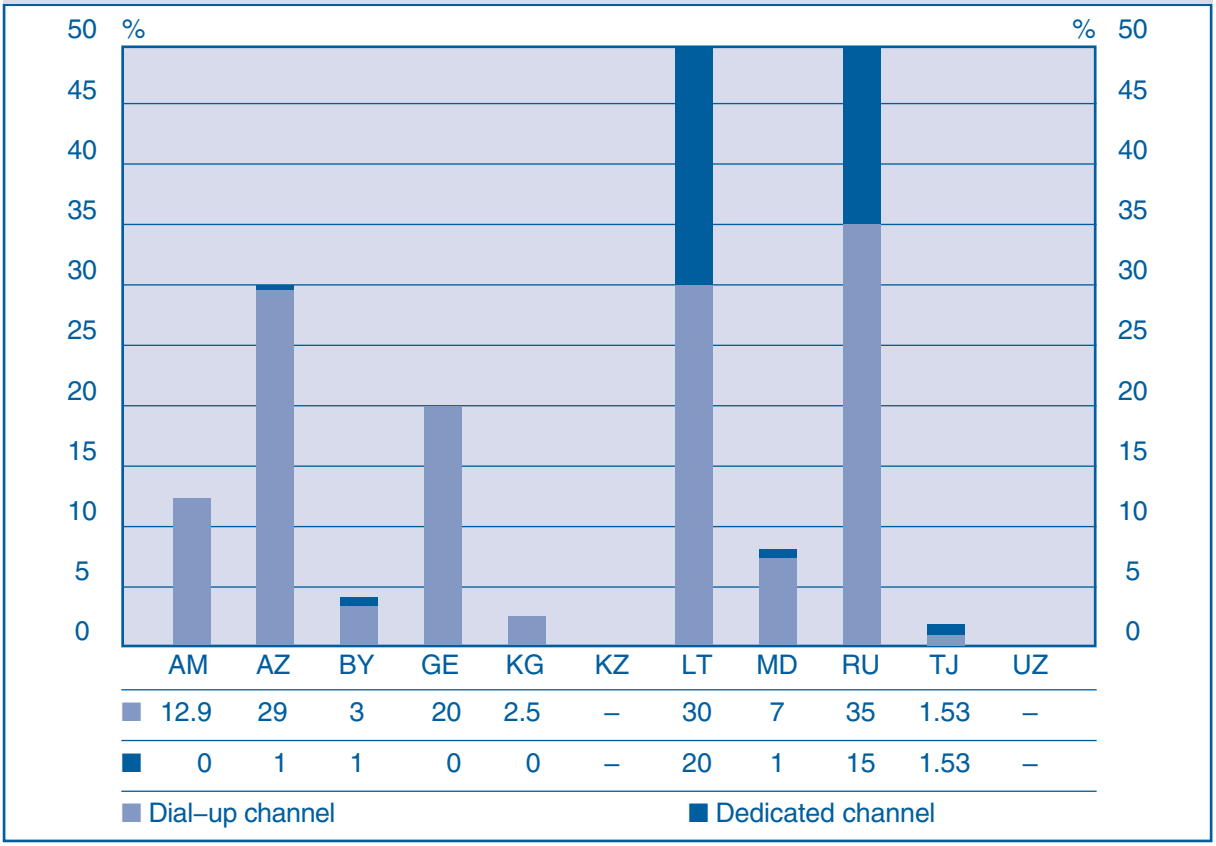
In European countries, 71% and 60% teachers of elementary and secondary schools, respectively, regularly used ICTs to teach in 2000-2001. Basically, computers are used to communicate or seek information on the Internet. The major obstacles presented by ICT application in the classroom are the lack of equipment and Internet access problems. Provided that these technological problems are resolved, teachers name doubtful and insufficient reliability of information on the Internet as major drawbacks.

In the Baltic and CIS States, Internet access at schools with computer classes was described by indicators I(O), I(C), I(L), I(D), I(W) (see List of Symbols, pp. 5-8). Here, the best numbers were recorded in the Russian Federation (50%), Lithuania (50%) and Azerbaijan (30%). In Georgia, 20% of schools have Internet access. In Lithuania, 20% of schools are connected to the Internet via dedicated channels. A total of 20% of schools in Azerbaijan and 10% in Lithuania have their own web sites. Low numbers for Internet access at schools were recorded in Belarus (4%), Tajikistan (3%) and Kyrgyzstan (2,5%).

This data is determined by the formula below and shown in diagram 7:

$I(O) = \frac{IO}{SC} 100\%$	$I(L) = \frac{IL}{SC} 100\%$	$I(C) = \frac{IC}{SC} 100\%$	$I(D) = \frac{ID}{SC} 100\%$	$I(W) = \frac{IW}{SC} 100\%$

Diagram 7. EI access to Internet. EI percentage with Internet access via dial–up or dedicated channel



Indicator Group 6. Personnel

Acknowledging the importance of applying ICT in education also involves the attention devoted to teacher training. Only a qualified teacher, namely a specialist in the ICT field, can confidently guide students while perfecting their own skills in computer training.

In the majority of European countries, ICTs are an obligatory subject of curricula for professional teacher training in elementary and secondary schools. However, these requirements are often of a general and declarative nature. Many countries have not determined duration requirements for training future teachers in ICTs. The recommendations for content are more detailed and include both applied ICT skills and special qualifications for ICT application in classes.

The organization, content and scope of training courses are not subject to centralized regulation, but are rather the prerogative of individual pedagogical institutes. Under these conditions, the questions arise regarding the succession and compatibility of students training levels as well as training quality standards.

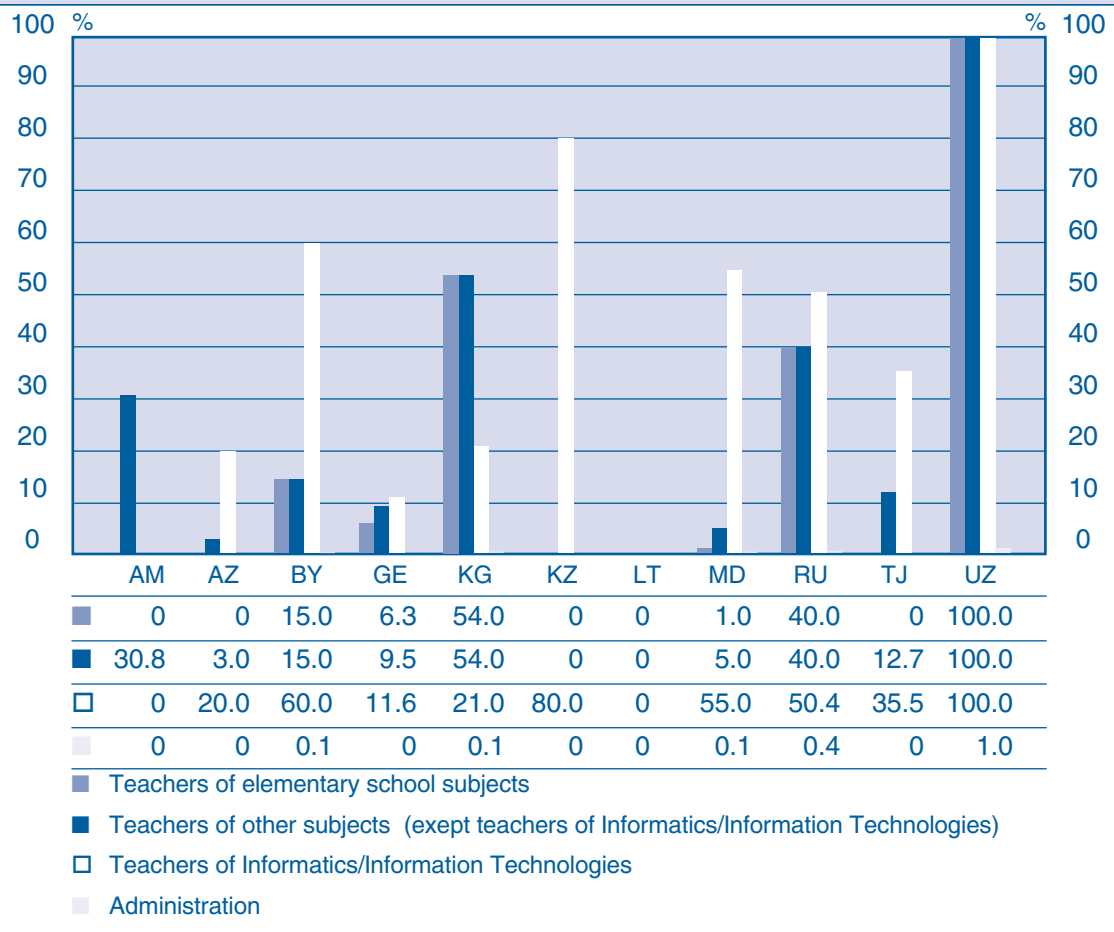
However, in all countries, necessary plans for retraining teachers have already been developed to solve these problems in the future in order to provide the next generation of teachers. The timely acquisition of relevant ICT skills by future teachers is equally important.

Advanced computer literacy training of Baltic and CIS educational institution staff was described by indicators U(P), U(S), U(I), U(D) (see List of Symbols, pp. 5-8) as well as the types of employees (teachers of elementary classes, other subjects, informatics/information technologies and administrators) attending the courses with lengths of up to 50 hours, 50-100 hours and over 100 hours.

This data is calculated with the below formula and is shown in diagram 8:

$U_k(P) = \frac{U_k P}{UP} 100\%$	$U_k(S) = \frac{U_k S}{US} 100\%$	$U_k(I) = \frac{U_k I}{UI} 100\%$	$U_k(D) = \frac{U_k D}{UD} 100\%$

Diagram 8. EI staff development in the field of computer literacy. Percentage of teachers trained



In Uzbekistan, all administrators and elementary school teachers have been trained for up to 50 hours, while the teachers of other subjects have trained for 50 – 100 hours and informatics teachers for over 100 hours (Appendix 8).

Among the 'other subject' and elementary school teachers, relatively high figures were recorded in Kyrgyzstan (54%) and the Russian Federation (40%). As far as informatics teachers are concerned, high figures were recorded in Kazakhstan (80%), Belarus (60%), the Russian Federation (50%) and the Republic of Moldova (55%). In the Russian Federation, 40% of school administrators have been retrained, while this number is extremely low in other countries.

The quality of computer training is denoted by the following indicators: L(P), L(S), L(I), L(D) (see List of Symbols, pp. 5-8) The same EI personnel categories were estimated at two levels and derived based on the following formula:

$L_1(P) = \frac{L_k P}{UP} 100\%$	$L_1(S) = \frac{L_k S}{US} 100\%$	$L_1(I) = \frac{L_k I}{UI} 100\%$	$L_1(D) = \frac{L_k D}{UD} 100\%$

Basic computer literacy implies the ability to work with word processors and spreadsheets. Elementary school and subject teachers in Uzbekistan (80% / 75%), Kyrgyzstan (54%), the Russian Federation (40%) and Belarus (20%) have strong basic computer literacy skills. Informatics teachers in Belarus (100%), Tajikistan (98%), the Republic of Moldova (90%), Kazakhstan (80%) and Azerbaijan (70%) also have strong basic computer literacy skills.

A total of 50% of informatics teachers both in the Republic of Moldova and Belarus have proficient computer literacy skills.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

This report presents unique methods in specialized comparative research of state-of-the-art of education in the Baltic and CIS regions as well as the comprehensive study of ICT usage in education. The following conclusions were made as the results of the accomplished work and statistics calculated for this project:

- the Baltic and CIS States show interest in the project and participation in data collection;
- there is a lack of advanced organizational tools for data acquisition, as well as difficulties in obtaining homogenous and reliable data and no real way to verify data;
- there is a considerable scattering of national, geographical, historical, social and economic features of the processes under study. This is combined with high diversity in different data categories and the complexity of comparative data analysis;
- there is a need to organize systematic and continuous research in order to determine the dynamics of the processes studied.

Based on the above conclusions, we recommend that the education policy-makers and decision-makers in the project's participating countries take the following steps:

- take advantage of the materials included in this statistical report in shaping national programmes of ICT integrating in education;
- conduct similar research at the local level to design national and local educational development programmes;
- consider the recommendations for each indicator when identifying priorities and choosing the most efficient trends in educational development;
- disseminate the best methods for efficient development of educational ICT usage based on the research results.

APPENDIX 1.
List of International Experts of the Survey "ICT Usage Indicators in Secondary Education of the Baltic and CIS States" Questionnaire

Mr Mike Aston
Consultant
The Advisory Unit: Computers in Education
Great Britain
Tel.: (44) 1707 658644
Fax: (44) 1707 856565
E-mail: mike_aston@kcited.demon.co.uk

Ms Lyudmila Pankratova
Head of Informatics Department
The Academy of Right and Business, St. Petersburg
Russian Federation
Tel.: (812)143 87 07
Fax: (812)143 71 75
E-mail: informi_a@educate.ru

Ms Carmelita Villanueva
Chief Information Programmes and Services
Principal Regional Office for Asia and Pacific (PROAP).
UNESCO Bangkok
Thailand
Tel.: (66-2) 3910-703; 3910-577; 391-0550
Fax: (66-2) 391-0866
E-mail: pips@unesco-proap.org
rechpec@unesco-proap.org

List of Education Ministries of the Countries Participating in the Project

State	Ministry	Tel.	Fax	E–mail
Armenia	Ministry of Education and Science of the Republic of Armenia Movsesa Horenatsi str. 13, 375010, Yerevan, Armenia	(374 1) 52–66–02 52–53–17 52–41–12	(374 1) 15 16 51 56 74 13 58 04 03	cfep@arminco.con
Azerbaijan	Ministry of Education of the Azerbaijani Republic The House of the Government, 370016, Baju, Azerbaijan	(994 1 2) 93–70–83	(994 1 2) 98–75–69	edu–min@azeri.com
Belarus	Ministry of Education of the Republic of Belarus Sovetskaya str. 9, 220010 Minsk, Belarus	(375 17 2) 20 99 09	(375–17 2) 20 84 83	root@minedu.unibel.by
Georgia	Ministry of Education of Georgia Tchkheidze str. 52, 380002, Tbilisi, Georgia	(995 32) 95–88–86 95–31–55 95–64–27	(995 32) 95–70–10 77–00–73	
Kazakhstan	Ministry of Education and Science of the Republic of Kazakhstan Kinisary str. 83, 437000 Astana, Kazakhstan	(317 2) 33 33 25 (327 2) 62 16 01	(327 2) 32–64–82	
Kyrgyzstan	Ministry of Education, Science and Culture of the Kyrgyz Republic K. Tynystanova str. 257, 720040, Bishkek, Kyrgyzstan	(996 31 2) 66–24–42 22 88 95	(996 31 2) 22–86–04	postmaster@mon.bishkek.su
Republic of Moldova	Ministry of Education and Science of the Republic of Moldova The Great National Council square 1, MD 2033 Kishinev, Republic of Moldova	(373 2) 23–35–15 23–24–15 23–80–61 23–32–83 23–33–48	(373 2) 23–34–74	
Russian Federation	Ministry of Education of the Russian Federation Lyusinovskaya st. 51, 113833 Moscow, M–230, GSP, Russian Federation	(095) 237–76–23	(095) 230–21–45 924–69–89	root@bicab.ed.gov.ru

List of Education Ministries of the Countries Participating in the Project

State	Ministry	Tel.	Fax	E–mail
Tajikistan	Ministry of Education of the Republic of Tajikistan Chekhova str. 13 a, 734024 Dushanbe, Tajikistan	(992 37 2) 23–33–92 27–43–74 27–56–07	(992 37 2) 21–70–41	maorif@minedu.td.silk.org
Turkmenistan	Ministry of Education of Turkmenistan Gorgoly str. 2, 744000 Ashgabat, Turkmenistan	(993 1 2) 35–58–03	(993 1 2) 39–88–11	
Uzbekistan	Ministry for Higher and Secondary Special Education of the Republic of Uzbekistan Mustakillik square 5, 700078 Tashkent, Uzbekistan	(998 71 2) 39–15–00	(998 71 2) 39–43–29 33–68–14	
	Ministry of People's Education of the Republic of Uzbekistan Mustakillik square 5, 700078 Tashkent, Uzbekistan	(998 71 2) 39–42–14 39–45–63	(998 71 2) 39–11–73	
Ukraine	Ministry of Education of Ukraine Victory square 10, Kiev, Ukraine	(380 44) 226–26–61 226–24–42 216–24–42	(3712) 274–10–49 39–11–73 (380 44) 274–61–28	vvv@minosvit.niiit.kiev.ua
Latvia	Ministry of Education and Science of the Republic of Latvia Valnu str. 2 LV 1050, Riga, Latvia	(371) 722–24–15	(371) 721–3992	
Lithuania	Ministry of Education and Science A. Valano str. 2/7, 2691, Vilnius, Lithuania	(370 2) 62–24–83 61–00–34 61–63–15	(3702) 61–20–77	
Estonia	Ministry of Education of Estonia Tunismagi str. 9/11, 15192, Tallinn, Estonia	(372) 628–12–22 628–12–12	(372) 631–12–13 (372) 628–13–00	

APPENDIX 3.
List of Specialists for Survey Data Submission

Aliev Abulfaz
Azerbaijan
Tel.: 994-12-932346
E-mail: edu_min@azeri.com

Arutyunyan Karine
Armenia
Tel.: 374-1-575690
E-mail: cfep@arminco.com

Baygelov Kanay
Kazakhstan
Tel.: 73172-214210
E-mail: baigelov@mail.ru,
baigelov@hotmail.com

Brazdeikis Vainas
Lithuania
Tel.: 370-2-650361
E-mail: vainas@ipc.lt

Gvaramiya Giya
Georgia
Tel.: 995-32-955298
E-mail: giagg@ip.osgf.ge

Imamov Erkin
Uzbekistan
Tel.: 998711-440111
E-mail: problem@uzsci.net

Karimov Olim
Tajikistan
Tel.: 992-372-349530

Kim Maya
Kyrgyzstan
Tel.: 996 312-228777

Listopad Nikolay
Belarus
Tel.: 375-17-2361594
E-mail: listopad@unibel.by

Payu Mikhail
Republic of Moldova
Tel.: 373-2-232680
E-mail: paiu@minedu.moldnet.md

Samsonov Valeriy
Ukraine
Tel.: 380-44-2119752
E-mail: samsonov@niiit.kiev.ua

Verzhbitskiy Vladimir
Russian Federation
Tel.: 7-095-2378824
E-mail: vvv@ministry.ru

APPENDIX 4.
Recommendations of Working Meeting "ICT Usage Indicators in Secondary Education of the Baltic and CIS States", IITE, Moscow, November 2001

To recommend that:

1. Similar meetings be held in order to exchange experience and information. To recommend that IITE organize these working meetings as well as talks on experience exchange and other activities.

2. Work on the data presentation model be continued. Automatic data collection and processing methods should also be further developed and improved. Statistical reports should include not only averages but should also reflect the worst and best cases based on answers provided in the questionnaire.

3. Information be summoned via three independent channels: official statistics, expert estimates and field studies.

4. The project be translated into Russian and circulated throughout the Commonwealth of Independent States.

5. Systematic information collection activities be organized once every two years.

6. Analyzing the experiences of Armenia and Kyrgyzstan in order to form a basis for additional recommendations to be included in the project.

7. Materials reflecting international experience in statistics collection on educational ICT usage be found, processed and distributed among the project's participating countries.

APPENDIX 5.
Recommendations of International Expert Meeting "ICT Usage Indicators in Education" IITE, Moscow, March 2001

Considering the evaluation of ICT application in education to be one of the most important parts of the work on the project *ICTs in Education: State-of-the-Art, Needs and Perspectives* in the IITE activities, a study of existing experience and special research should be made, analytical survey should be prepared and disseminated and a system of ICT indicators be determined, standards and procedures of indicator measurement for different educational systems should be included in the list of IITE activities for the near future.

Since educational systems of UNESCO Member States vary significantly, there exists a need in a module to be developed for policy- and decision- makers as well as educational authorities on the Indicators of ICT usage in Education, hence, IITE recommended to form an international working team for the module elaboration.

A policy paper on indicators of ICT usage in education based on the expert meeting recommendations should be developed by IITE in collaboration with partners in the UNESCO Member States. IITE, at the request of UNESCO Member States, should support the pilot projects on the application of ICT use indicators in national action plans and policy documents.

The IITE information system network should include data acquisition, processing, analysis and dissemination mechanism for the indicators of ICT usage in education. This mechanism should be made the part of the IITE clearing-house activities.

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator	Symbols	Data Type	Description	Formula
Official Documents	Official documents on national policies on ICT usage in secondary education	1.1	Official documents in IT/ICTs in secondary education valid till 2002	D1	Text	List of laws, decrees, etc. regulating ICT usage in education up until 2002	—
		1.2	Official documents in IT/ICTs in secondary education currently in force	D2	Text	List of laws, decrees, etc. regulating ICT usage in education currently in effect	—
		2.1	Available state curriculum on Informatics/Information Technologies	PR	YES/NO	—	—
		2.2	Informatics/Information Technologies as a separate subject	IT	YES/NO	—	—
		2.3	ICT usage to support other subjects implied in curricula	SS	YES/NO	—	—
Hardware	Computer equipment in rural and urban educational institutions	3.1	Availability of computer classrooms in EI	S(C)	%	Ratio of the number of EI equipped with computer classrooms (SC) to the total number of EI (S) times 100%	$S(C) = \frac{SC}{S} 100\%$

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator	Symbols	Data Type	Description	Formula
Hardware	Computer equipment in rural and urban educational institutions	3.2	The average number of students per one computer in EI offering computer classes	NC	number	Ratio of the number of students in EI equipped with computer classrooms (USC) to the number of computers in these EI (CSC).	$NC = \frac{USC}{CSC}$
		3.3	Percentage of computers compatible with IBM and Apple models in total number of EI computers	C(A)	%	Ratio (times 100%) of computers compatible with IBM and Apple models (CA) to the total number of computers in EI (C)	$C(A) = \frac{CA}{C} 100\%$
		3.4	Percentage of EI equipped with one or more multimedia systems in total number of EI equipped with computer classrooms	SC(M)	%	Ratio (times 100%) of the number of EI with at least one multimedia computer (SCM) to the total number of EI equipped with computer classrooms	$SC(M) = \frac{SCM}{SC} 100\%$
		3.5	Percentage of EI equipped with local networks to the total number of EI equipped with computer classrooms	SC(LAN)	%	Ratio (times 100%) of the number of EI equipped with local network (SCL) to total number of EI equipped with computer classrooms	$SC(LAN) = \frac{SCL}{SC} 100\%$
Software programmes	Operational system	4.1	Percentage of computers with installed OS DOS™ to total number of computers in computer classrooms	OS(D)	%	Ratio (times 100%) of the number of computers with installed OS DOS™ (OSD) to the total number of computers in computer classrooms	$OS(D) = \frac{OSD}{C} 100\%$

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator		Symbols	Data Type	Description	Formula
Software programmes	Operational system	4.2	Percentage of computers with installed OS Windows™ or Apple Macintosh to total number of computers in computer classrooms		OS(A)	%	Ratio (times 100%) of the number of computers with installed OS Windows™ or Apple Macintosh (OSA) to total number of computers in computer classrooms	$OS(A) = \frac{OSA}{C}\ 100\%$
		4.3	Percentage of computers with other installed OS to the total number of computers in computer classrooms		OS(O)	%	Ratio (times 100%) of the number of computers with other installed OS (OSO) to total number of computers in computer classrooms OS(D)+OS(A)+OS(O)=100%	$OS(O) = \frac{OSO}{C}\ 100\%$
	Educational software programmes	5.1	Percentage of EI with any installed educational software programmes for corresponding subjects to total number of EI equipped with computer classrooms	Elementary school subjects	SE(P)	%	Ratio (times 100%) of the number of EI with any installed educational software programmes for elementary school (SEP) to total number of EI equipped with computer classrooms	$SE(P) = \frac{SEP}{SC}\ 100\%$
				Science subjects	SE(N)	%	Ratio (times 100%) of the number of EI with any installed educational software programmes for science subjects (SEN) to total number of EI equipped with computer classrooms	$SE(N) = \frac{SEN}{SC}\ 100\%$
				Humanities	SE(H)	%	Ratio (times 100%) of the number of EI with any installed educational software programmes for humanities (SEH) to total number of EI equipped with computer classrooms	$SE(H) = \frac{SEH}{SC}\ 100\%$

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator	Symbols	Data Type	Description	Formula
Software programmes	Educational software programmes	5.1	Percentage of EI with any installed educational software programmes for corresponding subjects to total number of EI equipped with computer classrooms — Informatics/ Information Technologies	SE(I)	%	Ratio (times 100%) of the number of EI with any installed educational software programmes for Informatics/Information Technologies (SEI) to total number of EI equipped with computer classrooms	$SE(I) = \frac{SEI}{SC} 100\%$
		5.2	Percentage of educational software programmes designed by the domestic specialists to total number of educational software programmes used in EI for corresponding subject curriculum (elementary school, science subjects, humanities, informatics/information technologies)	IN(P) IN(N) IN(H) IN(I)	%	Ratio (times 100%) of the number of domestic educational software programmes for elementary school subjects (INP), science subjects (INN), humanities (INH), informatics/ information technologies (INI) to total number of educational software programmes for curricula of elementary school (P), science subjects (N), humanities (H), informatics/ information technologies (I)	$IN(P) = \frac{INP}{P} 100\%$ $IN(N) = \frac{INN}{N} 100\%$ $IN(H) = \frac{INH}{H} 100\%$ $IN(I) = \frac{INI}{I} 100\%$

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator	Symbols	Data Type	Description	Formula
Software programmes	Educational software programmes	5.3	Percentage of educational software programmes designed by foreign specialists to total number of educational software programmes used in EI for teaching the corresponding curriculum (elementary school, science subjects, humanities, informatics/ information technologies)	EX(P) EX(N) EX(H) EX(I)	%	Ratio (times 100%) of the number of educational software programmes designed by foreign specialists for curricula in elementary school (EXP), science subjects (EXN), the humanities (EXH), informatics/ information technologies (EXI) to total number of educational software programmes	$EX(P) = \frac{EXP}{P} 100\%$ $EX(N) = \frac{EXN}{N} 100\%$ $EX(H) = \frac{EXH}{H} 100\%$ $EX(I) = \frac{EXI}{I} 100\%$
Communications	Internet access	6.1	Percentage of EI without Internet access	I(O)	%	Ratio (times 100%) of the number of EI without Internet access (IO) to the number of EI equipped with computer classrooms	$I(O) = \frac{IO}{SC} 100\%$
		6.2	Percentage of EI with limited Internet access – e–mail only	I(L)	%	Ratio (times 100%) of the number of EI with limited Internet access (IL) to the number of EI equipped with computer classrooms	$I(L) = \frac{IL}{SC} 100\%$
		6.3	Percentage of EI with Internet access via dial–up channel	I(C)	%	Ratio (times 100%) of the number of EI with dial–up Internet access (IC) to the number of EI equipped with computer classrooms	$I(C) = \frac{IC}{SC} 100\%$
		6.4	Percentage of EI with Internet access via dedicated line	I(D)	%	Ratio (times 100%) of the number of EI with Internet access via dedicated line (ID) to the number of EI equipped with computer classrooms	$I(D) = \frac{ID}{SC} 100\%$

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator		Symbols	Data Type	Description	Formula
Communications	Internet access	6.5	Percentage of EI with own web sites		I(W)	%	Ratio (times 100%) of the number of EI with own web sites (IW) to the number of EI equipped with computer classrooms	$I(W) = \frac{IW}{SC} 100\%$
Personnel	EI staff development in computer literacy	7.1	Percentage of elementary school teachers, subject teachers (except teachers of Informatics/ Information Technologies), teachers of Informatics and EI administration who have taken a computer literacy course from September 1, 1999 until present time	50 hours or less (index 1)	$U_1(P)$ $U_1(S)$ $U_1(I)$ $U_1(D)$	%	Ratio (times 100%) of the number of elementary school teachers, subject teachers (except teachers of Informatics and/or Information Technologies), teachers of Informatics and EI administration who have taken a computer literacy course of up to 50 hours (k=1); 50–100 hours (k=2); over 100 hours (k=3) (U_kP, U_kS, U_kI, U_kD) to total number of teachers of corresponding profession/ administration (UP, US, UI, UD)	$U_k(P) = \frac{U_kP}{UP} 100\%$ $U_k(S) = \frac{U_kS}{US} 100\%$ $U_k(I) = \frac{U_kI}{UI} 100\%$ $U_k(D) = \frac{U_kD}{UD} 100\%$ k = 1, 2, 3
		7.2		50–100 hours (index 2)	$U_2(P)$ $U_2(S)$ $U_2(I)$ $U_2(D)$			
		7.3		over 100 hours (index 3)	$U_3(P)$ $U_3(S)$ $U_3(I)$ $U_3(D)$			

Table of Indicators for the Survey *ICT Usage Indicators in Secondary Education of the Baltic and CIS States*

Group	Characteristics	№	Indicator	Symbols	Data Type	Description	Formula
Personnel	Computer skills of elementary school teachers, other subject teachers, teachers of Informatics and administration	7.1	Basic computer literacy	$L_1(P)$ $L_1(S)$ $L_1(I)$ $L_1(D)$	%	Ratio (times 100%) of the number of elementary school teachers, other subject teachers, teachers of Informatics and EI administration who possess basic computer literacy skills (L_1P, L_1S, L_1I, L_1D) to total number of teachers of corresponding profession/ administration	$L_1(P) = \frac{L_kP}{UP}\ 100\%$ $L_1(S) = \frac{L_kS}{US}\ 100\%$ $L_1(I) = \frac{L_kI}{UI}\ 100\%$ $L_1(D) = \frac{L_kD}{UD}\ 100\%$ $k = 1, 2$
		7.2	Proficient computer skills	$L_2(P)$ $L_2(S)$ $L_2(I)$ $L_2(D)$	%	Ratio (times 100%) of the number of elementary school teachers, other subject teachers, teachers of Informatics and EI administration who are proficient in the ICT field (L_2P, L_2S, L_2I, L_2D) to total number of teachers of corresponding profession/administration	

APPENDIX 7.
Questionnaire for the Survey "ICT Usage Indicators in Secondary Education in the Baltic and CIS States"

The structure of educational systems in the CIS is similar and includes three stages (see Table 1). In this questionnaire, these stages are denoted as **elementary education, basic education and secondary education.**

Table 1. Structure of Educational Systems

State	Student ages, years / education periods, years		
	1st stage (Elementary education)	2nd stage (Basic education)	3rd stage (Secondary education)
Armenia	7–10 / 4	11–14 / 4	15–16 / 2
Azerbaijan	6–9 / 4	10–14 / 5	15–16 / 2
Belarus	6–9 / 4	10–14 / 5	15–16 / 2
Kazakhstan	7–10 / 4	11–15 / 5	16–17 / 2
Kyrgyzstan	7–10 / 4	11–15 / 5	16–17 / 2
Republic of Moldova	7–10 / 4	11–15 / 5	16–17 / 2
Russian Federation	7–9 / 3	10–14 / 5	15–16 / 2
Tajikistan	7–10 / 4	11–15 / 5	16–17 / 2
Turkmenistan	7–10 / 4	11–15 / 5	16–17 / 2
Ukraine	7–10 / 4	11–15 / 5	16–17 / 2
Uzbekistan	6–9 / 4	10–14 / 5	15–16 / 2

School systems include the following educational institutions: elementary school (elementary education), basic school (elementary education, basic education), secondary school (elementary, basic and secondary education) as well as new educational institutions, such as gymnasiums, college, lyceum, etc. Furthermore, all of these three types of educational institutions will be abbreviated as **EI** in this questionnaire.

Country	
Organization	Name: ..... Tel.: ..... Fax: ..... Web site: http// .....
Expert	Name: ..... Tel.: ..... E–mail: .....

Appendix 7

1. Government Documents Regulating ICT Usage and Development in School Education

Government documents include state curricula, plans, official decrees, government resolutions, etc.

1.1 Government documents regulating ICT usage in education

1.2 Government documents regulating ICT usage in education effective beginning in 2002

Points 1.1 and 1.2 indicate the exact name of the document as well as how copies can be obtained (e.g., mailing address, organization's official web site with access to paper and electronic copies of the documents).

2. ICTs in Curricula

A government curriculum is a curriculum approved by a country's Education Ministry and mandatory for all EI in that country.

2.1 Government curriculum available for Informatics and/or Information Technologies	2.1.1	YES	2.1.2	NO
2.2 If "Yes" in point 2.1, please specify how a copy of the curriculum and the document(s) regulating the educational content in this subject (if it exists) can be obtained				

State of Education	Informatics and/or Information Technologies as a separate subject				ICT usage in support of other subjects as stipulated by curricula for these subjects			
2.3 Elementary education	2.3.1	YES	2.3.2	NO	2.3.3	YES	2.3.4	NO
2.4 Basic education	2.4.1	YES	2.4.2	NO	2.4.3	YES	2.4.4	NO
2.5 Secondary education	2.5.1	YES	2.5.2	NO	2.5.3	YES	2.5.4	NO

In points 2.1, 2.3, 2.4 and 2.5, select "Yes" or "No" and circle the answer.

3. Computer Equipment at EI

	Percentage of EI equipped with computer classrooms		Average number of students per computer in EI equipped with computer classrooms		Percentage of computers compatible with IBM and Apple models in the total number of computers used in EI		Percentage of EI equipped with one or more multimedia system* in the total number of EI equipped with computer classrooms		Percentage of EI equipped with a local network** in the total number of EI equipped with computer classrooms	
Total	3.1.1		3.1.2		3.1.3		3.1.4		3.1.5	
Including ***urban EI	3.2.1		3.2.2		3.2.3		3.2.4		3.2.5	
***rural EI	3.3.1		3.3.2		3.3.3		3.3.4		3.3.5	

Points 3.2.1-3.2.5 indicate EI in urban areas and points 3.3.1-3.3.5 indicate EI in rural areas.

In point 3.1.1, the percentage is compared to the total number of EI; in point 3.2.1, the total number of urban EI; in point 3.3.1, the total number of rural EI.

* Multimedia system equipment means soundcards, audio systems (speakers and/or headphones) and CD-ROMs.

** Local network equipment means any network that connects all the computers in classrooms or administrative workplaces (principal, deputy principal) that can be used in educational processes and management (e.g., curriculum planning, assessment, statistics processing, etc.)

*** Urban EI are those located in areas with city status or city-type status, while rural indicates all other EI.

4. Software

Operation System

PC's – DOS™		PC's – Windows™ or Apple Macintosh		Other OS		TOTAL
4.1	%	4.2	%	4.3	%	100%

In points 4.1-4.3, please note the percentage of OS types compared to the total number of computers used in EI.

Educational Software programmes

	Percentage of EI with any educational software programmes for teaching corresponding subjects to total number of EI equipped with computer classrooms		Percentage of educational software programmes developed by domestic specialists to the total number of educational software programmes used in EI for teaching the corresponding set of subjects		Percentage of educational software programmes developed by foreign specialists to the total number of educational software programmes used in EI for teaching the corresponding set of subjects	
4.4 Elementary school subjects	4.4.1		4.4.2		4.4.3	
4.5 Science subjects	4.5.1		4.5.2		4.5.3	
4.6 Humanities	4.6.1		4.6.2		4.6.3	
4.7 Informatics and/or Information Technologies	4.7.1		4.7.2		4.7.3	

5. Communications – EI Internet Access

Percentage of EI with no access	5.1	
Percentage of EI with e–mail only	5.2	
Percentage of EI with access via dial–up connection	5.3	
Percentage of EI with access via dedicated channel	5.4	
Percentage of EI with own web sites	5.5	

Points 5.1-5.5: please specify the percentage compared to the total number of schools equipped with computer classrooms.

6. EI Staff Development in Computer Literacy

	Computer literacy courses taken from September 1999 and after					
	< 50 hours		50–100 hours		>100 hours	
6.1 Elementary school teachers	6.1.1	%	6.1.2	%	6.1.3	%
6.2 Teachers of other subject, not including Informatics and/or Information Technologies	6.2.1	%	6.2.2	%	6.2.3	%
6.3. Teachers of Informatics and/or Information Technologies	6.3.1	%	6.3.2	%	6.3.3	%
6.4 Administration	6.4.1	%	6.4.2	%	6.4.3	%

A course in computer literacy implies a training course with topics such as OS basics, text and graphic editors, spreadsheets, educational software, etc.

7. EI Staff Computer Knowledge Levels

	Elementary computer knowledge		ICT proficiency	
7.1 Elementary school teachers	7.1.1	%	7.1.2	%
7.2 Teachers of subjects not including Informatics and/or Information Technologies	7.2.1	%	7.2.2	%
7.3 Teachers of Informatics and/or Information Technologies	7.3.1	%	7.3.2	%
7.4 Administration	7.4.1	%	7.4.2	%

Elementary computer knowledge means the ability to work with text processors and spreadsheets.

ICT proficiency implies Internet skills (e-mail, news services, other informational resources), the ability to use special professional domain software programmes and the ability to create training materials using electronic presentations (e.g., PowerPoint), web page editors (e.g., "FrontPage"), CAI tools (e.g., "TeachCad", "ToolBook") in addition to the Elementary computer knowledge described above.

8. Comments

In this section, you may comment on the data presented above and/or make notes and recommendations on the content and form of the questionnaire. We will be happy to receive any questions, comments, suggestions or ideas that you may have.

Respondent's comments

APPENDIX 8.
Government Documents Regulating ICT Usage and Development in Education

	Valid through 2002
Armenia	The Law of the Republic of Armenia. "RA government education programme for 2001–2005," Section 3 "Objectives and Actions," item 4 "Integration in the International Education Society"
Azerbaijan	Under development
Belarus	The republican program "Informatisation of the Educational System". The Education Ministry Board's resolution titled "Basic Trends in Integrating Informatics in Educational Activities and Management in Secondary Schools of the Republic of Belarus". A government program stipulating the creation of a computer network for education in the Republic of Belarus. Syllabi for the "Informatics" secondary school (8–11 grades)
Georgia	Education Law adopted by the parliament and approved by the president of Georgia on 27 June 1997
Kyrgyzstan	Curricula, syllabi, and a draft of government educational standards for Informatics. Curriculum approved by Kyrgyzstan's Education Ministry
Kazakhstan	Education Law №3904, adopted 7 June 1999. The Government Program of the President of the Republic of Kazakhstan "ICT Application in Secondary Education Systems" approved by Presidential order №3645 on 22 September 1997. The government standard of Informatics education (grades 7–11). Curriculum on Informatics (7–11 grades)
Lithuania	Strategy for incorporating ICT in education
Republic of Moldova	Curricula and syllabi
Russian Federation	Education Ministry orders: №322 (9 February 1998), №56 (30 June 1999), №1788 (20 April 2001)
Tajikistan	Development and incorporation of new IT into the educational system. "Computerization of information processes in education management"
Ukraine	Law on the "Concept of National Information Integration Program" (4 February 1998). Law on the "National Informatization Programme" (4 February 1998). Amendments to Ukraine's law on the "National Informatization Programme" (13 September 2001). Presidential order on "Activities to Develop National Components on the World Wide Web / Internet and to Provide Extensive Internet Access in Ukraine" (31 June 2000). Resolutions passed by the Supreme Rada of Ukraine titled: "Approval of Tasks stipulated by the National Information Integration Programme"
Uzbekistan	Education Ministry Resolution №230 (2 May 2001). The Computer and Information Technologies Programme for 2001–2005, aiming to provide extensive access to the Internet

Appendix 8

2002 and on	
Armenia	Official Government RA Educational Development Program
Azerbaijani	Under development
Belarus	The republican programme “Information Integration in the Education System” (effective until 2006). The government programme on computer networks for education systems in Belarus (2001–2005)
Georgia	Presidential order №865 (4 August 2000): “Urgent Measures to Promote the Development of Information Integration in Georgia”
Kyrgyzstan	KR Government resolution №697 titled: “Approval of the Information and Communication Technologies Development Program in the Kyrgyz Republic” (8 November 2001)
Kazakhstan	The government program for secondary education in the Republic of Kazakhstan (2002–2004). The information integration program for elementary and secondary vocational institutions in the Republic of Kazakhstan. Approved by RK government resolution №616 on 10 May 2001
Lithuania	Under development
Republic of Moldova	The government’s draft resolution on incorporating ICT in education
Russian Federation	Government resolutions №224 (23 March 2001) and №630 (28 August 2001). Education Ministry orders: №1788 (20 April 2001), №2093 (21 May 2001 (Appendix)), №834 (6 March 2001)
Tadjikistan	A coordinative plan on complex education issues (2001–2010). Official statement ordering the analysis of ICT efficiency in education, approved by the Education Ministry and the Academy of Sciences
Ukraine	Presidential Address to the Supreme Rada titled: “Ukraine in the 21st Century. Strategies for Economic and Social Development fin 2001–2004”. The Cabinet of Ministers resolution (6 May 2001) approving the information integration program for comprehensive secondary schools and the computerization of rural schools in 2001–2003
Uzbekistan	Education Ministry order №237 (29 June 2001) to create the New Information Technologies Center

* For the exact titles of the laws and official documents mentioned above, please refer to the appropriate sources.

APPENDIX 9.
Excerpt from the Curriculum on Advanced Training for Teachers and Administration of Educational Institutions in the Uzbekistan's System of Continued Education

Educational and Information Center of the National University of Uzbekistan
Topic: The Internet – 36 hours.

1. INTERNET BASICS
   - What is the Internet?
   - The number of Internet users. Estimates
   - Internet structure
   - Internet access
   - Internet
   - Internet access and services protocols

2. DISTRIBUTED NETWORKS
   - Local networks as nodes of distributed access system
   - Network topology
   - Types of Ethernet connection
   - Client-server architecture, servers and workstations
   - Types of connection channels
   - Equipment and software programmes for local network access to communication channels

3. IINTERNET BROWSERS
   - Internet Explorer
   - Windows-style graphic user interface
   - Web browsing
   - Web surfing
   - Web pages printing
   - Editing and saving of Web page excerpts

4. CONNECTING TO THE INTERNET
   - What is an Internet provider? Selection criteria
   - Provider services
   - The Internet in Uzbekistan
   - Internet providers and Internet companies in Uzbekistan
   - What does one need to connect to the Internet?

5. INTERNET SEARCH
   - Information search on the Web
   - Catalogue servers and search engines
   - Using catalogue servers
   - Query languages and using search engines
   - Characteristics of different search engines on the Web
   - Search using servers in Uzbekistan
   - Russian search engines

6. E-MAIL
   - The basics of e-mail.
   - E-mail at mail.yahoo.com
   - How to read e-mail messages
   - How to send messages via e-mail
   - How to send links, pictures and attached files