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INFORMATION AND COMMUNICATION TECHNOLOGIES FOR THE DEVELOPMENT OF EDUCATION AND THE CONSTRUCTION OF A KNOWLEDGE SOCIETY

INDICATORS OF ICT APPLICATION IN SECONDARY EDUCATION OF SOUTH–EAST EUROPEAN COUNTRIES

STATISTICAL SURVEY

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Indicators of ICT Application in Secondary Education of South-East European Countries. Statistical survey

The survey *Indicators of ICT Application in Secondary Education of South-East European Countries* aims at investigating the main factors, tendencies, problems and solutions for ICT applications in secondary schools of South-Eastern Europe, at collecting data and at developing recommendations stimulating national educational policies, strategies and their implementation.

The survey presents the results of the statistical research *Indicators of ICT Application in Secondary Education* accomplished within the framework of the UNESCO IITE sub-regional project for South-Eastern Europe *Information and Communication Technologies for the Development of Education and the Construction of a Knowledge Society.*

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FOREWORD

A number of UNESCO programmes aims at education development. One of the main UNESCO programmes *Education for All* emphases the provision of basic education for everyone by renewing educational systems and informational support for them. The programme includes analysis of the national policies and strategies, and activities expanding the role of knowledge and communications among all actors of education.

Following these objectives UNESCO educational programmes raise the role of education exchanging qualitative information and knowledge at international, national and regional levels. It could be achieved by promoting the application of information and communication technologies (ICTs) in education in different aspects – management of education, information support, and teaching.

Although, European countries are advanced technologically as a whole, Europe exposes a diversity of situations and some contrast between Western and South-Eastern countries. Alongside with countries with highly developed education systems employing advanced teaching approaches and newest ICTs, there are other states that are only in initial stages of deploying such tools. UNESCO is challenged to help alleviate a growing gap in educational development and delivery systems, especially by assisting the South-East European countries.

To ensure the free flow of, and equitable access to knowledge, information, data and best practices on ICT application in education, the UNESCO Institute for Information Technologies in Education (IITE) has launched sub-regional project for South-Eastern Europe *Information and Communication Technologies for the Development of Education and the Construction of a Knowledge Society* funded by the Japanese Funds-in-Trust for the Capacity Building of Human Resources. Nine countries from the region are involved in the project: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, former Yugoslav Republic of Macedonia (FYRO Macedonia), Republic of Moldova, Romania, Serbia and Montenegro, and Turkey.

Ministries of education, national commissions for UNESCO, pre- and in-service pedagogical institutions and national focal points for cooperation with IITE coordinate the events under the project at the national level. At the international level the activities are coordinated and supported by IITE.

The report presents the results of the statistical survey *Indicators of ICT Application in Secondary Education of South-East European Countries* within the framework of the project.

ABBREVIATIONS

IT – information technologies
ICTs – information and communication technologies
EI – educational institutions
OS – operational systems
SEE – South-Eastern Europe
GDP – gross domestic product

Abbreviations for participating countries	
ALB	Albania
BIH	Bosnia and Herzegovina
BUL	Bulgaria
CRO	Croatia
MCD	FYRO Macedonia
MOL	Republic of Moldova
ROM	Romania
SCG	Serbia and Montenegro

DESCRIPTION OF THE RESEARCH

The survey *Indicators of ICT Application in Secondary Education of South-East European Countries* aims at investigating the main factors, tendencies, problems and solutions for ICT applications in secondary schools of the South-Eastern Europe (SEE), at collecting data and developing recommendations to stimulate national educational policies, strategies and their implementation.

To start the activity IITE held the expert meeting *Indicators of ICT Application in Secondary Education* within the framework of the IITE sub-regional project for SEE *Information and Communication Technologies for the Development of Education and the Construction of a Knowledge Society* in Bucharest, Romania, in February 2004. National specialists and experts responsible for educational statistics were invited to discuss the procedures of data collection and analysis for the survey.

During the meeting IITE presented the results of the similar research carried out by IITE for CIS countries. IITE experts suggested exemplary questionnaires for data collection. The participants of the meeting found the research topical for their countries and agreed to participate in further activities. Special discussion was devoted to the analysis of the proposed questionnaires to make up the appropriate one for the study.

On the basis of suggestions and recommendations of the expert meeting IITE developed the questionnaire which was consequently used in the study.

As indicated in the IITE position paper *Information and Communication Technologies in Secondary Education* "the unique role of ICTs in improving education quality is based on their ability to effectively facilitate the fulfilment of both necessary and sufficient conditions for receiving quality education. The necessary conditions would include such educational components as:

- well-equipped classrooms and lecture halls;
- highly professional administrators in managerial positions at the educational institutions;
- highly qualified teaching and technical personnel;
- easy access for students and teachers to quality textbooks and professional literature as well as to modern teaching aids and supplementary information."

The questionnaire for the survey was based on a system of indicators reflecting necessary conditions of education quality. It included questions concerning national ICT policy and action plan; financial support; educational target groups; ICT curriculum, computer equipment, and ICT school staff.

Almost all participating countries submitted the required data. Figure 1 presents the survey geography.

Figure 1. Countries participating in the survey

To collect the relevant data on indicators a contact was established with the leading specialists from the ministries of education responsible for policy-making, specialists from statistical units, other management authorities and schools.

The report is based on the data collected and analyzed. The statistical data is presented in tables and diagrams.

ORGANIZATION OF THE RESEARCH

The events under the project for SEE are provided at the national level by ministries of education, national commissions for UNESCO, pre- and in-service pedagogical institutions, national focal points for cooperation with IITE. At the international level the activities are coordinated and supported by IITE.

The survey was accomplished in several steps. During the first step a questionnaire was developed, discussed and improved accounting the recommendations of the participants of the expert meeting. The final questionnaire is presented in Appendix 3.

The next step was to appoint specialists (Appendix 2) responsible for data collection and submission of the filled-in questionnaire. Responsible experts and official institutions involved in the survey expressed their strong interest in the project and assisted in gathering data. They sent the information requested to Ministry of Education by e-mail and fax. The information was generalized by the national coordinators and teams attached; the questionnaires were filled in and e-mailed to IITE. The international team of experts summarized data of all countries participated in the project and made a final report for the survey. The final report with conclusions and recommendations was sent to the countries to benefit national ICT actors in promoting policy, strategy and implementation.

SYSTEM OF INDICATORS

The survey questionnaire aims at exploring the main factors important for effective implementation of national education policy.

The questionnaire includes 18 questions that could be grouped according to the following topics:

Indicators Group 1: National ICT Policy and Action Plan. This group focuses on existing picture; means of implementation; financial support; curricula; educational software; at what level ICTs are taught first. The picture is drawn on the lists of the official documents on ICT usage in secondary education (D); government curricula for Informatics/Information technologies as separate subjects (PR), ICTs as a separate course (SI) and integration of ICTs in other subjects (SS).

Indicators Group 2: Statistics. This group draws attention to computer equipment of schools; the average number of students per one computer; Internet access; type of connection; availability of e-mail and school web sites; types of software installed; ICT school staff (teachers of Informatics/ICTs and teachers of other subjects) – level of their experience. In particular, this group is presented by the following indicators:

- Percentage of schools with computer classrooms (SC);
- Average number of students per computer in schools with computer classrooms (NC);
- Percentage of schools having computer classrooms with computers not older than 1995 (SCN);
- Percentage of schools with a local network in the total number of schools with computer classrooms (SCL);
- Percentage of schools without Internet access (IO);
- Percentage of schools with e-mail only (IL);
- Percentage of schools with access via dial-up connection (IC);
- Percentage of schools with access via dedicated channel (ID);
- Percentage of schools having their own web sites (IW);
- Elementary school teachers (TE);
- Teachers of Informatics and/or Information technologies (TI);
- Teachers of other subjects (excluding Informatics or Information technologies) (TO);
- Administrators (AD);
- Percentage of elementary school teachers with elementary computer skills (TEE);
- Percentage of elementary school teachers with advanced computer skills (TEA);
- Percentage of teachers of Informatics and/or Information technologies with elementary computer skills (TIE);
- Percentage of teachers of Informatics and/or Information technologies with advanced computer skills (TIA);
- Percentage of teachers of other subjects (excluding Informatics or Information technologies) with elementary computer skills (TOE);
- Percentage of teachers of other subjects (excluding Informatics or Information technologies) with advanced computer skills (TOA);
- Percentage of administrators with elementary computer skills (ADE);
- Percentage of administrators with advanced computer skills (ADA).

Refer to Appendix 1 for the detailed list of data indicators, conventional symbols, and calculation methods.
These indicator groups defined the content of the questionnaire's guidelines for the survey *Indicators of ICT Application in Secondary Education of South-East European Countries.*

STUDY RESULTS

Indicators Group 1. National ICT Policy and Action Plan

The national policies on ICT integration in education can be considered in the context of education. There is a great diversity between countries, and it depends on the economic development and funding of education. Data for education financing of some European countries is shown below as a percent of GDP ("Human Development Report 2004" – UNDP):

Country	1990	1999
Norway	7.1	6.8
Sweden	7.4	7.6
Belgium	5.0	5.8
Ireland	5.2	4.3
Switzerland	5.1	5,6
United Kingdom	4.9	4.6
Finland	5.6	6.3
France	5.4	5.7
Denmark	...	8.3
Germany	...	4.6
Croatia	...	4.2
Bulgaria	5.2	...
Republic of Moldova	...	4.0
Turkey	2.2	3.7
Romania	2.8	3.5
FYRO Macedonia	...	4.1

The last six countries in this list participated in the present survey. The data show that the education in these countries doesn't have strong financial support in comparison with other European countries.

Information and communication technologies in European schools receive the attention of European Commission and European Union. In the report *Key Data on Information and Communication Technology in Schools in Europe,* 2004 edition, it is noted: *"All schools, if not all classes, should be highly computerized, all teachers should be able to use the technology to enhance their working methods and all young people should be able to broaden their horizons by using it comfortably though with the necessary critical perspective."* These goals draw the scores of the European Union ICT policy in education for 2010.

Questions 4–14 deal with the description of the national policies.

All countries answered the question on availability of national policy. Four of them (Albania, Bulgaria, Croatia and Republic of Moldova) have developed and adopted national strategies and action plans for implementation. The descriptions of Croatia and Bulgaria give information that the process of implementation of their national policies is ongoing. Ministry of Education and Science of Albania plans the implementation of national ICT policy in 2005–2015. No data is available for the implementation period for the Republic of Moldova. The strategies of the four countries are designed to provide school equipment (hardware and software), build educational infrastructure,

Internet access, and to train teachers. The Republic of Moldova and Bulgaria include the development of educational management systems and portals with teaching support materials. Foster orientation to life-long learning is involved in the strategy of Croatia.

The strategies of Bulgaria and Croatia cover formal schools only (both primary and secondary), however that of Albania covers non-formal education only. No data is available about the Republic of Moldova.

Table below shows presence or absence of the given components in the national policies on ICT application in education.

Table 1. Presence or absence of the following in the implementation of the national policies on ICT application in education

Country	Master plan	Timeframe	Separate unit	Monitoring and evaluation scheme	Budget plan
Albania	Yes	Yes	Yes	No	No
Bulgaria	Yes	Yes	Yes	Yes	Yes
Croatia	Yes	Yes	No	Yes	Yes
Bosnia and Herzegovina	No national policy on ICT application in education				
FYRO Macedonia					
Republic of Moldova					
Romania					
Serbia and Montenegro					

For the present survey according to Albanian strategy (which has no budget) the planned funding relies on external donors. It could be explained by the fact that the Albanian measures relate to the non-formal education. The rest two countries envisage the following funding for their strategies' implementation: Bulgaria – 1.76% from 2005 national budget for education, Croatia – 0.0103%. No data were provided from the Republic of Moldova.

The national policies of Bulgaria and Croatia (Appendix 4) cover remote schools, minorities, girls and children with special needs.

Bosnia, Romania and Serbia do not have any national policies. They apply different approaches of ICT integration in education. Bosnia, FYRO Macedonia and Romania have projects of ministries; Bosnia and FYRO Macedonia rely on ad hoc committee. In Serbia ICTs in education are integrated in the regular programme of Ministry.

All participating countries, except Bosnia, have a curriculum of ICT application in education at the national level. Students from four countries – Albania, Bulgaria, Croatia, FYRO Macedonia and Romania – acquire ICT skills in obligatory subjects. Only three of these countries (Bulgaria, FYRO Macedonia and Serbia) have elective subjects in their curricula. Most primary schools in Croatia also have elective ICT subjects. National curricula of two countries only (Bulgaria and Romania) include ICT applications in other subjects. For Croatia integration of computer technologies is recommended, not compulsory. Some students from Romanian high schools can be acquainted with new ICTs using computers in other subjects. Data collected shows that Bulgarian curricula propose the most forms of ICT education – compulsory and elective subjects, integration of ICTs in another subjects. Romania and FYRO Macedonia are in the second place, then Croatia (see Table 2).

Table 2. ICT national curriculum

Country	Compulsory subject	Elective subject	Integrating ICTs in other subjects	Others
Albania	X			
Bosnia	X			
Bulgaria	X	X	X	X
Croatia	X	X		
FYRO Macedonia	X	X		X
Republic of Moldova	X			
Romania	X		X	
Serbia	X	X		

There is special educational software for ICT curricula in five countries of the region: Albania, Bulgaria, Croatia, FYRO Macedonia and Romania. Bulgarian data shows availability of special educational software in other subjects supported by ICTs. In Romania special educational software is developed under Ministry of Education programme *Educational IT-Based System*.

According to *Key Data on Information and Communication Technology in Schools in Europe,* 2004 edition, the picture of ICT teaching in primary schools is the following. Most countries involve compulsory ICT minimum in primary education, except Bulgaria, Czech Republic, Hungary, Italy, Latvia, Lithuania and Slovakia. Romanian pupils learn ICTs as a subject in primary schools. Belgium, Denmark, Germany, Greece, Finland, Norway, Portugal, Spain, Sweden propose ICT usage as a tool for other subjects. United Kingdom, Netherlands and Poland apply both approaches – a separate subject and integration of ICTs in other subjects. ICT is a compulsory subject for all day primary schools in Greece. In United Kingdom a separate subject is defined by the National Curriculum, but the way it is taught is a matter of school (separate lessons, cross-curricular teaching or a combination of both). In Northern Ireland the teaching objectives for ICTs are included in the statutory requirements for all subjects. For Hungary and Bulgaria non-compulsory courses are possible. This picture changes fast. European countries, in which ICTs is not a compulsory subject in the curriculum for 2002/2003, are now exception to the rule. In primary education ICT is a part of the compulsory education for most European countries, except Bulgaria, Czech Republic, Hungary, Italy, Latvia, Lithuania and Slovakia.

What is a European state at the secondary school level? The surveys show that all European countries offer ICT compulsory curriculum at this level. Italian curriculum does not include ICT compulsory matter either in lower secondary school or in upper secondary one. Bulgaria offers compulsory subjects in the upper secondary school only.

In most cases the national curricula combine two approaches to ICT teaching – a separate subject and integrating ICTs in other subjects. Spain has ICT a compulsory subject in the first two years of secondary education, and in new curriculum ICT skills may be used as a tool. For France in the first year of upper secondary school ICTs is a core curriculum option. Luxemburg applies both approaches – in technical secondary schools ICTs is a separate subject but in all other types – ICTs is integrated as a tool.

In conclusion, ICTs are often included in the curriculum as a separate subject and a tool for other subjects. Also there is a tendency to promote teaching ICTs as a separate subject.

What does the data give for the survey?

Table 3. Level of ICTs introduction as a separate subject

Country	Primary education	Lower secondary education	Upper secondary education	Grade/age
Albania			X	9/14–15
Bosnia				
Bulgaria			X	9/15
Croatia		X		/15
FYRO Macedonia		X		6/12–13
Republic of Moldova				
Romania		X		
Serbia	X			7/13

Table 3 presents the answers of the participating countries to the question: At what level students begin to learn ICTs as a separate subject in your country?

Table 3 shows that in the South-Eastern region ICTs as a separate subject appear too late. Only in one country first ICTs are introduced in primary education. The most countries (Croatia, FYRO Macedonia, Romania) introduce ICTs in lower secondary school. Albania and Bulgaria offer a separate ICT course too late – in upper secondary education. The lowest grade is 7 (13 years). The highest grade is 9 (14–15 years). Late introduction of ICTs in educational curricula can be explained by the difficulties of the countries in transition.

A successful national policy needs management, monitoring and evaluation of the process of implementation. In all European countries (as the report *Key Data on Information and Communication Technology in Schools in Europe*, 2004 edition shows) one or more units are responsible for implementation or promotion of ICT policy. In most countries these unites are in ministries of education (Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Hungary, Italy, Poland and others). In Sweden the official ICT body is not Ministry of Education. In some countries both Ministry and organization outside Ministry are responsible for ICT policy in education (Finland, Norway, Spain, Turkey, United Kingdom and others). These units define the objectives, organize professional training for teachers, develop new software support, monitor and coordinate the ICT educational initiatives and projects, they are responsible for the decisions taken. There are special units in five of the participating countries – Albania, Bulgaria, Croatia, Romania and Serbia.

Indicators Group 2. Statistics

2.1. Computer Equipment

The empirical data collected in other surveys (PISA[1] , PIRLS[2]) show that the level of ICT penetration in schools varies widely from one country to another, from school to school. Even in some countries with a satisfactory level of ICT penetration, over 60% of students have never used the available equipment. In the initial stage computer facilities are mainly for administrative and teaching staff. Recently ICTs have started to serve educational purposes.

[1] http://nces.ed.gov/surveys/pisa/

[2] http://www.nfer.ac.uk/research/DOWNLOADS/PIRLS/PIRLS1.pdf

EURYDICE[3] report *Key Data on Information and Communication Technology in Schools in Europe – 2004* shows that in most European countries there are no centralized decisions for investment in computer equipment – it is a question of local authorities or schools. Some countries such as Belgium (Flemish part), United Kingdom (England, Scotland), Malta and Slovenia have recommendations for "the number of pupils working on one computer". Bulgaria, Greece, Lithuania and Portugal move to reduce the ratio. In most European countries (in 2000) there are 20 students per one computer. Denmark, Finland, Liechtenstein, Luxemburg, Norway, Sweden and United Kingdom have the ratio less than 10; in Bulgaria and Latvia – 30 pupils per one computer; in Greece, Portugal and Romania – more than 50. This picture changes quickly. It is noticed that this ratio is better in the countries where these decisions are not delegated to local authorities.

For the survey data related to quantity and quality of hardware equipment in secondary schools of the countries from South-Eastern Europe is shown by the following indicators:

- SC – percentage of schools with computer classrooms;
- NC – average number of students per computer in schools with computer classrooms;
- SCN – percentage of schools having computer classrooms equipped with computers not older than 1995;
- SCL – percentage of schools with a local network in the total number of schools with computer classrooms.

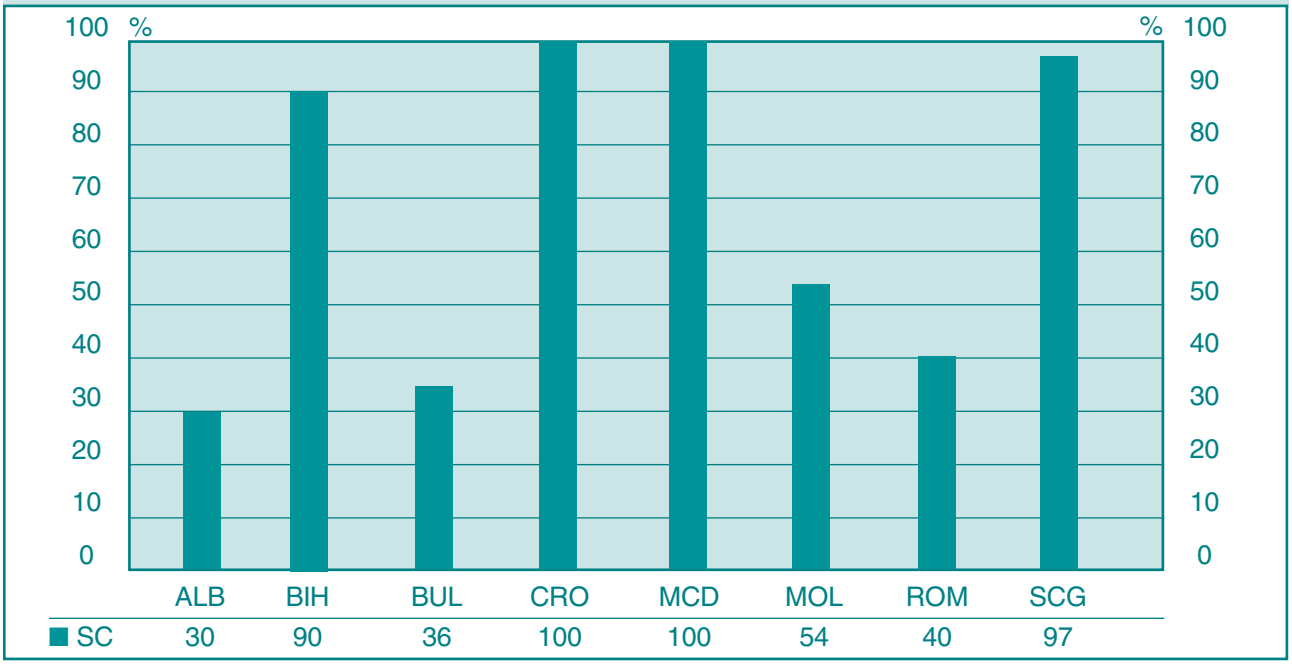
The following formulas are used in calculations:

$SC = \frac{SCC}{S} * 100\%$	$NC = \frac{NSC}{C} * 100\%$	$SCN = \frac{CN}{SCC} * 100\%$	$SCL = \frac{SL}{SCC} * 100\%$

This data is shown in Diagrams 1–4 below.

Diagram 1 presents data on the percentage of the secondary schools from participating countries with computer classrooms. The best results belong to Croatia and FYRO Macedonia (all schools have computer labs – at least one per school). Serbia and Bosnia go next.

Diagram 1. Percentage of schools with computer classrooms



[3] The information network on education in Europe

Diagram 2 presents the average number of students using one computer in schools with computer classrooms. The best result is 17 students per computer in Croatia. It is close to average European statistics. Romania is next with 25 students per computer, and the worst result of 150 is in FYRO Macedonia.

Diagram 2. Average number of students per computer in schools with computer classrooms

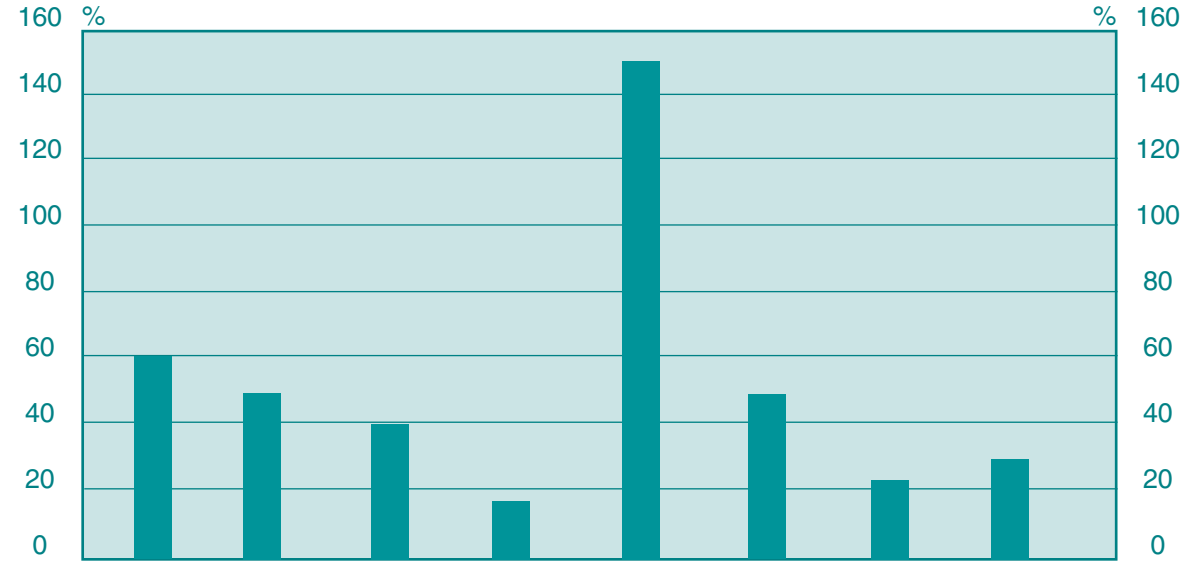


Diagram 3 shows the quality of the computer equipment and percentage of schools that have classrooms equipped with computers not older than 1995. Macedonian schools use new ICTs, though they are few in number. Serbia and Croatia are next. The lowest result belongs to Bosnia – 50% computer equipment was bought before 1995.

Diagram 3. Percentage of schools having computer classrooms equipped with computers not older than 1995

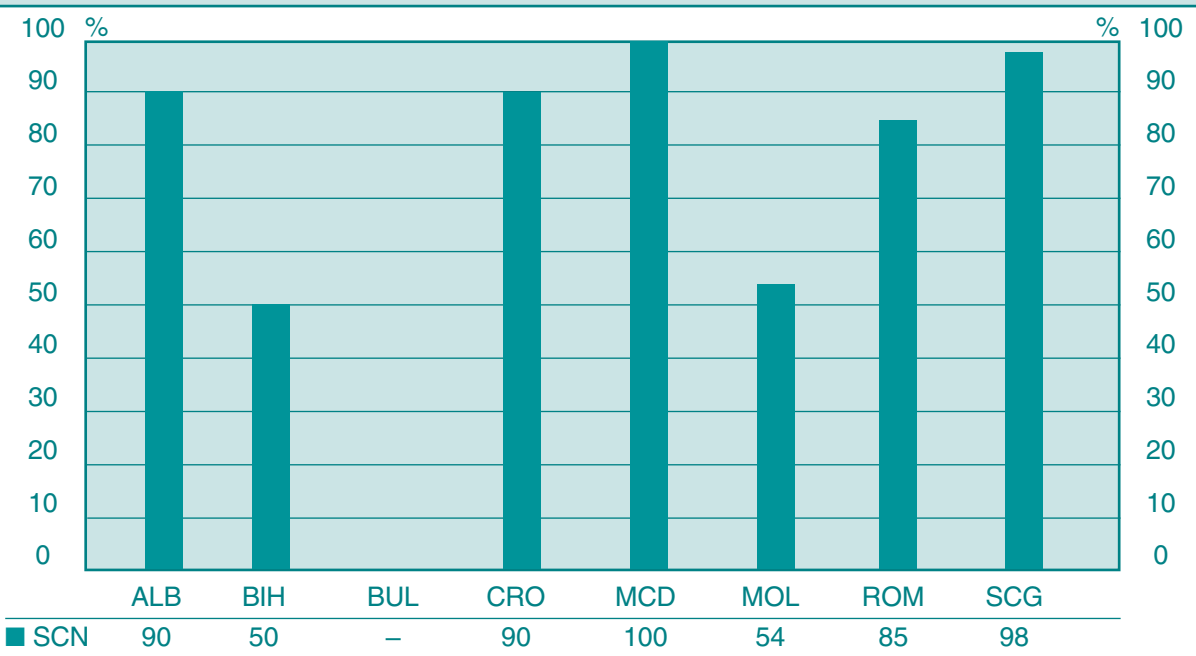
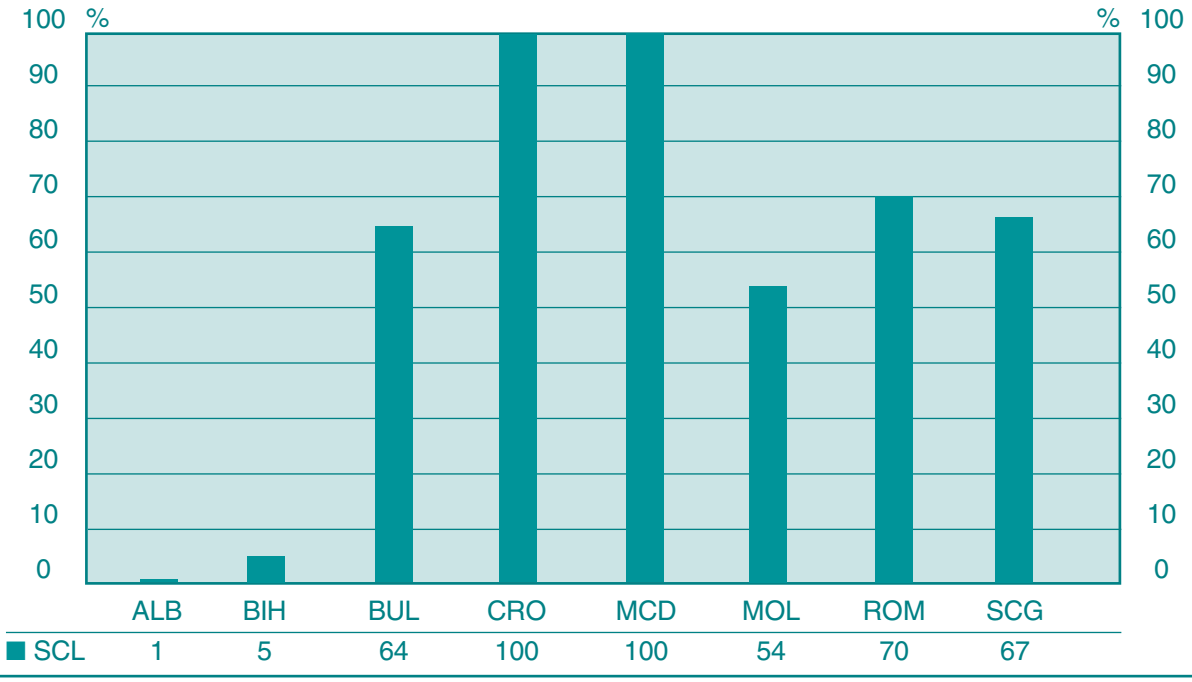


Diagram 4 gives the picture of availability of the local networks in schools with computer classrooms. The best results are in Croatia. FYRO Macedonia has high result due to the fact that they have few well-equipped computer classrooms with local networks. Albania shows the lowest result – only 1% schools have LAN. More than half of schools with computer labs in Bulgaria, Croatia, FYRO Macedonia, Republic of Moldova, Romania and Serbia use local networks.

Diagram 4. Percentage of schools with a local network in the total number of schools with computer classrooms



2.2. Internet Access

UNDP *Human Development Report 2004* gives the following number of Internet users per 1,000 people:

Countries by group	1999	2002
All developing countries	...	40.9
Central and Eastern Europe and the CIS	0	71.8
High human development	2.5	382.6
Medium human development	0	37.3
Low human development	0	5.9
High income	3.1	445.8
Middle income	0	59.5
Low income	0	13.0
World	0.5	99.4

According to this report the best index for European countries is:

Countries	1999	2002
Finland	4.0	508.9
France	0.5	313
Iceland	0	647.9
Netherlands	3.3	506.3
Norway	7.1	502.6
Sweden	5.8	573.1
Switzerland	5.8	351.0
United Kingdom	0.9	423.1

The countries participating in this survey show the following results:

Countries	1999	2002
Albania	0	3.9
Bulgaria	0	80.8
Croatia	0	180.4
FYRO Macedonia	0	48.4
Republic of Moldova	0	34.1
Romania	0	101.5
Turkey	0	72.8

Comparison of data reveals that the number of Internet users has increased essentially in the last three years.

For European countries the level of Internet access has always been lower than the level of computerization. The schools with more computers have high rates of computers with Internet access (Finland, Iceland, Liechtenstein, Luxemburg, Sweden). The surveys of OECD and PISA in 2000 show the highest result in Luxemburg – 87.8% computers are connected to the Internet, in Finland – 83.7%, in Island – 82.6%.

For the present survey data collected on Internet access of the secondary schools is described by the following indicators:

- IO – percentage of schools without Internet access;
- IL – percentage of schools with e-mail only;
- IC – percentage of schools with access via dial-up connection;
- ID – percentage of schools with access via dedicated channel;
- IW – percentage of schools having their own web sites.

The following formulas are used in calculations:

$IO = \frac{SIO}{SCC} * 100\%$	$IL = \frac{SIL}{SCC} * 100\%$	$IC = \frac{SIC}{SCC} * 100\%$	$ID = \frac{SID}{SCC} * 100\%$	$IW = \frac{SIW}{SCC} * 100\%$

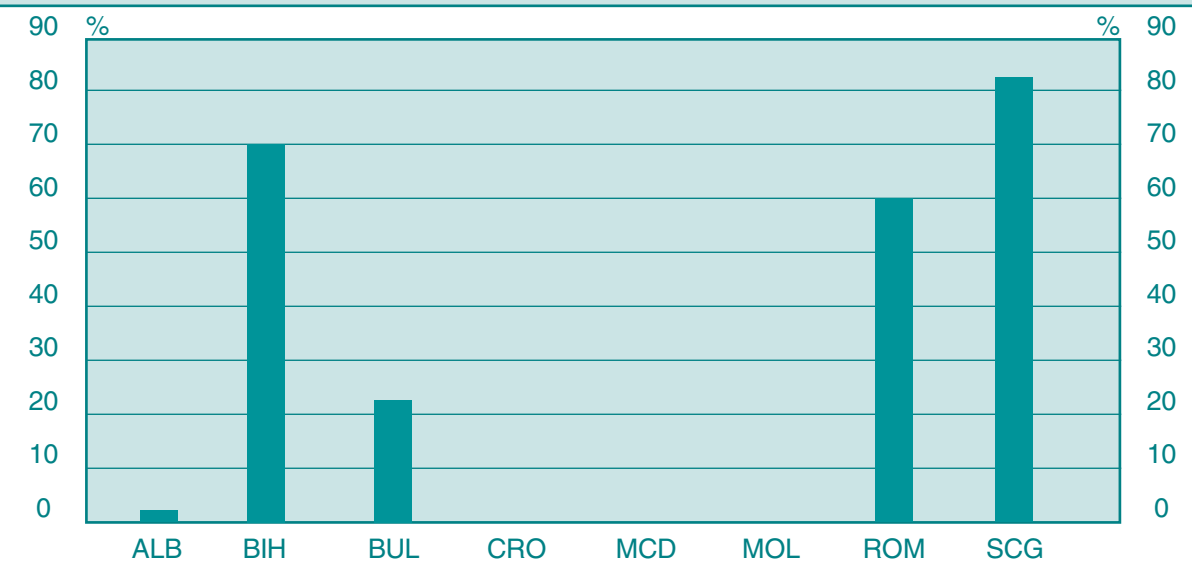
This data is shown in Diagrams 5–8 below.

Diagram 5 presents the best result recorded in Croatia – 100% schools with computer classes have access to Internet (1% via dedicated channel and 99% via dial-up connection), and FYRO Macedonia with 22% and 78% respectively. Romania follows with 85% schools (5% via dedicated channel and 80% via dial-up connection). The diagram shows that the most widespread connection is dial-up. The schools have no contemporary means for Internet connection.

Diagram 5. Percentage of schools with Internet access via dial–up connection (IC) and via dedicated channel (ID)

	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
ID	0	0	–	1	22	0	5	–
IC	3	65	–	99	78	10	80	–

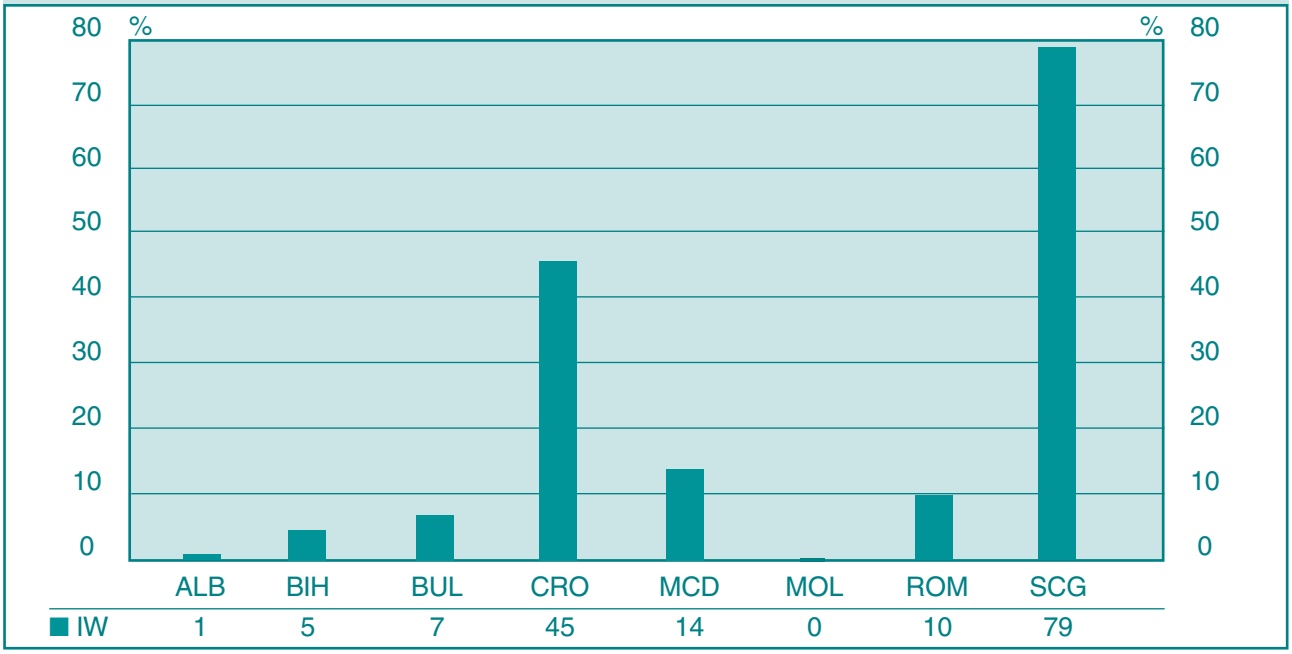
Diagram 6. Percentage of schools with e–mail only



	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
IL	3	70	23	0	0	0	60	83

Diagram 7 shows the percentage of schools that have their own web sites. The common picture is that it is not a widespread practice for secondary schools to develop and use sites. The highest result is 79% schools with Internet, which have own sites, are in Serbia. Croatia follows with 49% schools. The rest six countries (Albania, Bulgaria, Bosnia, FYRO Macedonia, Republic of Moldova and Romania) have low result – less than 10% schools possess their own sites. Schools in FYRO Macedonia and the Republic of Moldova do not have sites.

Diagram 7. Percentage of schools having their own web sites



2.3. School Personnel – Level of Experience

According to EURYDICE data ICT specialists teach ICTs as a separate subject, or teach how to use ICTs as a tool for other subjects, or support other subjects. In almost all countries these specialists are employed at secondary school level. In most countries there is a preliminary education leading to a qualification as an ICT specialist teacher. In most cases this education is provided at universities and lasts 3, 4 or 5 years. In many European countries the qualified teachers may take further education to obtain a qualification of ICT specialists. In the majority of countries there are special national programmes for in-service education of teachers. They have different duration and may last up to two years. This education provides courses for teachers of all school levels. Teachers are not the only target group for in-service ICT training (Czech Republic, Germany, Finland, Latvia, Lithuania, Slovenia, Sweden). In some countries in-service education is compulsory for teachers, but in most countries – not. In other countries these courses may be prescribed or recommended following evaluation procedures.

All participating countries understand that teachers are a key element in ICT education, and even the best ideas could not succeed without well-trained teachers. It is reflected in the national policies, and each country plans training of different target groups: teachers of ICTs, teachers of other subjects, teachers of elementary school, administrators.

Data collected about the readiness of the school staff to use or teach computers and ICTs in their work is described by such indicators as:

- TE1 – percentage of elementary school teachers who have taken <30 hour computer literacy courses;
- TE2 – percentage of elementary school teachers who have taken 30–70 hour computer literacy courses;
- TE3 – percentage of elementary school teachers who have taken >70 hour computer literacy courses;
- TI1 – percentage of teachers of Informatics and/or Information technologies who have taken <30 hour computer literacy courses;

- TI2 – total number of teachers of Informatics and/or Information technologies who have taken 30–70 hour computer literacy courses;
- TI3 – percentage of teachers of Informatics and/or Information technologies who have taken >70 hour computer literacy courses;
- TO1 – percentage of teachers of other subjects (not including Informatics or Information technologies) who have taken <30 hour computer literacy courses;
- TO2 – percentage of teachers of other subjects (not including Informatics or Information technologies) who have taken 30–70 hour computer literacy courses;
- TO3 – percentage of teachers of other subjects (not including Informatics or Information technologies) who have taken >70 hour computer literacy courses;
- AD1 – percentage of administrators who have taken <30 hour computer literacy courses;
- AD2 – percentage of administrators who have taken 30–70 hour computer literacy courses;
- AD3 – percentage of administrators who have taken >70 hour computer literacy courses;
- TEE – percentage of elementary school teachers with elementary computer skills;
- TIE – percentage of teachers of Informatics and/or Information technologies with elementary computer skills;
- TOE – percentage of teachers of other subjects (not including Informatics or Information technologies) with elementary computer skills;
- ADE – percentage of administrators with elementary computer skills;
- TEA – percentage of elementary school teachers with advanced computer skills;
- TIA – percentage of teachers of Informatics and/or Information technologies with advanced computer skills;
- TOA – percentage of teachers of other subjects (not including Informatics or Information technologies) with advanced computer skills;
- ADA – percentage of administrators with advanced computer skills.

The following formulas are used in calculations:

$TE1 = \frac{TES}{TE} * 100\%$	$TE2 = \frac{TEM}{TE} * 100\%$	$TE3 = \frac{TEL}{TE} * 100\%$
$TI1 = \frac{TIS}{TI} * 100\%$	$TI2 = \frac{TIM}{TI} * 100\%$	$TI3 = \frac{TIL}{TI} * 100\%$
$TO1 = \frac{TOS}{TO} * 100\%$	$TO2 = \frac{TOM}{TO} * 100\%$	$TO3 = \frac{TOL}{TO} * 100\%$
$AD1 = \frac{ADS}{AD} * 100\%$	$AD2 = \frac{ADM}{AD} * 100\%$	$AD3 = \frac{ADL}{AD} * 100\%$

$TEE = \frac{TEEN}{TE} * 100\%$	$TEA = \frac{TEAN}{TE} * 100\%$
$TIE = \frac{TIEN}{TI} * 100\%$	$TIA = \frac{TIAN}{TI} * 100\%$
$TOE = \frac{TOEN}{TO} * 100\%$	$TOA = \frac{TOAN}{TO} * 100\%$
$ADE = \frac{ADEN}{AD} * 100\%$	$ADA = \frac{ADAN}{AD} * 100\%$

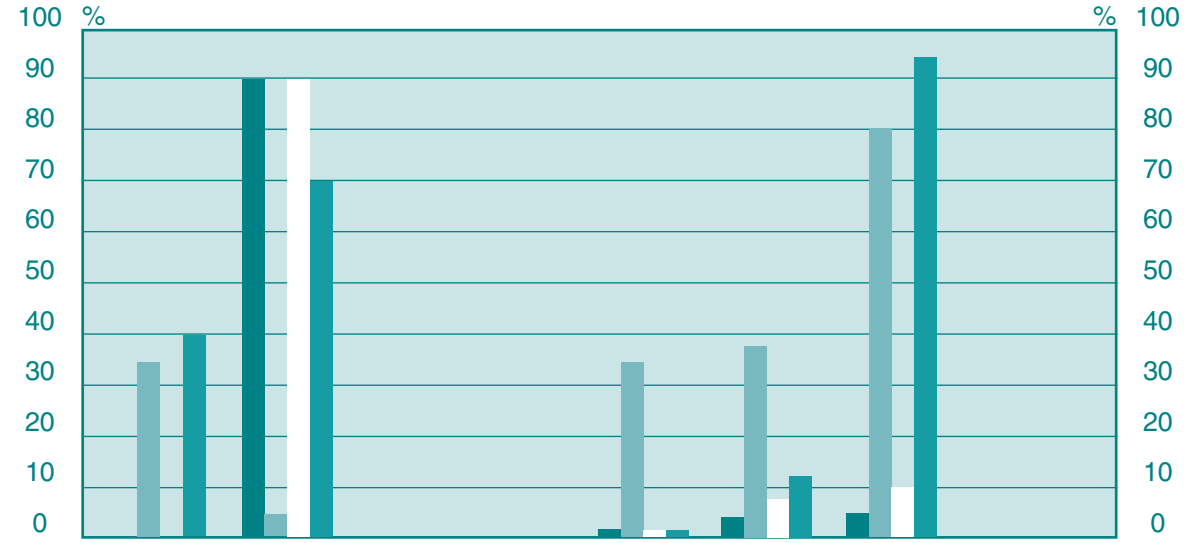
Here:
- TE – elementary school teachers;
- TES – total number of elementary school teachers who have taken <30 hour computer literacy courses;

- TEM – total number of elementary school teachers who have taken 30–70 hour computer literacy courses;
- TEL – total number of elementary school teachers who have taken >70 hour computer literacy courses;
- TI – teachers of Informatics and/or Information technologies;
- TIS – total number of teachers of Informatics and/or Information technologies who have taken <30 hour computer literacy courses;
- TIM – total number of teachers of Informatics and/or Information technologies who have taken 30–70 hour computer literacy courses;
- TIL – total number of teachers of Informatics and/or Information technologies who have taken >70 hour computer literacy courses;
- TO – total number of teachers of other subjects (excluding Informatics or Information technologies);
- TOS – total number of teachers of other subjects (excluding Informatics or Information technologies) who have taken <30 hour computer literacy courses;
- TOM– total number of teachers of other subjects (excluding Informatics or Information technologies) who have taken 30–70 hour computer literacy courses;
- TOL – total number of teachers of other subjects (excluding Informatics or Information technologies) who have taken >70 hour computer literacy courses;
- AD – total number of administrators;
- ADS – total number of administrators who have taken <30 hour computer literacy courses;
- ADM– total number of administrators who have taken 30–70 hour computer literacy courses;
- ADL – total number of administrators who have taken >70 hour computer literacy courses.

Diagrams 8–12 give the picture of the staff training in secondary schools of the participating countries.

Diagram 8 below shows the percentage of the school personnel (Informatics/ICT teachers, teachers of other subjects, teachers of elementary school and administrators) who have taken training courses less than 30 hours. The best complex results are achieved in Bosnia – 90% teachers from elementary schools and 90% teachers of different than Informatics/ICT subjects have passed courses of less than 30 hours. The Bosnia data about the administrators is a little less, but high enough – 70%. Romania follows – 95% school administrators and 80% teachers of Informatics/ICTs have taken short courses. From the data collected it is seen that the lowest result belongs to FYRO Macedonia. As a whole training of the different target groups is not proportional in each country.

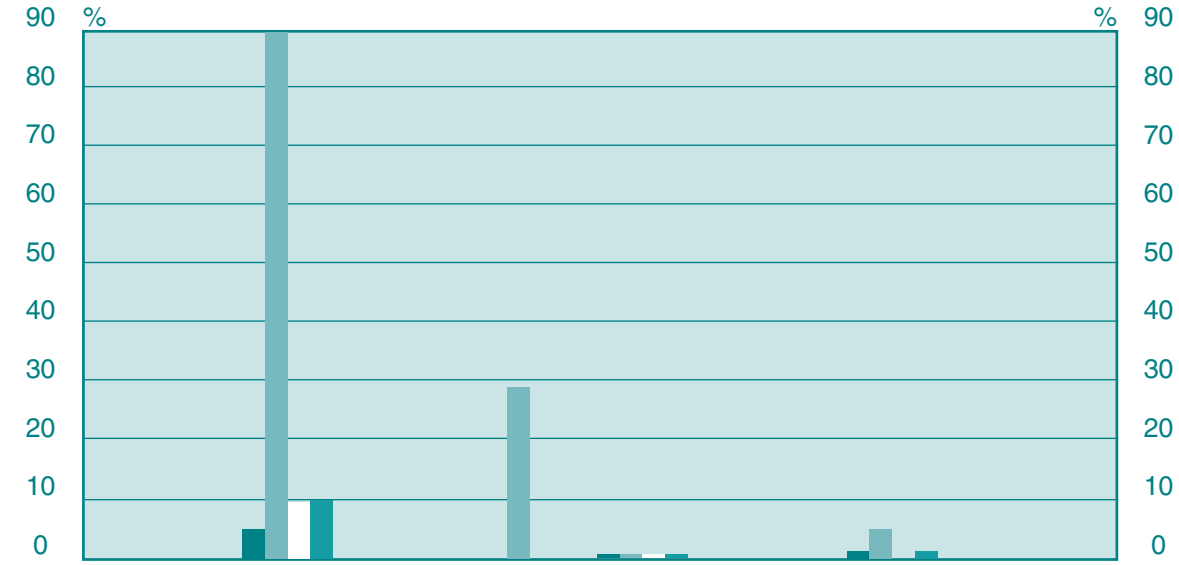
Diagram 8. Percentage of elementary school teachers (TE1), teachers of Informatics and/or Information technologies (TI1), teachers of other subjects (TO1) and administrators (AD1) who have taken computer literacy courses of less than 30 hours



	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
TE1	0	90	–	–	2	4	5	–
TI1	35	5	–	–	35	37	80	–
TO1	0	90	–	–	2	7	10	–
AD1	40	70	–	–	2	12	95	–

Diagram 9 below shows the percentage of the school personnel by target groups who have taken training courses between 30 and 70 hours. The best complex results are achieved by Bosnia again – 90% teachers of Informatics/ICTs have taken courses. The lowest data is in the Republic of Moldova – 0% training for all target groups. As a whole the training of the different target groups is not proportional in each country. The comparison of Diagrams 8 and 9 shows that shorter training courses are preferable.

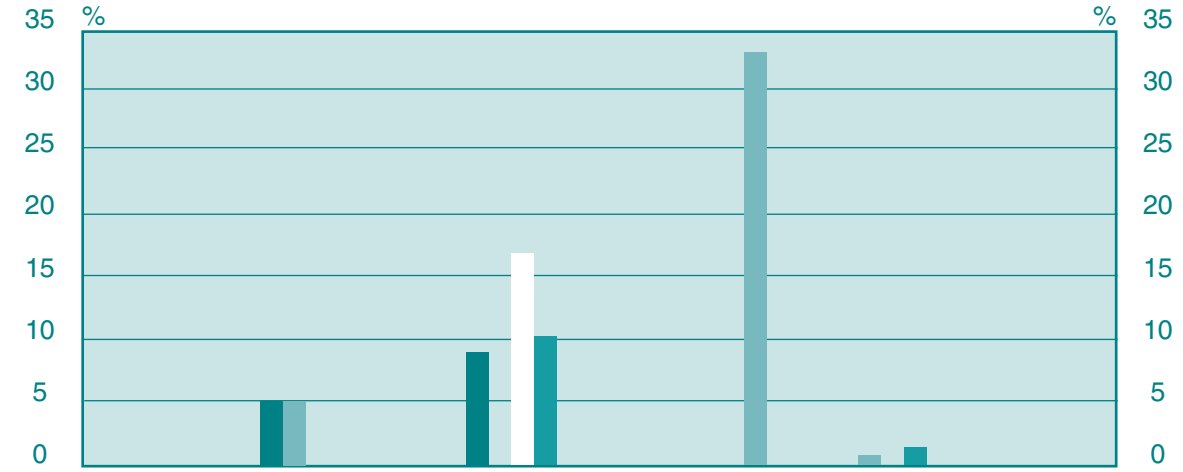
Diagram 9. Percentage of elementary school teachers (TE2), teachers of Informatics and/or Information technologies (TI2), teachers of other subjects (TO2) and administrators (AD2) who have taken computer literacy courses 30–70 hours



	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
TE2	0	5	–	–	1	0	2	–
TI2	0	90	–	29	1	0	5	–
TO2	0	10	–	–	1	0	0	–
AD2	0	10	–	–	1	0	2	–

Diagram 10 shows the percentage of the school personnel by target groups who have taken training courses of more than 70 hours. As a whole the results here are much lower than in the previous diagrams, which can be explained by the fact that countries prefer shorter courses. The best complex result is achieved by Croatia – 17% teachers of different subjects, 10% administrators and 9% teachers of elementary school. The lowest data is in FYRO Macedonia and Albania – 0% of staff trained in the courses of more than 70 hours. This data is below 2% for each target groups in Romania. The Republic of Moldova has trained 33% teachers of Informatics/ICTs during the long courses. Obviously, the countries have insufficient financing for longer training courses.

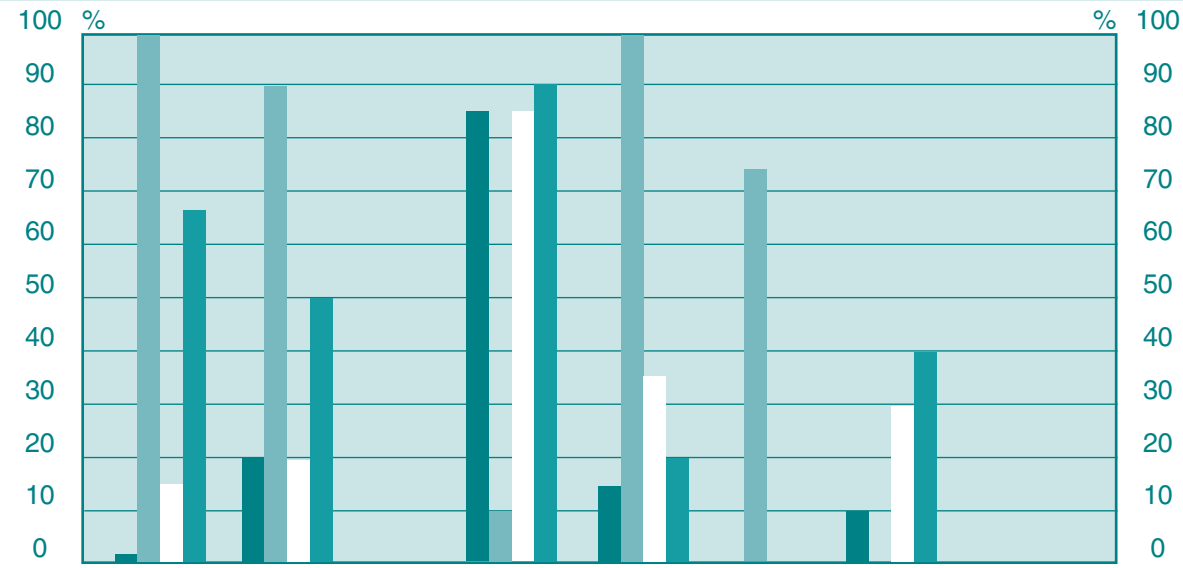
Diagram 10. Percentage of elementary school teachers (TE3), teachers of Informatics and/or Information technologies (TI3), teachers of other subjects (TO3) and administrators (AD3) who have taken computer literacy courses of more than 70 hours



	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
TE3	0	5	–	9	0	0	0	–
TI3	0	5	–	–	0	33	1	–
TO3	0	0	–	17	0	0	0	–
AD3	0	0	–	10	0	0	2	–

Diagram 11 presents the elementary computer literacy of each target group. Croatia school staff as a whole has the highest elementary computer literacy – 90% administrators, 85% teachers on Informatics/ICTs, 85% teachers of other subjects. Albania and FYRO Macedonia have the highest results for teachers of Informatics/ICTs – 100% of them in both countries have elementary computer literacy. For Romania this data vary for all target groups from 10% to 40%.

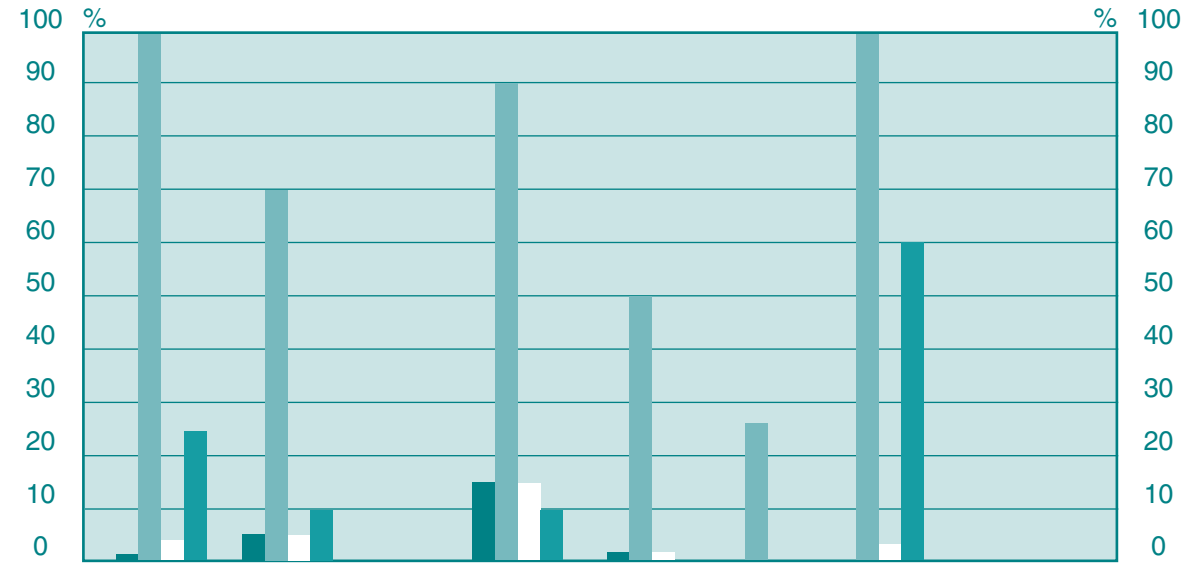
Diagram 11. Percentage of elementary school teachers (TEE), teachers of Informatics and/or Information technologies (TIE), teachers of other subjects (TOE) and administrators (ADE) with elementary computer skills



	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
TEE	2	20	–	85	15	–	10	–
TIE	100	90	–	10	100	74	–	–
TOE	15	20	–	85	35	–	30	–
ADE	67	50	–	90	20	–	40	–

Diagram 12 presents the advanced computer literacy of each target group. No homogeneous results exist for all countries. It is natural that the highest values for each country belong to the teachers of Informatics/ICT. Romania and Albania present data showing 100% advanced literacy for their Informatics teachers. Croatia follows with 90%. The lowest values relate to teachers of elementary school.

Diagram 12. Percentage of elementary school teachers (TEA), teachers of Informatics and/or Information technologies (TIA), teachers of other subjects (TOA) and administrators (ADA) with advanced computer skills



	ALB	BIH	BUL	CRO	MCD	MOL	ROM	SCG
TEA	1	5	–	15	2	–	0	–
TIA	100	70	–	90	50	26	100	–
TOA	4	5	–	15	2	–	3	–
ADA	25	10	–	10	0	–	60	–

GENERAL CONCLUSIONS AND RECOMMENDATIONS

The report presents the specialized comparative research exploring the state-of-art of Informatics/ICTs and ICT applications in other subjects in schools from South-East European region. After the analysis of the data collected the following conclusions and recommendations were made:

Concerning the organization of the survey:

- The countries from the South-East European region demonstrated a strong interest in the given comparative survey and participated responsibly in the questionnaire development, data collection and interpretation of the national results.
- During all stages of the survey there was a lack of advanced tools for monitoring, ways for verifying reliability and authenticity of the data gathered, assurance of the homogenous data from different countries.
- There is a need in providing similar comparative studies periodically in order to stimulate countries to develop and effectively implement a modern ICT education policy.

Recommendations to the educational policy- and decision-makers:

- To strengthen the national policies, action plans and ways of implementation in their variety and complexity, taking advantages of the approaches of the other countries of this project;
- To track the process of changes in other European countries in the field of Informatics/ICT education and integration of ICTs into different subjects and to hold the line of drawing closer to European education;
- To provide similar research at the national level regularly and to improve the situation;
- To promote national curriculum for both Informatics/ICTs and for integration of ICTs in other subjects;
- To support national curriculum with a variety of educational software;
- To disseminate the best national and international practices in schools.

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http://hdr.undp.org/reports/global/2004/

Information and Communication Technologies in Secondary Education. Position paper. IITE, Moscow, 2004

Key Data on Information and Communication Technology in Schools in Europe. 2004 edition, EURYDICE programme, European Commission
http://www.eurydice.org/Documents/KDICT/en/FrameSet.htm

APPENDIX 1

Basic Indicators

D – The list of official documents on ICTs in secondary education
PR – Government curriculum on Informatics/ICTs in secondary schools
SI – ICTs as a separate course
SS – ICT integration in other subjects
S – Total number of schools
SC – Percentage of schools with computer classrooms
SCC – Total number of schools with computer classrooms
NC – Average number of students per computer in schools with computer classrooms
NSC – Total number of students in schools with computer classrooms
C – Total number of computers in computer classrooms
SCN – Percentage of schools having computer classrooms equipped with computers not older than 1995
CN – Total number of computers in computer classrooms not older than 1995
SCL – Percentage of schools with a local network in the total number of schools equipped with computer classrooms
SL – Total number of schools with a local network in the total number of schools with computer classrooms
IO – Percentage of schools without Internet access
SIO – Total number of schools without Internet access
IL – Percentage of schools with e-mail only
SIL – Total number of schools with e-mail only
IC – Percentage of schools with access via dial-up connection
SIC – Total number of schools with access via dial-up connection
ID – Percentage of schools with access via dedicated channel
SID – Total number of schools with access via dedicated channel
IW – Percentage of schools having their own web sites
SIW – Total number of schools having their own web sites
TE – Elementary school teachers
TI – Teachers of Informatics and/or Information technologies
TO – Teachers of other subjects (not including Informatics or Information technologies)
AD – Administrators
TE1 – Percentage of elementary school teachers who have taken <30 hour computer literacy courses
TES – Total number of elementary school teachers who have taken <30 hour computer literacy courses
TE2 – Percentage of elementary school teachers who have taken 30–70 hour computer literacy courses
TEM – Total number of elementary school teachers who have taken 30–70 hour computer literacy courses
TE3 – Percentage of elementary school teachers who have taken >70 hour computer literacy courses
TEL – Total number of elementary school teachers who have taken >70 hour computer literacy courses
TI1 – Percentage of teachers of Informatics and/or Information technologies who have taken <30 hour computer literacy courses
TIS – Total number of teachers of Informatics and/or Information technologies who have taken <30 hour computer literacy courses
TI2 – Percentage of teachers of Informatics and/or Information technologies who have taken 30–70 hour computer literacy courses
TIM – Total number of teachers of Informatics and/or Information technologies who have taken 30–70 hour computer literacy courses
TI3 – Percentage of teachers of Informatics and/or Information technologies who have taken >70 hour computer literacy courses
TIL – Total number of teachers of Informatics and/or Information technologies who have taken >70 hour computer literacy courses
TO1 – Percentage of teachers of other subjects (excluding Informatics or Information technologies) who have taken <30 hour computer literacy courses

TOS – Total number of teachers of other subjects (excluding Informatics or Information technologies) who have taken <30 hour computer literacy courses
TO2 – Percentage of teachers of other subjects (excluding Informatics or Information technologies) who have taken 30–70 hour computer literacy courses
TOM – Total number of teachers of other subjects (excluding Informatics or Information technologies) who have taken 30–70 hour computer literacy courses
TO3 – Percentage of teachers of other subjects (excluding Informatics or Information technologies) who have taken >70 hour computer literacy courses
TOL – Total number of teachers of other subjects (excluding Informatics or Information technologies) who have taken >70 hour computer literacy courses
AD1 – Percentage of administrators who have taken <30 hour computer literacy courses
ADS – Total number of administrators who have taken <30 hour computer literacy courses
AD2 – Percentage of administrators who have taken 30–70 hour computer literacy courses
ADM – Total number of administrators who have taken 30–70 hour computer literacy courses
AD3 – Percentage of administrators who have taken >70 hour computer literacy courses
ADL – Total number of administrators who have taken >70 hour computer literacy courses
TEE – Percentage of elementary school teachers with elementary computer skills
TEEN – Total number of elementary school teachers with elementary computer skills
TEA – Percentage of elementary school teachers with advanced computer skills
TEAN – Total number of elementary school teachers with advanced computer skills
TIE – Percentage of teachers of Informatics and/or Information technologies with elementary computer skills
TIEN – Total number of teachers of Informatics and/or Information technologies with elementary computer skills
TIA – Percentage of teachers of Informatics and/or Information technologies with advanced computer skills
TIAN – Total number of teachers of Informatics and/or Information technologies with advanced computer skills
TOE – Percentage of teachers of other subjects (excluding Informatics or Information technologies) with elementary computer skills
TOEN – Total number of teachers of other subjects (excluding Informatics or Information technologies) with elementary computer skills
TOA – Percentage of teachers of other subjects (excluding Informatics or Information technologies) with advanced computer skills
TOAN – Total number of teachers of other subjects (excluding Informatics or Information technologies) with advanced computer skills
ADE – Percentage of administrators with elementary computer skills
ADEN – Total number of administrators with elementary computer skills
ADA – Percentage of administrators with advanced computer skills
ADAN – Total number of administrators with advanced computer skills

APPENDIX 2

List of Persons Responsible for Submission of Information

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APPENDIX 3

Questionnaire Used for Data Collection

1. Country:	

2. Person responsible for data provision:	Name:
	Position:
	Contact information:

3. Name of Ministry:	

POLICY

4. Does your Ministry have a national policy on ICT application in education?

Yes		No	***(if no, proceed to question no. 10)***

If yes, is this policy applicable to:

	formal school only (both primary and secondary)
	non–formal only
	both formal and non–formal

5. Please state below your national policy on ICT application in education:

6. Please check below the columns Yes, No to indicate presence or absence of the following in the implementation of the national policy on ICT application in education:

	Yes	No
Master plan		
Time–frame		
Budget plan		
Appropriations from the national budget		
Separate body/structure/organization/bureau		
Monitoring and evaluation scheme		

7. Is there a separate budget appropriated for the implementation of the national policy on ICT application in education?

	Yes		No

If yes, what percentage of the national budget for education is allocated for ICTs?

If no, where does funding come from?

	included in the national budget for education
	other sources (please specify):

8. In the implementation of national policy on ICT application in education in your country, do you include as clientele the following:

	Yes	No
Remote schools?		
Minorities?		
Girls?		
Children with special needs?		

(Please proceed to question no. 10)

9. If your country has no national policy on ICT application in education, how does your ministry integrate ICTs in education?

	as part of the regular programme of ministry
	as a project of ministry
	under an ad hoc committee*
	others (please specify):
	ICT application in education is not the ministry's responsibility

ICT application in education is regulated at:

	regional level
	provincial level
	district level
	municipal level

* The committee especially established for this purpose

10. At national level, is there a prescribed curriculum on ICT application in education?

	Yes		No
			(if no, proceed to question no. 14)

If yes, how is ICT taught in the classroom?

	as a separate subject

			obligatory		elective

	integrated in other subjects

	others (pls. specify)

11. Are there special educational software products in prescribed curriculum on ICTs for:

	ICTs as a separate subject?		other subjects supported by ICTs?

12. At what level are ICTs first taught as a subject?

	primary		lower secondary		upper secondary

Please specify:

grade level	year level

13. Is there a separate body in ministry to monitor and evaluate implementation of ICT curriculum in schools?

	Yes		No

If yes, please indicate name and describe its functions below:

If no, how is implementation of ICT curriculum in schools monitored and evaluated? Please describe below.

14. If there is no prescribed curriculum on ICTs at the national level, how do schools implement the national policy on ICTs in education?

	based on the mission and vision statement of schools
	schools are given the discretion to develop own curriculum on ICTs
	others (please specify):

STATISTICS

Please provide the following statistics at the national level.

Please don't leave any fields blank.

If for some indicators the official statistics is not available, but expert estimation can be provided, please, put the corresponding figures in brackets. If information is not available, please, put N/A. Please put "0" only for zero values.

15. Computer equipment in schools:

(1) Percentage of schools with computer classrooms	
(2) Average number of students per computer in schools with computer classrooms	
(3) Percentage of schools having computer classrooms equipped with computers not older than 1995	
(4) Percentage of schools with a local network in the total number of schools with computer classrooms	

16. Internet access. Please give percentage of schools:

(1) with no access	

(2) with e–mail only	
(3) with access via dial–up connection	
(4) with access via dedicated channel	
(5) having their own web sites	

17. School staff development in computer literacy. Please indicate the percentage of school personnel* who took computer literacy courses during 2003/2004 school year (the period from September 2003 till September 2004).

	< 30 hours	30–70 hours	>70 hours
Elementary school teachers			
Teachers of Informatics and/or Information technologies			
Teachers of other subjects (excluding Informatics or Information technologies)			
Administrators			

18. Level of computer expertise of school personnel. Please indicate the percentage of school personnel* for each level of ICT proficiency:

	Elementary computer skills	Advanced computer skills
Elementary school teachers		
Teachers of Informatics and/or Information technologies		
Teachers of other subjects (excluding Informatics or Information technologies)		
Administrators		

* The percentage is taken in relation to total quantity of school staff in appropriate category

APPENDIX 4

National Policies of Bulgaria and Croatia in the Sphere of ICT Application in Education

BULGARIA

The main goals of the strategy are:

- To modernize the whole education system and improve the quality of education so that all students are prepared to enter the information society by achieving a satisfactory level of computer literacy.

- To develop the skills of all teachers and use ICTs for teaching and learning.

- To provide quality education system based on the experience of the EU countries. The following priorities can be defined on the basis of the analysis of the present situation and the experience of other countries, as well as on the basis of the general policy of the government for modernization of the education in the context of building an information society in Bulgaria:

  – Training of staff. Providing multi-channel technical support.
  – Providing sufficient technical resources.
  – Providing appropriate software and educational multimedia content.
  – Changing and updating the legal framework of the ICTs education.
  – Changing the educational content and organization of the educational process.
  – Providing and implementing an efficient management information system to support the process of decision-making.

CROATIA

On 25 May 2002 Government of the Republic of Croatia accepted and approved the strategic document *Information and Communication Technology – Croatia in 21st Century* and nominated the institutions in charge of the strategy. In October 2002 the government signed the *Agenda for Electronic South-East Europe* (eSEE Agenda) taking the charges and responsibilities to harmonize legislature with EU in the field of building knowledge society, thus harmonizing strategic documents and regional cooperation in the field of application and use of ICTs. In order to foster and speed up the process of informatization, in 2003 the programme e-Croatia was adopted. The strategic document in Chapter 6 present the strategy in the field of primary and secondary education stressing the following:

- Through informatization process the stage should be reached where the presently prevailing system of teaching factografic knowledge and ex cathedra teaching should be changed to a system that will teach pupils and students problem-solving approach, thus ensure having after school the basic skills of how to search, analyze and synthesize data and information by use of ICTs and know how to utilize ICTs as a tool in solving problems rather than memorizing data, information and processes in order to be able to repeat them when required.

- During the schooling pupils and students should master the skills of using computers and networks (primary school), skills in basic text processing, spreadsheet calculations, and Internet and sound theoretic knowledge of ICTs (secondary school). Proper theoretic knowledge should enable them to overcome the problems of quick obsolescence of the equipment and software and prepare them for life-long learning using ICTs intensively and efficiently. The curriculum should be designed like the curriculum for science in the depth and scope and methods of teaching. All other subjects should introduce ICTs in teaching and learning.

- The important step is teacher training to use ICTs in all subjects. The teachers of ICTs should be also trainers for other teachers.

- Foster orientation toward life-long learning and stress more on education of ICT professionals at all levels including secondary education.
- Educate the young people for life and work in the knowledge society.
- Schools should be provided with modern ICT infrastructure for teaching and learning.

The implementation programme for 2004 includes:

- start the project *Information System for Primary and Secondary Education;*
- provide additional equipment to schools;
- implement the national portal for teachers;
- organize and carry out further teacher training to use ICTs in teaching and learning;
- introduction of ICT subject as compulsory in all primary and secondary schools.

APPENDIX 5

Summary Table of Statistics Data

Country	Computer equipment				Internet access. Percentage of schools in total number of schools					School stuff development. Percentage of school personnel who took computer literacy courses during 2003/2004 school year												Computer competence. Percentage of school personnel for elementary/advanced level of ICT proficiency							
										Elementary school teachers			Teachers of ICTs			Subject teachers			Administrators			Elementary school teachers		Teachers of ICTs		Subject teachers		Administrators	
	Percentage of schools with computer classrooms to total number of schools	Average number of students per computer in schools with computer classrooms	Percentage of schools with computers not older than 1995 in the total number of schools with computer classrooms	Percentage of schools with a local network in the total number of schools with computer classrooms	with no access	with e-mail only	with access via dial-up connection	with access via dedicated channel	having their own web sites	<30 hrs	30–70 hrs	>70 hrs	<30 hrs	30–70 hrs	>70 hrs	<30 hrs	30–70 hrs	>70 hrs	<30 hrs	30–70 hrs	>70 hrs	Elementary computer skills	Advanced computer skills	Elementary computer skills	Advanced computer skills	Elementary computer skills	Advanced computer skills	Elementary computer skills	Advanced computer skills
ALB	30	60	90	1	97	3	3	0	1	0	0	0	35	0	0	0	0	0	40	0	0	2	1	100	100	15	4	67	25
BIH	90	50	50	5	35	70	65	0	5	90	5	5	5	90	5	90	10	0	70	10	0	20	5	90	70	20	5	50	10
BUL	35.7	40	N/A	63.7	76.4	23	N/A	N/A	7	N/A																			
CRO	100	17	90	100	0	0	99	1	45	–	–	9	–	29	–	–	–	17	–	–	10	85	15	10	90	85	15	90	10
MCD	100	>150	100	100	<25	0	0	>75	>60	2	1	0	30–35	1	0	2	1	0	2	1	0	<15	<2	100	>50	100[i]	2[ii]	15[iii]	0
MOL	54	50	54	54	90.1	0	9.9	0	0	3.5	0	0	36.6	0	33.4	7.34	0	0	11.8	0	0	N/A	N/A	73.7	26.3	N/A			
ROM	40	25	85	70	N/A	60	80	5	10	5	2	0	80	5	1	10	0	0	95	2	2	10	0	0	100	30	3	40	60
SCG	97	32	98	67.2	20.6	82.6	N/A	N/A	79.2	N/A																			

[i] 100% of personnel younger than 30; others 2%

[ii] Refers to personnel younger than 30

[iii] Refers to personnel younger than 30; others <5%