

SIBIS – Workpackage 2: Topic research and indicator development

Topic Report No.4:
Education

Tasks 2.1 (Update) + 2.2

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0 Overview

This work package extends the work started in WP1 and will culminate in a Topic Report consisting of:

- A report on the results of the topic research activities,
- A comprehensive listing of the most relevant issues and key dimensions of the information society for which new statistical indicators are to be developed, piloted and tested,

Part A constitutes the major input into the development of indicators (work task 2.2) that is documented in Part B of this document.

Part A is based on a review of supranational and national policy and statistical documents available. The research has mainly been conducted within the EU and mainly focuses on Denmark, Sweden, Finland, Norway and the UK, as these countries have the most innovative approach to educational issues of the development of the information society.

The literature review consists of a brief introduction to the new trends in education in the information society or the new economy. Based on literature review 10, the main issues in relation to education are described. The issues are interdependent and interwoven, but separated for analytical reasons. The main issues regarding ICT in education identified from the literature review are:

- Lifelong learning
- e-learning
- ICT infrastructure of the educational system
- Materials and sources - content
- Digital literacy
- Training of teachers – teachers qualifications
- Integration of ICT in curricula
- Flexible educational institutions and virtual mobility
- Networking between educational institutions and public/private collaboration
- Evaluation and research

The 'Education' concept is changing. From the formal and pre-defined curriculum in the industrial society, education is today redefined as lifelong learning in the information society.

This shift of focus underpins the identified gap between existing and needed indicators on education and ICT. So far, focus has mainly been on indicators on infrastructure, counting computers, net-access, etc. In the near future, the central focus is going to be on use and competencies. The technological developments as well as the growing distribution of hardware tends to decrease the importance of this focus. Instead, there is a need for generic, statistical information on citizen and employee behaviour when working and learning in information society and indicators outlining the competencies information society has available.

Based on the work in Part A, Part B outlines the gaps in statistical coverage of indicators of the information society in the topic education. The structure of Part B follows the structure developed in work task 2.1:

- Three general issues relating to education and partly included in the specific issues
- Seven specific issues all relating to the eEurope action plan:
 - ICT infrastructure of the educational system

- Support services and educational resources - software (pre-conditions for e-learning)
- Integration of ICT in curricula
- Training of teachers – teachers' qualifications
- Digital literacy
- Flexible educational institutions and virtual mobility
- Networking between educational institutions and public/private collaboration

The analysis and outlining of gaps in statistical coverage is related to these seven specific issues only.

In Chapter 6, the main gaps in the statistical coverage of each issue are briefly presented.

Chapter 7 consists of a schematic breakdown of the seven issues into a logical tree, defining the sub-issues of the overall issues and showing indicators for the sub-issues. The logical tree shows the breakdown of the issues into indicators and the status of the indicators, if they are existing, partly covered or subject to new data collection.

Chapter 8 is a detailed definition of the new proposed indicators. The new indicators, which refer to a position in the logical tree, are described by name, definition, existing sources of data or proposals for how or where to get the data.

Chapter 9 outlines a suggestion for two composite indices, focusing on:

- Digital skills
- ICT readiness index

Finally, Chapter 10 sums up the results of the report.

PART A (D 2.1)

1 Introduction: Issues and Concepts

1.1 *Aims of the deliverable*

This work package extends the work started in WP1 and will culminate in a Topic Report consisting of:

- A report on the results of the topic research activities,
- A comprehensive listing of the most relevant issues and key dimensions of the information society for which new statistical indicators are to be developed, piloted and tested,

It constitutes the major input into the development of indicators that will take place in work task 2.2.

The Topic Report is based on a review of supranational and national policy and statistical documents available. The research has mainly been conducted within the EU and mainly focuses on Denmark, Sweden, Finland, Norway and the UK, as these countries have the most innovative approach to educational issues of the development of the information society.

1.2 *Description of work tasks*

This section describes the work, which was undertaken to produce the deliverable. It includes a description of the eEurope action lines relevant to the topic area.

In approaching research on documents related to education, we have targeted the following types of organisations:

- Ministry of Education and Ministry of Information Technology and Research
- Labour market authorities
- The European Commission (primarily DG IS and DG Education)
- Agencies (e.g. EURYDICE)
- Socrates, European Schoolnet
- Labour Unions
- National statistical offices
- Private management consulting corporations
- The OECD

Besides researching supranational documents, we have focussed on pointing out key documents regarding educational issues for Denmark, Finland, Norway, Sweden and the UK.

In our approach to the research of documents, we first identified the types of organisations that potentially produce policy and statistical documents on educational issues related to the development of the information society. This made us focus on the above-mentioned organisations. The documents found were then sorted by relevance to information society or network economy, as a vast number of documents are of course published on the topic education itself.

Second, we were careful about collecting references that we assumed have a high degree of validity only, particularly when searching Internet sources. We made a critical judgement of the validity of each of the documents found.

Third, it was important to collect documents according to the definition of the topic area, i.e. education. However, some documents overlap in relevance with Topic 5, i.e. work, skills and employment, on issues such as lifelong learning and e-learning. Because of our distinction between pre- and post labour market acquisition of skills as well as between internal and external learning activities, Topic 4 (Education) deals with institutional structures and activities of education preparing individuals before entering into the labour market for the first time, whereas Topic 5 (work, skills and employment) deals with education and learning activities that take place after entering the labour market, either inside or outside an employment relationship.

In relation to education, the action line "European youth into the digital age" is the central line of the eEurope action lines. "European youth into the digital age" consists of six actions that are listed in the below table.

European youth into the digital age

#	Action
2A-1	Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
2A-2	Connects schools progressively to the research networks.
2A-3	Ensure availability of support services and educational resources on the Internet, as well as e-learning platforms for teachers, pupils, and parents.
2A-4	Provide training to all teachers, in particular adapts teacher curricula and offer incentives to teachers to actually use digital technologies in teaching.
2A-5	Adapt school curricula to enable new ways of learning using information technologies.
2A-6	Ensure that all pupils have the opportunity to be digitally literate by the time they leave school.

1.3 Structure of the deliverable

With a brief outline of some of the major issues to emerge from the work, the structure of the deliverable is as follows:

- Chapter 1: Introduction
- Chapter 2: Literature review

The literature review consists of a brief introduction to the new trends in education in the information society or the new economy. Based on literature review 10, the main issues in relation to education are described. The issues are interdependent and interwoven, but separated for analytical reasons.

- Chapter 3: Review of policy documents.

Central policy documents and action plans in the EU and OECD as well as national documents from Sweden, Norway, Finland and the United Kingdom are reviewed.

- Chapter 4: Review of existing indicators

The central indicators of education in relation to the information society are reviewed. Existing indicators from supranational bodies, such as Eurydice and Eurostat as well as national statistical offices and associations and consultants.

- Chapter 5: Summary and conclusions
- Bibliography

2 Literature review

The main aim of this chapter is to review relevant published literature.

First, we review the changed role of education in the knowledge economy. Second, we look at ten main issues regarding ICT in education, and education in ICT in the literature is identified and described briefly.

In order to achieve the goals set at the European Council's summit in Lisbon, i.e. that Europe is to become the world's leading economy, the central role of education in transforming education was highlighted in the ministers' communication.

This transformation process is of a dual nature:

- On one hand, the educational system will have to adapt to a knowledge economy both in terms of organisational settings, infrastructures and partnerships, pedagogy, curricula and teachers' qualifications.
- On the other hand, users of education at all levels and ages will need to develop another mindset, i.e. moving from an instruction-based understanding of education to a paradigm where the individual most likely will be expected to take a much larger co-responsibility for identifying and continuously developing his/her skills basis in a variety of ways and settings. Likewise, companies and institutions are in the process of adapting to a business environment where skills and knowledge play a much more central role in overall economic performance.

Whether we talk about policy developments related to educational systems or the adaptation process of the individual, companies and organisations to living, learning and working in a knowledge economy – ICT is viewed as a critical enabler.

Table Major characteristics of the "old" and the "new economy"

ISSUE	OLD ECONOMY	NEW ECONOMY
Markets	Stable	Dynamic
Scope of Competition	National	Global
Organisational Form	Hierarchical	Networked
Organisation of production	Mass production	Flexible production
Key drivers of growth	Capital/labour	Knowledge/innovation
Key technology Driver	Mechanisation	Digitalisation
Source of competitive advantage	Economies of scale	Time to market, innovation
Relations with other firms	Single mover	Alliances and collaboration
WORKFORCE		
Policy Goal	Full employment	Employability
Skills	Job specific	Multidimensional (deep and broad foundation skills)
Requisite Education	A skill- A degree	Lifelong Learning

Source: Atkinson R., " *The New economy Index* " Progressive Policy Institute, 1998

This constitutes the background for the development of new and supplementary indicators in the area of education.

Much of the policy debate on education for the information society has focused on an extension of the definition of education in view of the changes in what has been called the shift from an "old economy" to a "new economy".

A trend in the new economy is that innovation cycles are getting shorter¹. This means that on the one hand all innovation and innovation related factors, such as human capital and education, skills and knowledge, increase in importance throughout life. This is expressed in the policy focus on *lifelong learning*, but it also means that the nature of the demand for skills and knowledge changes with greater focus on construction of new knowledge as a central educational domain rather than primarily focusing on acquisition of existing knowledge repositories.

The following table points out some key differences regarding education in the industrial society and the knowledge society.

	Industrial Society	New Economy/Knowledge Society
<i>Education structure</i>	Learning of practical skills and factual codified knowledge. Separation of professional and practical skills. School/practical training dichotomy	Learning codified knowledge as well as constructing/discovering new knowledge domains in areas of high innovation. Practice/theory dimensions change through experimentation, testing, etc.
<i>Education goal</i>	Educated/trained for a specific job/trade. Profession concept	Acquire deep and broad competencies with a view to job and competence mobility in an unstable and ever changing job market.
<i>Teaching form</i>	Instruction, practical training, classroom, institutional setting	Construction, discovery, simulation, analysis, evaluation in relation to different problems and realities – anywhere, anytime.
<i>Organisation of teaching/learning</i>	Subjects class, institutions are the organising elements	Problem areas, multidisciplinary, multiple resources is the given context.
<i>Teacher's role</i>	Professional authority. Conveys knowledge	Supervisor, tutor, "devil's advocate" guided learning towards enhanced autonomy.
<i>Didactical space</i>	Teacher's responsibility: motivate and activate student	Student shares responsibility for the development of the learning trajectory.
<i>Learning concept</i>	Focus on teaching as communication of externally determined goals and institutionally codified knowledge. Learning as an individual process oriented towards learning skills and knowledge	Learning occurs in a context, in a continual process – discovery, experimentation.
<i>Learning processes</i>	Teacher responsible for reaching determined goals. Goals determined from the outside. Focus on results	Student and teacher co-operate to define and reach goals. Learning to learn is a central process goal.

Source: Shapiro, Hanne: "Basic Pedagogical Memorandum, Reform 2000 (Pædagogisk Grundlagsnotat," Reform 2000), 1999, Danish Ministry of Education.

¹ "The new Economy" working paper IPTS, Spain, 2000

2.1 Main issues from the literature

Looking at the policies which most of the European countries and the European Commission have devised with regard to the "new economy", education appears as one of the central focus points.

In all of the examined countries there is strong and broad national focus on developing human resources and physical infrastructures that match the new opportunities in the knowledge society or the so-called new economy. Most of the countries have produced national policy documents or action plans describing the objectives for future development. Often, the overall goal is to become the world's leading ICT nation or, at least, one of the leading ICT nations.

The policy documents show that education and ICT are interdependent. ICT has become an educational priority. Consequently, development of the knowledge economy depends on a broad range of educational efforts from primary school to lifelong learning, where people's ability to take part in the knowledge economy is an overall goal in the policies. To give people the necessary qualifications – both young and old – is an important issue on the political agenda. From the statistical documents reviewed, it particularly seems clear that the attention today is on providing information primarily on the technological conditions and infrastructure, while use and competencies are gaining political interest and should therefore receive statistical attention.

From our studies of the literature, ten main issues emerge as the most important in educational plans and goals. Though they are closely related and interwoven, they are separated for analytical reasons:

1. Lifelong learning
2. e-learning,
3. ICT infrastructure of the educational system
4. Materials and sources - content
5. Digital literacy
6. Training of teachers – teachers qualifications
7. Integration of ICT in curricula
8. Flexible educational institutions and virtual mobility
9. Networking between educational institutions and public/private collaboration
10. Evaluation and research

2.1.1 Lifelong learning

At the Cologne European Council, June 1999, the Member States agreed on a common definition for lifelong learning: "*all purposeful learning activity, whether formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills, and competence*". Commitment to this definition has enormous implications for policy².

Lifelong learning is regarded as formal and informal education within and outside the educational system throughout life, though primarily with focus on the period individuals are or potentially are engaged in the labour market. Though primarily argued from an economic point of view, education is aimed at developing qualifications among citizens that go beyond technical ICT qualifications with focus on higher order skills to ensure employability and adaptability of the individual to the demands of a knowledge economy. This characterises the basic

² Training Village, Cedefop, <http://www2.trainingvillage.gr/etv/III/III-sum.asp>

philosophy in many national, regional and sectoral information society policies, for which reason education is not a task to be carried out by the educational system alone, but in various partnership arrangements. Apart from the changes in everyday life and working life that derive from technology itself, characterised by the Futures Project, ICT creates opportunities for developing new forms of educational settings and infrastructures.

According to the Training Village at Cedefop, the realisation of lifelong learning is seen as a long-term policy task that has to be achieved in two stages. First, for the generation still in school, the foundations must be laid before they leave the formal education system, and they must emerge as lifelong learners with the motivation, incentive and basic skills to direct their own learning for the rest of their lives. Second, adults must have the opportunity and the means to access whatever learning they require throughout their lives. This duality of the concept is one of the main changes in the paradigm, which until now has concentrated only on recurrent or continuous learning supply for adults.

In Denmark, for instance, lifelong learning is one out of five objectives³ in the overall national strategy for the Information Society. The objectives formulated in the "Digital Denmark" paper outline several recommendations for actions to be taken under the headline "lifelong learning". The focus of these recommendations is on IT-support for teachers, PC Scheme for All Publicly Employed Teachers, IT Integration in All Subjects, One link to the Internet for Every 10th Pupil, English from Nursery School Class, Virtual University, More IT Students on Further Education Degree Courses, More Computer Science Graduates and IT Competence for the Unemployed and Those Threatened with Unemployment.

These Danish recommendations are an example of the very broad definition of lifelong learning. According to Training Village⁴, the terminology and definitions of lifelong learning have developed in line with the shift of emphasis away from the system (in lifelong education) to the learner (in lifelong learning) and different meanings are given to the term in different contexts.

In this chapter, we recognise the broad term as an overall policy objective and pinpoint the core elements of the concept in the following sections.

According to a survey jointly conducted by Cedefop and Eurydice examining the national actions of implementing lifelong learning in Europe, there are differences in the initiatives implemented in the various national systems: "Opposite trends coexist given the numerous and sometimes contrasted expectations placed on education and training systems. Yet, certain common trends are particularly prominent. There is emphasis on an effective grasp of new basic skills and, with them, on the definition of standards to be attained. Systems of education and training are being rationalised and reorganised, often in the belief that benefits may be derived from greater autonomy for schools and other institutions, and that system-based approaches, including guidance and counselling services, are necessary. Partnerships and the use of ICT are helping to achieve these fresh aims by providing for greater overall consistency, flexibility, and broader range of options and, in certain cases, economies of scale. Rather than increased investment, the emphasis is on rebuilding systems or parts of systems as the means to improving overall effectiveness".⁵

³ Digital Denmark, The Ministry of Research and Information Technology, <http://www.detdigtaledanmark.dk/english/english2.html#0.3.1.1>

⁴ Cedefop, <http://www2.trainingvillage.gr/etv/III/III-sum.asp>

⁵ Press release: "Achieving a successful transition to a society of knowledge – National actions to implement Lifelong Learning in Europe", Joint publication of Cedefop and Eurydice, July 2001

2.1.2 E-learning

In the policy debates on the information society and knowledge economy, e-learning is seen as an essential component through the entire educational system and in a lifelong learning perspective.

E-learning can be used as a concept for electronic mediated learning. This includes creation and recreation as well as sharing and distribution of knowledge resources and education, real-time or asynchronous, in a singular mode or collaboratively. Distributed e-learning creates new pedagogical opportunities, particularly with broad band communications and mobile access devices, as well as creating new roles and responsibilities for the educational stakeholders⁶.

Within the educational system, the opportunities of e-learning have serious consequences. To use the ICT and e-learning in an effective way, the educational system has to rethink the approaches to teaching and learning. In order to be effective, the introduction of information and communication technologies will have to be accompanied by a far-reaching reorganisation of learning structures.

E-learning therefore concerns a range of issues that will be addressed below:

- The availability of the technologies carrying e-learning opportunities: ICT infrastructure as well as the contents
- The development of new skills that enable pupils, students and teachers to take part in the e-learning: digital literacy
- Establishing local learning environments that make the most of the e-learning opportunities, such as training teachers to be able to e-learn and to cope with the new role of teachers in e-learning. Furthermore, the issue of integration of ICT and e-learning in the curriculum as a subject, and an integrated part of all subjects.
- Establishing regional/global learning environments; institutional adaptation of virtual mobility and promoting of networking horizontal, vertical, national and international in the educational sector as well as cross-sectoral networking, e.g. public-private.
- Finally establishing apparatus for research and evaluation of the progress within e-learning in education to follow, adjust and change the actions within the issues.

2.1.3 ICT infrastructure of the educational system

The ICT infrastructure of the educational system is an issue of understanding the technological conditions and development under which new ways of working and learning can emerge. We regard ICT infrastructure as consisting of hardware, e.g. PC's, servers, etc., and the physical networks that connect the computers locally and globally. Content: educational software and platforms for networking are dealt with separately as "materials and sources".

Most policy papers and programmes reflect an understanding of the importance of developing the ICT infrastructure in the educational system as the basis for e-learning.⁷

- Availability of computer hardware should be improved; counted in ratios of computers/student, computers/classroom, computers/teacher, type of computers (stand alone/multimedia in network).

⁶ Another important area for the ICT educational level is the ability of the companies to internally enhance learning and development of competencies. However, this perspective will not be treated in this chapter, please refer to Topic 5 Work, skills and employment. Education in Topic 4 is delimited to pre-labour market education, that is education ranging from primary to tertiary school.

⁷ This is a basic target in most policies and programmes; in the EU eLearning Action Plan, eEurope, eLearning summit and various national programmes, e.g. United Kingdom, Scotland and Denmark.

- Connectivity and bandwidth of the computers available should be improved. If they are connected at all, and the type and bandwidth of the connections, high-speed, broadband, wireless. Connectivity is more important than bandwidth, as it is possible to provide high-quality educational content that does not require great bandwidth. However, the possibility of using e.g. video and animation in educational content will benefit from the availability of broadband networks.

As also pointed out in our review of statistical documents, a large part of the indicators available today are focused on outlining the technological infrastructure and conditions of ICT in the educational system. They offer a relatively simple indication of the development of the digitalisation of the school and educational system. However, technological innovations of the hardware and diffusion of ICT throughout society, including schools, tend to diminish the importance of these indicators.

- Some technical indicators become outdated rather quickly as a result of technological progress, as an example: when internet penetration of schools is almost 100 percent, an indicator measuring the bandwidth of the connection is much more interesting than simply knowing if a school is connected to the internet or not).
- As the availability of computers in the schools reach a high level and become the standard, importance of availability decrease in relation to the importance of the actual use of the technology.

The status of the ICT infrastructure is still the physical precondition for being included in e-learning and the information society. However, other qualitative issues are gaining importance as targets for further development of education in the information society.⁸

2.1.4 Materials and sources – contents

A pre-condition for developing and implementing e-learning in the educational system is the availability of software that supports the new ways of learning, in technical terms as well as content. Therefore, a central issues regarding education in the information society is development of sources and materials for e-learning.

In this context, development of open technical standards is important as a platform for a variety of digital content products for education.⁹ At the European level, programmes have been established to support the increasing dynamism of the European digital content market regarding questions of technology as well as content.¹⁰ This will also be of great importance for production of content for education. Making sure that the necessary services for platforms are available is also an important technical pre-condition for using ICT in education.¹¹

Development of technical solutions and content is interwoven. The expected content should be reflected in the technical solutions. However, the technical solutions also open for new possible contents and pedagogical methods – but could as well delimit the possible content and methods.

Therefore, the pedagogical considerations should be given proper weight in development of ICT and educational products. At the European level, actions and programmes are aware of the importance of pedagogical considerations. A central objective in the Minerva action (part of the Socrates programme) is to ensure that pedagogical considerations are taken into account in relation to development of contents.¹² This of course is also a central issue in relation

⁸ As an example, the focus of the Netd@ys has shifted from use of media to content.

⁹ European eLearning Summit Declaration p. 4.

¹⁰ E.g. The eContent Work Programme 2001-2002.

¹¹ Mentioned as a target in eEurope initiative and eEurope 2002.

¹² The Minerva action in *Gateway to education – Socrates*

to integration of ICT in the curriculum, as well as tools in the existing curriculum, as a dynamic part of the digitalisation of curriculum and pedagogical methods.

A special target in relation to e-learning is development of platforms or gateways for networking within and between institutions and individuals in education¹³. Various initiatives have been taken to develop such platforms for networking between students, teachers, school leaders and administrators, etc. at national as well as supranational level, such as:

- The European Schoolnet, a European network of national and other computer networks.¹⁴ This network is as platform for exchanging ideas and experiences within ICT and other subjects, on line workshops, etc.
- The Prometheus gateway for “special interest groups” on ICT in ten different areas. It is based on the “Memorandum of Understanding” between 500 European companies and public institutions.
- The UK “National Grid for Learning”.

Therefore, the pedagogical considerations should be given proper weight in development of ICT and educational products. At the European level, actions and programmes are aware of the importance of pedagogical considerations. A central objective in the Minerva action (part of the Socrates programme) is to ensure that pedagogical considerations are taken into account in relation to development of contents.¹⁵ This of course is also a central issue in relation to integration of ICT in the curriculum, as well as tools in the existing curriculum, as a dynamic part of the digitalisation of curriculum and pedagogical methods.

Further development of ICT based platforms for networking is an important tool for enabling creation of networking skills to pupils and students, and to enable the actual networking between individuals (pupils, students, teachers and researchers) in the educational system across institutions, regions and countries to exchange knowledge and experiences.

2.1.5 Digital literacy

The emergence of the knowledge-based society implies that every citizen must be digitally literate. All groups of society, regardless of age, gender, educational background, etc., must have the opportunity to take part in the societal processes of living, working, and learning to avoid any kind of social exclusion or biases on the labour market.

The recognition that every citizen must be digitally literate also appears from the eLearning Action Plan that has set the target to ensure that all school-leavers have had the opportunity to become digitally literate, and that digital literacy must be adapted to the different learning contexts and target groups.

At the eLearning summit on Digital Literacy in Brussels in May 2001, it was concluded that the 3R's must now have a fourth dimension, i.e. digital literacy. The 3R's are the basic skills of reading, 'riting and 'rithmetic that people learned during the industrial era of society, which is now proposed to be expanded with digital literacy as an important part of the curriculum.

In the discussion paper from the eLearning summit on digital literacy it is suggested that a digitally literate citizen will at least know how to:

- Communicate digitally
- Choose, apply and keep up to date with digital tools
- Search, process and use information in a discriminating and responsible manner

¹³ E.g. a target in eEurope 2002.

¹⁴ See <http://www.en.eun.org/eun.org2/eun/en/index.htm>

¹⁵ The Minerva action in *Gateway to education – Socrates*

- Learn and take responsibility for continuous, personal learning development and employability.

This definition or understanding of digital literacy of course raises the question which skills will in fact be necessary now and in the future knowledge-based society in particular? The answer to this question depends on the actual technological developments in the years to come. As mentioned in the discussion paper from the digital literacy workshop, market developments threaten to erode the relevance of basic ICT skills because of the introduction of simpler interfaces and more user-friendly software applications. Within a very short time, the focus may be more on how to successfully promote higher orders of digital literacy processes. Therefore, long-term digital literacy programmes may be more concerned with students' ability to:

- Recognise that different types of cognitive skills and learning strategies are required depending on the medium that is being used ("learning to learn")
- Work collaboratively with others and apply appropriate social rules and etiquette in a variety of real-life and virtual learning environments
- Assess the reliability of information and the quality of content in networked environments, where contributors can be remote and anonymous, and where trusted "brands" are still emerging
- Understand and articulate their individual preferences with a high degree of precision so that "intelligent" search engines and agents can provide them with relevant results
- Appreciate the need for lifelong learning and regular updating of skills

Although governments will have to become deeply involved in persuading citizens to accept that digital literacy is central to employability, it is also very much the responsibility of every individual to ensure ongoing acquisition of relevant skills. Changing employment patterns will increasingly require a more flexible workforce made up of individuals who are capable of assuming a greater responsibility for their own training (with support from qualified mentors) and who recognise the need for lifelong learning¹⁶.

In this document we will deal with digital literacy in a narrow meaning as digital skills, and label the broad competencies mentioned here as "cross curriculum competencies".

According to the narrow meaning of the phrase, digital skills refers to the use of computer and internet:

- Communicating digitally
- Obtaining and installing digital tools
- Questioning information search results and reliability
- Searching for information needed and process and use it in a discriminating and responsible manner

The broader "cross curriculum competencies" include 'soft' competencies which are not directly connected to ICT, but rather brought to the fore by the possibilities of ICT and the general development of the information society:

- Appreciate the need for lifelong learning and regular updating of skills
- Recognise different types of cognitive skills and learning strategies are required; that is learn to learn
- Work collaboratively with others and apply appropriate social rules and etiquette in a variety of real-life and virtual learning environments
- Be able to understand and articulate individual preferences

¹⁶ eLearning summit, Digital Literacy workshop, A discussion Paper, Brussels 10-11 May 2001

2.1.6 Training of teachers – teachers qualifications

Teachers and learners are the core elements in the education process. In a summary of a study carried out by CERI for the OECD¹⁷ on the importance of ICT in education it is emphasised that both teachers and learners need to fully embrace the potential of ICT for teaching and learning purposes. According to CERI and the OECD, it is not enough to equip schools with ICT materials and on-line access, although this is important too. Teachers must have the necessary skills and competencies, be familiar with relevant software and be able to plan and manage its incorporation into lesson activities and sequences to support desired educational objectives. In the report “Key Data on Europe”¹⁸, Eurydice has outlined the training effort for teachers regarding ICT. Specialist ICT teachers are mostly found at the secondary level. For general class teachers or specialist teachers in other subjects, training in ICT is optional during their initial training in some EU Member States (Germany, Spain, Ireland, Italy and Portugal). On the other hand, training in ICT forms an integral part of compulsory courses for teachers in the French and Flemish communities of Belgium, in Denmark, France, Luxembourg, the Netherlands, Austria, Finland, The UK, Iceland, Norway, Latvia and Cyprus. In-service training of teachers in ICT is often available but rarely compulsory.

The national actions taken to implement lifelong learning in Europe in terms of teachers' ICT qualifications is also summarised in the Eurydice/Cedefop report¹⁹ “National actions to implement lifelong Learning in Europe”. Teachers, trainers and sometimes other categories of educational staff (such as instructors and supervisors, etc.) are benefiting from special training schemes, particularly in the field of ICT, for which specialised centres are coming into existence. In higher education, teachers are being trained, for example, by having to confront groups of learners who are different in terms of their needs and background. ICT is a subject for training in its own right and backed by major campaigns to increase awareness. In some systems, computer science teachers are trained to provide assistance with the development and maintenance of school networks, as well as to help other teachers who are not specialists in this field. Systems with staff shortages are also taking action to attract candidates to the teaching profession, including reforms in training or conditions of employment, campaigns to target new groups of people or heighten awareness of the need for continuing training, etc.

Something more than a reform of teacher training may be needed for teachers to assume their new role. While national strategies list in-service training of teachers as a priority, the situation in schools is far from the philosophy of the teacher as learning counsellor or facilitator. The broader role for the school and teacher in the community has yet to be established²⁰.

Measures to reorganise the way schools work are sometimes necessary, as in cases in which greater autonomy is given to encourage improved co-operation between teachers at different levels of the system. Initiatives for the benefit of trainers, which have been identified, are uncommon, notwithstanding measures to formally consolidate the professional status of their occupation.

2.1.7 Integration of ICT in curricula

An important condition for the development of ICT skills is the degree of integration of ICT with curricula for education at all levels. ICT can either be an integrated element of the various subjects and courses or it can be an individual element of the curricula. There are differ-

¹⁷ <http://www1.oecd.org/els/pdfs/EDSMINDOCA009.pdf>

¹⁸ “Key data on Europe”, European Commission/Eurydice/Eurostat, 1999/2000

¹⁹ “National actions to implement lifelong Learning in Europe”, Eurydice/Cedefop/European Commission, DG Education and Culture, 2001

²⁰ Training Village, <http://www2.trainingvillage.gr/etv/III/III-sum.asp>

ences between the EU Member States with regard to the extent to which ICT is actually integrated in education.

Studies have provided information on the nature of integration of ICT in curricula in this respect for numerous school levels.²¹ However, information indicating whether and how curricula change qualitatively in accordance with the new technological and pedagogical opportunities is still not available. Information on the innovation and development of curricula is needed to provide knowledge on the extent to which the concept of lifelong learning is integrated into the national learning environments. Until now, it seems that the technology is mostly used to reflect traditional classroom methodology, though there is some increased attention to the individual learner according to the OECD.²² The OECD stresses that “learners have the right to a school experience which harmonises with the realities of contemporary life, which affords easy transition into the world beyond school, and which provides a solid basis for lifelong learning”. The OECD says that this implies:

- A curriculum that reflects the strength which ICT brings, including collaborative, enquiry-based methods of working, with emphasis on the development of skills rather than rote learning;
- More autonomy in working, including personal use of on-line formative assessment as learning develops;
- End-of-course examinations and certifications to be matched to the realities of learning and teaching with ICT.

2.1.8 Flexible educational institutions and virtual mobility

Student and researcher mobility is very central in most of the EU programmes in relation to Socrates and DG Education.²³ Virtual mobility or virtual universities allows the learner to stay at home or at his/her home school/university and still following courses at other schools/universities. By offering courses that can be followed via computer networks, normally via a web-based interface, the universities can - in principle - attract students from all over the world.

Besides the possibility for the learning to access education resources without constraints in terms of time or space, the eLearning action plan mentions the institutional perspective: The possibility of true virtual campuses where the whole university is virtual or the possibility of virtual networks for co-operation and collaboration, e.g. courses as a result of co-operation between two or more universities, where each university contributes with a part of the virtual course.

2.1.9 Networking between educational institutions and public/private collaboration

Networking is the organisational form of the information society.

Networking can be seen (at least) as three different things.

- 1) A competence or a skill as a central basic skill in the information society, where information and knowledge is disseminated quickly and widely diffuse. In this relation networking as a skill, competence for networking is addressed as theme in relation to digital literacy.

²¹ For example in “Key Data on Europe”, Eurydice/Eurostat

²² “ICT: School Innovation and the Quality of Learning - Progress and Pitfalls.”, OECD/CERI, 2001

²³ e.g. the main part of the Socrates funds are invested in student mobility.

- 2) A physical phenomena– e.g. hardware or portals/platforms on which networking in a digital form can take place. This is a theme in relation to ‘materials and sources – content.
- 3) Network as an organisational phenomena – e.g. formal/informal co-operation between educational institutions or cross sectoral co-operation

The network activities take place between individuals and institutions. They can take place in horizontal and vertical networks within the educational system, at national and/or international level, as well as between sectors – e.g. private-public collaboration.

The OECD and EU eLearning summit²⁴ emphasises the positive effects of establishing public-private co-operation or partnerships, which in various ways can speed and qualify the process of developing electronic educational content by²⁵:

- Providing longer-term investment strategies
- Encouraging exchange of experience and best practice
- Promoting dialogue on future requirements for multimedia learning materials, and content
- Enhancing technology transfer
- Ensuring that the necessary business skills are taken into account in the educational system.²⁶

2.1.10 Research and evaluation of ICT and the school

E-learning and the integration of ICT usage in curricula are still new to schools and educational institutions. To develop the most effective methods of learning and most relevant skills based on the experiences made in the myriad of projects at schools and where these initiatives are implemented, it is important to establish mechanisms to evaluate the processes. Furthermore, it is important to carry out research into the new types and understandings of problems that derive from these new experiences.

A systematic evaluation of projects and research in central issues would provide a tool to direct the efforts of ICT and e-learning investments in the most appropriate direction. Research and evaluation efforts should therefore be seen as activities to qualify and fine-tune the existing activities in the ICT and e-learning areas. Consequently, these activities contribute to speeding up the implementation and development of ICT in education.

Presently, evaluation/research activities in this area are not well developed according to a recent paper from the OECD. The OECD and the eLearning Summit have identified the following areas within educational research which should be subjected to continuous evaluation²⁷:

- The relationship between ICT and school innovation and reform;
- How ICT diffusion takes place through a school;
- The variables that determine the implementation of ICT;
- The impact of ICT on the quality of education;
- e-learning and e-content in general.

²⁴ OECD: ICT: School innovation.. and the eLearning summit declaration.

²⁵ The European Schoolnet is an example of such partnership with the educational system, as IBM was a partner in developing the Schoolnet. Microsoft is also engaged in various partnerships with universities world-wide.

²⁶ European eLearning Summit Declaration, 18/5-2001.

²⁷ This is the central conclusion of the OECD [ICT School innovation], as well of the eLearning summit declaration.

3 Policy documents

3.1 Overview: Policy documents on Education

The relevant policy documents come from the European Commission itself as well as bodies such as Eurydice and Cedefop. Other supranational institutions such as the OECD (and the UNESCO Institute for Information Technologies (IITE) – to be implemented)

At the national level policy papers from Denmark, Sweden, Finland and UK (England, Northern Ireland, Scotland and Wales) are included in the table below. These mainly come from the national ministries of education or bodies relating to these ministries.

No	Title of document	Author	Region	Year	Type of document
Key Supranational policy documents relevant to Education and learning					
1	eEurope. An Information Society for All	EU	EU	2000	Green Paper
2	eEurope action plan 2000	EU	EU	2000	Action Plan
3	eEurope 2002. Impact and Priorities	EU	EU	2001	Evaluation
4	eLearning - Designing tomorrow's education	EU	EU	2000	Green Paper
5	The eLearning Action Plan Designing tomorrow's education	EU	EU	2001	Action Plan
6	The European eLearning Summit.	EU: The eLearning Summit	EU	2001	Other (recommendations)
7	Development of Educational Content Workshop	EU: The eLearning Summit	EU	2001	Other (discussion paper)
8	Information and communication technology in the education systems in Europe	Eurydice	Europe – EU and others	2000	Report
9	Lifelong learning: The contribution of education systems the Member States of the European union.	Eurydice Survey 2	EU		Report
10	Memorandum on Lifelong Learning	EU	EU	2000	Other (Working Paper)
11	Information Society Technologies, 2001 Work programme	EU	EU	2001	Work programme
12	Achieving a National actions to implement Lifelong Learning in Europe	Cedefop and Eurydice	EU		Evaluation
13	Gateway to education – Socrates	EU	EU		
14	eContent Work Programme 2001-2002	EU	EU		Work Programme
15	ICT: School Innovation and the Quality of Learning - Progress and Pitfalls.	OECD	OECD	2001	Evaluation
16	Education Policy Analysis	OECD	OECD	2001	Report
17	Learning to Bridge the Digital Divide 2000	OECD	OECD	2000	Report

No	Title of document	Author	Region	Year	Type of document
18	eLearning: The Partnership Challenge	OECD	OECD	2001	Report
19	IDUN II	The Nordic Council	Nordic Countries		
Key documents relevant to education in the UK					
20	The national Grid for Learning	Department of Education and Employment (UK)	UK		
21	The Government's National Grid for Learning Challenge	UK government	UK	1998	
22	The learning age: the renaissance for a new Britain	UK state for Education and Employment	UK/England	1998	Green Paper
23	The learning and Skills Council: strategic priorities	UK	UK/England	2000	Other
24	Learning for tomorrow's world Towards a New Strategic Plan for education services in Northern Ireland 2000-2006	Department of Education Northern Ireland	Northern Ireland	1999	Consultation document
25	Scottish Executive Response on the Report on the Inquiry into Impact of the New Economy	Enterprise and Lifelong Learning Committee	Scotland	2001	Documentation (Scottish Executive Response)
Key documents relevant to education in Denmark					
26	Adult learning in Denmark	Ministry of education	DK	2000	
27	Information and communication technologies in the Education System. Action plan 1998-2003	Danish Ministry of Education	DK	1998	Action Plan
28	Information Technology and Education	Danish Ministry of Education	DK	1997	Green Paper (?)
29	Education, employers and Europe	Danish Employers Federation	DK	2000	Report
30	The Digital Denmark	Ministry of Information Technology and Research	DK	1999	Report
31	ICT-readiness in three Danish regions	Ministry of Information Technology and Research	DK	2000	Report

No	Title of document	Author	Region	Year	Type of document
32	IT i AMU (ICT in the adult Vocational training)	National Labour Market Authority	DK	1999	Report
33	Information and communication technologies in the Danish school system	Ministry of Education	DK	Later than 1998	Evaluation
34	Technology-supported learning	Ministry of education	DK		
Key documents relevant to education in Finland, Norway and Sweden					
35	Education, training and research in the Information Society	Finnish Ministry of Education	SF	1999	Green Paper (?)
36	Information strategy for education and research 2000-2004	Finnish Ministry of Education	SF	1999	Action Plan
37	ICT in Norwegian Education	Norwegian Ministry of church, education and re-search	N	1999/2000	Report

3.2 Policy documents at European level

At European level, education in general and higher education in particular are not subject to a common European policy. Responsibility for the content and the organisation of the education system remains at national level. Still the Community “*shall contribute to the development of quality education by encouraging cooperation between Member States*”.²⁸ This happens through a wide range of actions, promoting mobility of citizens, joint study programmes, networks, etc. The role for the European community therefore is complementary to the national activities. Still education plays a central role in setting up the “European knowledge society”.²⁹

The specific coupling of education and ICT within the EU could primarily be found in the policy initiatives “eEurope” and “eLearning”. These action plans intend to co-ordinate and supplement the range of other initiatives and programmes within the EU as well as provide support for activities in the Member States. Within the EU, DG Education and DG IST are the central bodies with a number of programmes in and between these bodies, which is relevant for ICT and education, such as Socrates, Prometheus, eContent, European Schoolnet and the Flexible University.

In the **eEurope initiative** education is primarily the topic of Objective 2.a: “European youth into the digital age” [1]. The goal for this objective is to turn digital literacy to a basic competence for all young Europeans. This means to master the new technology, using it in their learning processes and finally to acquire, during this process, certain new skills for learning and working promoted by the new technologies. A number of targets have been set:

- By the end of 2001:
 - All schools and public centre should have access to the Internet and multimedia resources.

²⁸ According to Article 149 of the Treaty of Amsterdam

²⁹ See <http://europa.eu.int/comm/education/higher.html>.

- Support services, including web-based information and educational resources, should be made available to all teachers and pupils.
- By the end of 2002:
 - All teachers should be individually equipped and skilled in the use of the Internet and multimedia resources.
 - All pupils should have access to high-speed Internet and multimedia resources in their classrooms.
- By the end of 2003:
 - All pupils should be “digitally literate” by the time they leave school.³⁰

These targets were further described in the eEurope Action Plan [2], specifying that most actions should be brought forward by the Member States.

"eEurope 2002 impact and priorities" [3] from March 2001 evaluates the progress so far and sets additional targets. The Member States have made a lot of progress regarding the level of access of schools to the Internet and training of teachers, but still both areas continue to require much attention. Emphasis is further put on the following targets:

- At least one multimedia computer per five pupils,
- Accelerate training programmes in digital technologies, particularly for teachers and trainers
- Adapt school curricula to enable new ways of learning and teaching using the Internet and multimedia
- Upgrade Internet access for learning and training establishments to higher bandwidth via ADSL, cable, wireless access, or other means
- Stimulate the availability of high-quality educational multimedia content and services, including those exploiting cultural heritage, as well as appropriate virtual learning environments
- Support research, through the IST programme, on e-learning advanced technologies and standards and their applications, to support Europe's move to an effective knowledge-based economy.
- Address the skills gap in information and communication technologies in the EU, by tackling its structural causes, promoting lifelong learning and supporting increased dialogue and co-operation between the social partners, educational institutions and other stakeholders.

The **eLearning initiative** is a part of the eEurope action plan in the educational area. The initiative: “eLearning: Designing tomorrow's education” was adopted in May 2000. The aim is to “accelerate the deployment in the European Union of a high-quality infrastructure at a reasonable cost.” In this context, the objectives of eEurope mentioned above have been adopted.

The eLearning initiative also aims to step up the training drive at all levels, particularly by promoting universal digital literacy and the general availability of appropriate training for teachers and trainers, including technology training as well as courses on the educational use of technology and management of change.

The eLearning initiative is not provided with new financial resources, but should be seen as an initiative to co-ordinate already existing activities at EU and Member State levels. Most of the resources to be mobilised will be national, but they should be backed by adequate community instruments (education, training and youth programmes, Structural Funds, and the IST) and by the development of partnerships between public authorities and industry. The

³⁰ In the eLearning initiative [4], this is described in three themes; infrastructure, increasing people's level of knowledge and adapting education and training systems to the knowledge-based society.

possibilities of establishing public-private partnerships in relation to developing education to fill the ICT skills gaps for young people and the workforce was discussed at the European eLearning Summit (Declaration 5).

The eLearning initiative has four action lines, i.e. infrastructure, training, Services and contents and co-operation and dialogue, described in the policy paper [4], the action plan [5], and the European eLearning Summit Declaration [6] :

- Infrastructure and equipment
 - Development of a tool to assist decision-making, benchmarking indicators on eLearning
 - A European research area for new learning environments with focus on development of systems of learning environments, virtual models (virtual university and mobility) and individual differences.
 - Encouraging the development of infrastructure, including development of open technical standards
- Training
 - New skills and eLearning, skills beyond the digital literacy, focused at the labour market.
 - Training of teachers and trainers. To apply the new technologies to innovative practical teaching methods and incorporate them into different disciplines to promote an interdisciplinary approach. Actions should identify best practices and improve training systems.
 - Enhance development of new pedagogical methods in relation to ICT
 - Develop flexible curricula in order to develop and update core digital literacy competencies.
- Services and content of learning environments
 - A conducive environment. Consumer protection, ethical questions and promotion of standards adapted to education and training.
 - Prioritise innovation and development of learning environments within languages, science, technology and society and the Arts, culture, and citizenship.
- Co-operation and dialogue
 - Developing the eLearning site, i.e. a virtual co-operation platform
 - Reinforcing European education and training networks, strengthening exchange of experience in key areas of policy on the use of ICT for education and training (e.g. Prometheus or European Schoolnet), and organising major events on eLearning.
 - The European eLearning Summit [6] further stresses the private-public partnership as a way to promoting long-term investment strategies, as well as encouraging exchange of experience, promoting dialogue on future requirements for multimedia learning material, enhancing technology transfer and ensuring business skill needs to be taken into account.³¹

ICT and “computer literacy³²” are important to all programmes in **DG Education**, which for the period 2000-2006 will upgrade focus on lifelong learning inside and outside formal educational systems.

The largest programme **Socrates** has EUR 1,850 million for the 7-year period. Most initiatives under the Socrates programme use of ICT as an important tool to open educational activities across Europe, build networks, etc.

³¹ See <http://europa.eu.int/comm/education/socrates/minerva/ind1a.html>.

³² The term “computer literacy” is not well defined. Here it mainly indicates the ability to use a computer for some basic functions as searching the web, receiving e-mails and using windows interfaces. Compare Comenius Catalogue of In-Service Training Courses for School Education Staff 2001, <http://europa.eu.int/comm/education/socrates/comenius/cat2001-2002/uk-066.pdf>

The **Comenius initiative** is in the first phase of education, from pre-school, primary to secondary school, and it is addressed to all members of the education community in the broad sense. The overall objectives of Comenius are to enhance the quality and reinforce the European dimension of school education, in particular by encouraging transnational cooperation between schools, contributing to the improved professional development of staff directly involved in the school education sector, and promoting the learning of languages and intercultural awareness.

ICT is mentioned as a specific target in relation to the objective of enhancing the quality and reinforcing the European dimension of school education:

- Promoting transnational cooperation and exchanges between schools and teacher training establishments
- Encouraging innovation in pedagogical methods and materials
- Promoting the transnational dissemination of good practice and innovation in the management of schools
- Promoting the use of information and communication technology in school education and in the training of staff working in this sector.

The **Erasmus initiative** is focused on higher education, particularly on student mobility, though more emphasis is placed on teaching staff exchanges, transnational curriculum development and pan-European thematic networks as well as bringing the European perspective into the courses. The budget of SOCRATES/Erasmus for 2000-2006 amounts to approx. € 950 million.

The **Minerva action** is dedicated to promotion of European co-operation in the field of Open and Distance Learning (ODL) and Information and Communication Technology (ICT) in education. Minerva has EUR 8 mill a year for supporting projects within three main objectives:

1. To promote understanding among teachers, learners, decision-makers and the public at large of the implications of MINERVA and ICT for education, as well as the critical and responsible use of ICT for educational purposes
2. To ensure that pedagogical considerations are given proper weight in the development of ICT and multimedia-based educational products and services; and
3. To promote access to improved methods and educational resources as well as to results and best practices in this field.

The **European Schoolnet**³³ is a “network of networks” supported by the EU, and a co-operation between the European ministries of education on information and communication technology in education.

The Schoolnet is a European network of national and other computer networks. It provides a platform for online workshops (e.g. on teachers training), finding partners for European projects and exchanging experiences between pupils and teachers using ICT as a subject and a tool in other subjects.

Prometheus is another a joint gateway for networking and exchange of experience. Prometheus is based on a Memorandum of Understanding between 500 large companies, universities, SME associations, etc. The objectives of the Memorandum of Understanding focus on:

- Co-operation between education and training authorities and establishments in EU,
- development of common European and international standards for digital multimedia learning content and services

³³ See <http://www.eun.org/eun.org2/eun/en/index.html>.

- A global dimension to their co-operation while upholding Europe's cultural interests and specificity,
- Achieving these goals is by following certain common guidelines organising their future co-operation³⁴

The Prometheus gateway is a base for a number of "special interest groups" around four key areas of co-operation:

- Interchange of multimedia educational material
- Knowledge and skills assessment,
- Accreditation of quality and best practise
- Interoperability of services

Ten SIG's presently focus on se key areas in schools, higher education, accessibility, etc.

DG IST has a number of programmes or contributes to other programmes and initiatives in or between EU bodies.

The **Information Society Technologies Programme** focuses on education and training. Key Action III, Multimedia, Content and Tools, is of special interest for education, as "*the work will cover new models, methods, technologies and systems for creating, processing, managing, networking, accessing and exploiting digital content, including audio-visual content.*"³⁵ This key line contributes to the eEurope Action Plan and the eLearning initiative by contributing to the development of new educational methods as well as content.

The Council adopted the **eContent programme** on the 22 December 2000 and for the period covering 2001-2005 has a budget of €100 million. The eContent programme, in particular, contributes to its third objective to stimulate the use of Internet as part of the eEurope Action Plan.

The programme is centred round the need of European businesses and citizens to access and use high-quality e-content suited to their needs, with three action lines:

- Improving access to and expanding use of public sector information;
- Enhancing the content production in a multilingual and multicultural environment;
- Increasing the dynamism of the digital content market.

The programme does not focus on education, though some of the supported projects could be within the educational sector. Nevertheless, the focus on access to public sector information and enhancing content production in a multilingual and multicultural environment is highly relevant for the question of developing materials and sources for the use in the educational system and the lifelong learning.

Other initiatives, such as **Netd@ys**, used to focus on use of new media (such as the Internet, videoconference or new audio-visual facilities, etc.) as resources for learning and teaching. The Netd@ys 2001 is focused on support of projects demonstrating good-quality educational content, by partnerships between different organisations, including youth and cultural organisations and other organisations in the public and private sectors.³⁶

Two institutions in relation to the EU contribute to evaluation and research in the field of ICT and education. The education information network in Europe, Eurydice, and Cedefop, which although it focuses on vocational training, also cover subject of educational interest.

³⁴ See <http://prometeus.org/1objectives.htm>.

³⁵ IST, Work Programme 2001.

³⁶ See <http://www.netdays2001.org/netdays/index.htm>.

A report from **Eurydice** "Information and communication technology in the education systems in Europe" [8] on the use of ICT in most European countries is evaluated based on a number of key indicators. A central conclusion is that the education policies in all countries are increasingly geared to the use of ICT. The sources of financing ICT investments as well as the level of inclusion of ICT in curricula for pupils and teacher training vary between the countries.

The Centre for Educational Research and Innovation in the OECD, **CERI**, runs the project "Schooling for tomorrow". Within this we find an international initiative "ICT and the quality of Learning". The focus is on five themes: Towards a changed educational culture; E-learning and partnerships; Learning to bridge the digital divide; Teaching and learning; and Research and development.

A midway evaluation paper [14] concludes upon ways to go:

- ICT infrastructure building: hardware and connectivity
- Convince all in the learning system to use ICT in their daily work.
- Build partnerships horizontally between education, the private sector and society, and vertically between different sectors of the education system.
- To evaluate the development to show "what works" regarding implementation of ICT.
- Sustained professional development for teachers and leaders of institutions and systems
- Developing courses and forums; courses in technical and pedagogical skills in relations to ICT, electronic forums for sharing curriculum developments, etc., as well as educational gateways.

A report within this initiative "Learning to Bridge the digital Divide" [18], discuss inequalities of the access to ICT. The report finds that the digital divide is a matter of inequalities of extent and quality of human knowledge and learning, rather than a question of having or not having access to ICT. At the same time, it is concluded that ICT can be the solution to inequalities rather than their cause.

3.3 Policy documents on Member State level

This section provides a textual overview of the main national policy documents in the topic area, concentrating on identifying the main issues for the countries examined.

In *Denmark*, the main policy documents focus on creating the best possible technological conditions for turning Denmark into a "digital nation".

Education and development of competencies and ICT skills are important topics of a political vision of placing Denmark as the leading ICT nation of the world. The documents on education focus on lifelong learning, ICT skills of teachers, PC arrangements for employees in the public sector, integration of ICT in education, high speed internet access, etc.

Other areas of interest in the policy documents are concerned with the promotion of flexible and equal access to education, digital infrastructure and development of educational software. In April 2001, the Ministry of Education and the Ministry of Information Technology and Research launched an initiative called "The ICT mirror". It aims at outlining the status of the integration of ICT in the Danish educational sector in the light of the vision that Denmark is to be one of the best ICT nations in the world. "The ICT mirror" is a tool for evaluating and benchmarking the integration of ICT regarding school management, teachers and pupils.

In *Finland*, policy documents also reflect a vision of becoming one of the leading knowledge and interaction societies. Policy documents focus on providing opportunities for developing information society skills for all, ICT skills of educational staff, development of knowledge of

professionals in the information and content industries, electronic publication, classification and distribution of research information and teaching material. Strengthening of the digital infrastructure is also a part of the Finish policy documents.

Like Denmark, Finland also has plans for establishing virtual universities/schools that are outlined in the policy documents. In Finland, each educational institution must have a strategy for using ICT in teaching by the end of 2001. A similar goal applies to Denmark.

According to the Norwegian national plan for ICT in education³⁷ Norway defines the goal for 2000-2003 as follows: "ICT is to be used in education in order to contribute to better organisation, greater skills and pedagogical competence within an education system that develops and exploits ICT as a subject. The potential of ICT is to be exploited within teaching and learning so that the skills requirements of the individual and the society as a whole can be met." This goal will be approached with the main priorities pedagogical facilitation, ICT both as a subject and ICT integrated in other subjects, development of teachers competence, research and development, organisation, and infrastructure and cooperation. In Norway ICT is seen as an integral part of the education system where ICT is to contribute to provide equal opportunities regardless of sex etc., more flexible training arrangements, new ways of working, learning and collaboration, and also ensuring equal opportunities to those with learning difficulties or physical handicaps. The focus on ICT in education in Norway is not explicitly on life long learning although several of the components of the concept of life long learning are included in the plans.

In the main national policy document on ICT in education³⁸ of Sweden the focus is on ICT in schools, spanning over several school levels and working life. It is seen as important to provide basic ICT skills equipping everyone for the life long learning. The Swedish programme "The National Action Programme for ICT in Schools" (ITiS) aims at boosting this development. ICT in higher education and adult education are areas also comprised by the central policy paper as well as ICT for senior citizens and persons with disabilities.

United Kingdom is at a very high international stage in relation to implementing ICT in education. According the Becta draft corporate plan (2001-2004) United Kingdom is world leading regarding access to ICT resources across the country, entitlement to ICT training for 5- to 16-year-olds, and considerable investment in teacher training³⁹.

The educational and training system of United Kingdom varies between England, Scotland, Wales and Northern Ireland, because this area is subject of local policy.

The National Grid for Learning is covering all United Kingdom, as the headline initiative for improving schools' ICT provision, developing a new generation of digital learning resources and equipping teachers with the skills to make effective use of them in the drive to raise standards.

The Grid, established in 1998, is an architecture of educationally valuable content on the Internet, and an initiative to support the equipping and networking of schools and other institutions, which is underpinned by five strategic targets covering "school connections to the Internet, developing digital learning resources, teacher training in ICT, pupil competence in ICT and on-line school administration". The National Grid for Learning includes extra funding (over £1bn) for hardware, software and networks, as well as for training in the use of information and communications technology (ICT) in the educational context⁴⁰.

Despite of the general high level of ICT training for 5 to 16 year olds, reports shows digital divide between best and least well equipped schools and colleges Especially at the secon-

³⁷ "ICT in Norwegian Education – Plan for 2000 – 2003", Kirke-, Utdannings- og Forskningsdepartementet <http://www.odin.dep.no/archive/kufbilder/01/03/IKTiu005.pdf>

³⁸ The development of IT skills – a publication about one of the priority areas of swedish IT-policy", Ministry of Industry, Employment and Communications, Sweden

³⁹ Becta Draft Corporate Plan 2001-2004

⁴⁰ The Government's National Grid for Learning Challenge. See <http://www.dfes.gov.uk/grid/challenge/index.htm> and Becta Draft Corporate Plan.

dary level⁴¹. This social-economic based divide is an issues which is faced in a number of initiatives⁴².

The UK Government's policy on future directions is, according to a green paper from the Department of Education and Employment: to develop software of real quality that is directly relevant to teaching and school administration, and to invest in training of teachers and head teachers to be able to use ICT effectively in their day-to-day work⁴³.

Specifically in relation to ICT, *Scotland* has formulated policies regarding infrastructure; an increase in the number of computers for pupils (1 to 5 in secondary, 1 to 7,5 in primary schools by 2002), and all school should be included in a broadband project year 2002, which includes a school intranet. Moreover, it is the plan to secure universal access to the web by 2005.

According to the Executive Memorandum, "IT literacy" has been integrated into the school curriculum, though this probably does no apply to integration in all subjects. By 2002, most school leavers should therefore have a good understanding of ICT.⁴⁴

⁴¹ Becta: Schools into Future – find original kilde.

⁴² The Becta corporate plan mentions the National E-learning Foundation, Excellence in Cities, the City Academies, and Computers within Reach.

⁴³ Department of Education and Employment: Building on Success.

⁴⁴ See the Report on the inquiry into the Impact of the New Economy.

4 Review of existing indicators

In this chapter, we will outline the existing indicators on ICT and education. For each indicator identified the following information is given:

- Definition of the indicator
- Source
- Countries covered by source
- Time series available
- Interpretation of the future value of the indicator (see template below)

Established indicators are described in section 4.1. An overview table lists all the identified indicators structured into sub-domains

Initiatives for innovative indicators, which are currently being worked on at international statistical organisations and elsewhere, are dealt with in section 4.2. Issues under debate and the specification of the new indicators being developed will be highlighted.

4.1 Existing indicators for education

This section is comprised of an overview table and a table for each indicator which describes these in detail.

The indicators are divided into four dimensions which relate to some or all of the issues identified from the literature review:

- Policy & Strategy
- Economy & Infrastructure
- Use & Access
- Competencies

Figure 1: Relation between the policy issues and dimensions of existing statistical indicators

	Policy & Strategy	Economy & Infrastructure	Use & Access	Competencies
ICT infrastructure of the educational system	X	X		
Materials and sources - content	X	X	X	
Digital literacy	X			X
Training of teachers – teachers qualifications	X	X		X
Integration of ICT in curricula	X			X
Flexible universities/virtual mobility	X	X	X	
Networking between educational institutions and public/private collaboration	X		X	X

Lifelong learning	X – covered by the above mentioned	X – covered by the above mentioned	X – covered by the above mentioned	X – covered by the above mentioned
e-learning	X – covered by the above mentioned	X – covered by the above mentioned	X – covered by the above mentioned	X – covered by the above mentioned
Evaluation and research	X – covered by the above mentioned	X – covered by the above mentioned	X – covered by the above mentioned	X – covered by the above mentioned

Four surveys have been source for a number of indicators. These are briefly presented below:

- A survey of ICT in Danish public primary and lower secondary schools .

The data is collected by a census covering all public primary and lower secondary schools in Denmark. 97,4 % of the schools answered the questionnaire. Data was collected between May and September 1999. The questionnaire was sent to the schools where it was answered by the head of administration in most cases.

- Key data on education in Europe by Eurydice .

These data is collected by the national Eurydice offices. A common questionnaire is answered by the national units, which answers on the background of existing data, i.e. either regular or one-off surveys or policy papers if the questions relates to policy.

- Information and Communications Technology in Schools, England: 2000 .

The ICT Survey is the source of information about the availability and use of information and communication technologies in primary, secondary and special schools in England. It is a sample survey and the sample is chosen to be representative of different types of school throughout the country. Responses were received from 769 primary, 714 secondary and 349 special schools .

- The Flash Eurobarometer surveys: Flash Eurobarometer 101, Headteachers and the information society and Flash Eurobarometer 102, Teachers in the information society.

These surveys are based on a sample of between 490 and 725 headteachers, and between 440 and 1200 teachers respective in each of the EU member states, except for Luxemburg. The surveys were carried out by telephone by EOS Gallup.

The target of the Flash Eurobarometer 101 "Headteachers" was defined as "all the schools frequented by pupils aged up to 18 years old". The person interviewed in each school was the one responsible for the school's didactical and administrative operation, i.e. the "headteacher" or "director". The results were presented country by country, as well as according to the main characteristics of schools, i.e. type and level of education, and size of locality.

The target of the Flash Eurobarometer 102 "Teachers" was defined by the European Commission as "all the teachers of pupils aged up to 18 years old". The results were presented country by country, as well as according to the main characteristics of teachers, i.e. type and level of education, main subject taught, gender and age.

Overview table

No.	Name of indicator	eEurope code	Main Source
A	Policy and strategy		
A1-1	Countries with an official policy on the use of ICT	2A-5	Eurydice ⁴⁵
A1-2	Schedule for implementing national ICT	2A-5	Eurydice

⁴⁵ Eurydice = "Key data on education in Europe"; In collaboration between Eurydice, EU - the information network on education in Europe and Eurostat.

No.	Name of indicator	eEurope code	Main Source
	education projects		
A1-3	Responsibility for the purchase and maintenance of hardware	No direct relevance	Eurydice
A1-4	Objectives in national ICT projects	2A-1, 2A-6	Eurydice
A1-5	Inclusion of ICT in the (national) curriculum	2A-5	Eurydice
A1-6a	Schools with ICT implementation plan (simple)	2A-5	DUT-DK ⁴⁶
A1-6b	Schools with ICT implementation plan (detailed)	2A-1, 2A-3, 2A-4, 2A-5, 2A-6	DEE-UK ⁴⁷
A1-7	Approaches of ICT defined in the curriculum	2A-5	Eurydice
A1-8	Objectives defined in the curriculum for the teaching or the use of ICT	2A-5, 2A-6	Eurydice
A1-9	Schools with autonomous decision power	No direct relevance	EU-MS
B	Economy & Infrastructure		
B1-1	Average expenditure on ICT in schools	2A-1, 2A-3, 2A-4, 2A-5, 2A-6	DEE-UK
B1-2	Sources of funding for ICT in schools	No direct relevance	DEE-UK
B1-3	Sources of funding for ICT in schools	No direct relevance	EU-MS
B1-4	Total expenditure on ICT in schools	2A-1, 2A-5, 2A-6	DEE-UK
B1-5	Distribution of the specific budget between the purchase of equipment and expenditure on human resources	2A-1, 2A-4	Eurydice
B2-1	Number of computers per 100 pupils	2A-1, 2A-6	EU-MS ⁴⁸
B2-2	Number and quality of computers available for administration, pupils and teachers	2A-1	DUT-DK, DEE-UK
B2-3	Number and quality of computers available for administration, pupils and teachers	B2-1	EU-MS
B2-4	Expected increase in the number of computers	2A-1	DUT-DK
B2-5	Computers with access to school net and/or Internet	2A-1	DUT-DK, S
B2-6	Quality of Internet access in schools	2A-1	EU-MS
B2-7a	Placement of the computers	2A-1	EU-MS, ESDIS ⁴⁹
B2-7b	Placement of the computers	2A-1	DUT-DK, S
B2-8	Schools with own web site	No direct relevance	Andersen Consulting, Denmark ⁵⁰
B2-9	Schools with on-line services	2A-3, 2A-6	Andersen Consulting, Den-

⁴⁶ DUT-DK =Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)

⁴⁷ DEE-UK =Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools. Similar found in DK.

⁴⁸ EU-MS= Sample survey/Eurobarometer - Member States, flash 101 and 102 (survey of teachers and head teachers).

⁵ ESDIS 2000: Benchmarking Report following up the "Strategies for jobs in the Information Society".

⁵⁰ Gallup and Andersen Consulting, Denmark

No.	Name of indicator	eEurope code	Main Source
			mark
B2-10	Schools with Intranet, web site, e-mail	2A-1, 2A-3	EU-MS
C	Use and access		
C1-1	Pupils and teachers with a personal e-mail address	2A-1, 2A-6	DEE-UK
C1-2	Use of ICT in areas of the curriculum	2A-5, 2A-6	DEE-UK
C1-3	Use of external electronic communication services	2A-1, 2A-6	DEE-UK
C1-4	Teachers using the Internet for non-computing teaching	eEurope benchmarking indicator	EU-MS
C1-5a	Internet use in teaching	eEurope benchmarking indicator	EU-MS
C1-5b	Internet use in teaching	eEurope benchmarking indicator	EU-MS
C1-6	Teachers opinion about the Internet as a tool	eEurope benchmarking indicator	EU-MS
C1-7	Pupils access to the Internet	2A-1	EU-MS
C1-8	Teachers access to computer and Internet at home	2A-1, 2A-4	EU-MS
C1-9	Who pays teachers home access	2A-1, 2A-4	EU-MS
C1-10	Teachers who connect with other schools via the Internet	2A-2	EU-MS
D	Competencies		
D1-1	New ICT and media students in percentages of all students	No direct relevance	SF ⁵¹ , On the Road to the Finnish Information Society II
D1-2	New ICT and media students by level of education	No direct relevance	SF
D1-3	Qualifications and degrees in information technology and media studies	2A-6	SF
D1-4	Population with a degree or qualification in ICT and media studies by field of study and level of education	2A-6	SF
D1-5	Hours/years spend to pedagogical IT-guidance	2A-3, 2A-6	DUT-DK
D1-6	Hours/years spend to technical IT-guidance	2A-3	DUT-DK
D1-7	Teachers' confidence in the use of ICT	2A-4	DEE-UK
D1-8	Students and teachers knowledge regarding ICT		Andersen Consulting, Denmark
D1-9	Specialist ICT teachers	2A-6	Andersen Consulting, Denmark
D-1-10	ICT courses during initial training of general class teachers	2A-4, 2A-6	Eurydice
D1-11	ICT trained teachers	2A-4, 2A-6	EU-MS

⁵¹ Statistics Finland

No.	Name of indicator	eEurope code	Main Source
D1-12	Change in teaching methods	2A-5	EU-MS

Indicator descriptions in detail in relation to policy and strategy

Name of indicator	A1-1: Countries with an official policy on the use of ICT
Definition	Is there an official policy on the use of ICT at the national level? Schools broken down by type of school: 1) primary and secondary 2) primary, secondary, and tertiary 3) secondary and tertiary.
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning using information technologies.
Future value	Limited. In near future all EU Member States will have some kind of ICT education policy
Links to other indicators	A1-2

Name of indicator	A1-2: Schedule for implementing national ICT education projects
Definition	Measuring the starting year for implementing national ICT projects. Schools broken down by type of school: 1) primary 2) lower secondary 3) higher secondary
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, EU - the information network on education in Europe and Eurostat.
Countries covered	EU-MS, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning using information technologies
Future value	Yes – especially if combined with other output indicators
Links to other indicators	A1-1

Name of indicator	A1-3: Responsibility for the purchase and maintenance of hardware
Definition	Who is responsible for purchasing and maintaining ICT hardware: Central level, local/school level or at different levels depending on the task and/or the education level
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, EU - the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	Which of the 6 eEurope actions within this topic does the indicator refer to: No direct relevance
Future value	?
Links to other indicators	No

Name of indicator	A1-4: Objectives in national ICT projects
Definition	What are the objectives in the national ICT projects (dichotomous scale: yes/no) Objectives differentiated as follows: <ul style="list-style-type: none"> • Equipment • Acquisition and/or distribution of software • Development of teachers skills • Development of pupils skills • Help in development of software/educational software • Use of the Internet Schools broken down by type of school: 1) Primary, 2) lower secondary, and 3) higher secondary.
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, EU - the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Future value may depend on whether or not the list of objectives will be extended
Links to other indicators	Indicator no. A1-8

Name of indicator	A1-5: Inclusion of ICT in the (national) curriculum
Definition	Is ICT included in the (national) curriculum or not? Schools broken down by type of school: 1) primary 2) lower secondary 3) higher secondary.
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, EU - the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98 (Key data published once every second year since 1994).
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning using information technologies.
Future value	Limited – in near future ICT is likely to be included in all national curricula
Links to other indicators	A1-1, A1-2

Name of indicator	A1-6a: Schools with ICT implementation plan
Definition	Number and percentage of schools with an ICT implementation plan.
Notes	Schools broken down into primary and lower secondary schools. The research also examines when the plan was evaluated/revised the last time. The question can be cross tabulated with data on number of pupils, number of teachers and school size (in number of pupils), e.g. xx per pupil..., which is also available in the survey.
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Data from 1996 and 1999. Occasional survey.
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning using ICT
Future value	Will be of increasing relevance if content (objectives) of the implementation plan are measured (see next indicator)
Links to other indicators	A1-6b

Name of indicator	A1-6b: Schools with ICT implementation plan
Definition	Percentage of schools that have drawn up an ICT development plan
Notes	<p>Schools broken down by type of school (secondary, primary and special).</p> <p>Factors included in schools' ICT development plans:</p> <p>Percentage of schools:</p> <ul style="list-style-type: none"> • which had an ICT development plan • which had plans which were available to parents <p>Percentage of schools which included in their plan:</p> <ul style="list-style-type: none"> • acquisition of new software and content and sharing with other schools • development of new curriculum opportunities using ICT • financial planning for the development of ICT facilities • development of the hardware provision, equipment upgrades, networking • depreciation cost of equipment and disposal of redundant equipment • staff training and development in the use of ICT • measures to protect against on-line access to undesirable materials • the use of ICT facilities outside school hours and including their use for community purposes
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	2000 (first time)
eEurope relevance	<p>2A-1: Provide all schools, teachers and students with convenient access to the Internet and multimedia resources</p> <p>2A-3: Ensure availability of support services and educational resources on the Internet, e-learning platforms, for teachers, pupils and parents</p> <p>2A-4: Provide training to all teachers, adapt teacher curricula and offer incentives to teachers to use digital technologies in teaching</p> <p>2A-5: Adapt school curricula to enable new ways of learning using ICT</p> <p>2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school</p>
Future value	Yes
Links to other indicators	Indicator A1-1a

Name of indicator	A1-7: Approaches of ICT defined in the curriculum
Definition	<p>Is ICT approached as a separate subject or as a tool for other subjects (or both) in the curriculum?</p> <p>Schools broken down by type of school:</p> <ol style="list-style-type: none"> 1) primary and secondary 2) primary, secondary and tertiary 3) secondary and tertiary.
Notes	-
Sources	<p>Eurydice (Key data on education in Europe)</p> <p>In collaboration between Eurydice, the information network on education in Europe and Eurostat.</p>
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning to use information technologies.
Future value	Limited value - Soon ICT will be approached as a tool for many other subjects
Links to other indicators	-

Name of indicator	A1-8: Objectives defined in the curriculum for the teaching or the use of ICT
Definition	Objectives as defined in the national curriculum for the teaching or the use of ICT? Objectives differentiated as follows: <ul style="list-style-type: none"> • To develop programming skills • To learn correct use of a word processor, a spreadsheet, etc. • To learn to search for information on a CD-ROM, a network, etc. • To communicate via a network • Schools broken down by type of school: <ol style="list-style-type: none"> 1) primary and secondary 2) primary, secondary and tertiary 3) secondary and tertiary.
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning using information technologies. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Yes
Links to other indicators	Indicators related to the use of ICT and to literacy

Name of indicator	A1-9: Schools with autonomous decision power
Definition	Percentage of schools with autonomous decision power on ICT issues
Notes	Issues examined: Does your school have autonomous decision power on: <ul style="list-style-type: none"> • hardware purchases? • software purchases? • Internet access type? • teacher training in this field?
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU Member States
Time series available	2001
eEurope relevance	No direct relation
Future value	-
Links to other indicators	-

Indicator descriptions in detail in relation to Economy & Infrastructure

Name of indicator	B1-1: Average expenditure on ICT in schools
Definition	Average expenditure on ICT in schools, per school/ per pupil, broken down by type
Notes	<p>Schools broken down by type of school (secondary, primary and special), per school and per pupil.</p> <p>Expenditure differentiated into teaching/learning vs management/administration, and type of ICT:</p> <ul style="list-style-type: none"> • Hardware including computers, robots, peripheral equipment, upgrades and replacements) • Software and on-line content. • Teachers who attend in-service training (INSET) courses on the use of new technologies and advisors employed to visit school • Telecommunications and (educational) Internet Service Provider charges • Technical, maintenance and other support
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in School
Countries covered	England
Time series available	Annually, Since 1998
eEurope relevance	<p>2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.</p> <p>2A-3 Ensure availability of support services and educational resources on the Internet, as well as e-learning platforms, for teachers, pupils and parents (e.g. access for disadvantaged children)</p> <p>2A-4 Provide training to all teachers, in particular adapt teacher curricula and offer incentives to teachers to actually use digital technologies in teaching.</p> <p>2A-5 Adapt school curricula to enable new ways of learning using information technologies.</p> <p>2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.</p>
Future value	As an economic measurement of the ICT frame the indicator will keep its value in the future, but more interest will be on actual use and competencies/literacy
Links to other indicators	-

Name of indicator	B1-2: Sources of funding for ICT in schools by type of school
Definition	Sources of funding for ICT in schools by type of school in percentage of total funding
Notes	Schools broken down by type of school (secondary, primary and special). Sources of funding broken down into: <ul style="list-style-type: none"> • Local management of schools • National Grid for Learning Standards fund • Local Education Authority • Central Government • PTA/Parents • Private sector sponsorship • Other sources
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	Annually, Since 1998
eEurope relevance	No direct relevance
Future value	Yes. Could be a first step to deal with development of public and private partnership in education
Links to other indicators	-

Name of indicator	B1-3: Sources of funding for ICT in schools by type of school
Definition	Percentage of the actual number of computers used for education which were donated by private sources
Notes	-
Sources	Eurobarometer survey flash 101 head teachers, Feb-May 2001
Countries covered	EU Member States
Time series available	2001
eEurope relevance	No direct relevance
Future value	Yes. Could be a first step to deal with development of public and private partnership in education
Links to other indicators	B1-4

Name of indicator	B1-4: Total expenditure on ICT in schools
Definition	Total expenditure on ICT in schools per pupil/ per school, broken down by type of school
Notes	Expenditure differentiated as follows: <ul style="list-style-type: none"> • teaching and learning • school management and administration Both in average per school and per pupil Schools broken down by type of school (secondary, primary and special).
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	Annually. Since 1997
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-5 Adapt school curricula to enable new ways of learning using information technologies. 2A-6 Ensure that all pupils have the possibility to be digitally illiterate by the time they leave school.
Future value	Limited – not detailed enough. But the focus on average expenditure per pupil is interesting and may be used in other indicators
Links to other indicators	B1-5

Name of indicator	B1-5: Distribution of the specific budget between the purchase of equipment and expenditure on human resources
Definition	How is the distribution of the specific IT budget between the purchase of equipment and expenditure on human resources? (in percentages) Schools broken down by type of school: 1) primary and secondary 2) primary, secondary and tertiary 3) secondary and tertiary.
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-4 Provide training to all teachers, in particular adapt teacher curricula and offer incentives to teachers to actually use digital technologies in teaching.
Future value	Limited – not detailed enough.
Links to other indicators	B1-4

Name of indicator	B2-1: Number of computers per 100 pupils
Definition	Number of computers per 100 pupils in primary/secondary/tertiary levels
Notes	Only those computers which are used for teaching purposes
Sources	Sample survey/Eurobarometer - Member States (a supplemented survey of teachers).
Countries covered	EU Member States
Time series available	Launched November 2000, Annual
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Limited – in a few years time it will be more interesting to measure the actual use of computers (intensity of usage)
Links to other indicators	Hours of computer use per pupil per week

Name of indicator	B2-2: Number and quality of computers available for administration, pupils and teachers
Definition	<ul style="list-style-type: none"> • The number of computers used for education is related to the number of pupils in the school • The quality of computers used for education is indicated by: <ul style="list-style-type: none"> • Share of total educational computers connected to the Internet • Share of total educational computer which are less than three years old
Notes	-
Sources	Eurobarometer survey flash 101 head teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	Provide all schools, teachers and students with convenient access to the Internet and multimedia resources
Future value	Limited – in a few years time it will be more interesting to measure how much the pupils actual use of computers
Links to other indicators	B2-1, B2-3

Name of indicator	B2-3: Number and quality of computers available for administration, pupils and teachers
Definition	Number and quality (type and size (depending of size of processor and PC/Machintosh)) of computers available for administration, pupils and teachers.
Notes	The question can be cross tabulated with data on number of pupils, number of teachers and school size (in number of pupils), e.g. xx per pupil..., which is also available in the survey.
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Data from 1996 and 1999. Occational survey.
eEurope relevance	Provide all schools, teachers and students with convenient access to the Internet and multimedia resources
Future value	Limited – in a few years time it will be more interesting to measure how much the pupils actual use of computers
Links to other indicators	B2-1, B2-2

Name of indicator	B2-4: Expected increases in the number of computers
Definition	Increase in the coming year in number of computers in the primary and lower secondary schools, as expected by schools.
Notes	-
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Data from 1996 and 1999. Occasional survey.
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
Future value	Limited – focus on hardware will become less interesting
Links to other indicators	No

Name of indicator	B2-5: Computers in primary and lower secondary schools with access to school network and/or Internet
Definition	Number of computers at primary and lower secondary schools with access to internal school network and/or Internet.
Notes	Data available for dividing: per school, per pupil, share of total number of computers
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Data from 1996 and 1999. Occasional survey.
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
Future value	Limited – focus on hardware will become less interesting
Links to other indicators	

Name of indicator	B2-6: Quality of Internet access in schools
Definition	Percentage of schools with Internet access
Notes	Access differentiated as follows: <ul style="list-style-type: none"> • a standard telephone line • an ISDN line (Integrated Services Digital Network) • ADSL (Asymmetric Digital Subscriber Line) • the television cable • a satellite • school is not connected to the Internet
Sources	Eurobarometer survey flash 101 head teachers Feb-May 2001
Countries covered	EU Member States
Time series available	2001
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
Future value	Limited value – focus on hardware will become less interesting
Links to other indicators	-

Name of indicator	B2-7a: Placement of the computers
Definition	Location where computers are placed in schools: The number of computers in the class room, a common room, a pedagogical service centre, a special computer room or other places, per pupil.
Notes	Data available for calculation: per school, per pupil, share of total number of computers
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Also measured in 1996 and 1999. Occasional survey.
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
Future value	Limited value
Links to other indicators	B2-7b

Name of indicator	B2-7b: Placement of the computers for educational purposes in schools
Definition	The indicator measure where the computers used for educational purposes in schools are located, because pedagogical possibilities depend on location of the computer
Notes	Answer categories: <ul style="list-style-type: none"> • in a computer lab • in the classrooms • in the school's library • you have laptops • elsewhere
Sources	Eurobarometer survey flash 101 head teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
Future value	Limited value
Links to other indicators	B2-7a

Name of indicator	B2-8: Schools with own web site
Definition	Schools with own web site, as percentage of all schools.
Notes	Schools broken down by type of school (primary, lower secondary, upper secondary, and tertiary).
Sources	Andersen Consulting, Denmark
Countries covered	DK
Time series available	2000
eEurope relevance	No direct relevance
Future value	Limited – an indirect way to measure if the school is giving information on the Internet
Links to other indicators	-

Name of indicator	B2-9: Schools with on-line services
Definition	Schools with on-line services as percentage of all schools
Notes	Schools broken down by type of school (primary, lower secondary, upper secondary, and tertiary).
Sources	Andersen Consulting, Denmark
Countries covered	DK
Time series available	2000
eEurope relevance	2A-3 Ensure availability of support services and educational resources on the Internet, as well as e-learning platforms, for teachers, pupils and parents (e.g. access for disadvantaged children) 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Yes – but has to be further developed: On-line services and e-learning will need more attention in the future
Links to other indicators	B2-7

Name of indicator	B2-10: Schools with Intranet, website, e-mail
Definition	Percentage of schools with an e-mail address, a web site, an internal PC network
Notes	
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-3 Ensure availability of support services and educational resources on the Internet, as well as e-learning platforms, for teachers, pupils and parents (e.g. access for disadvantaged children)
Future value	Yes
Links to other indicators	B2-8, B2-9

Indicator descriptions in detail in relation to ICT use and access

Name of indicator	C1-1: Pupils and teachers with a personal e-mail address
Definition	Percentage of all teachers and pupils who have a personal e-mail address
Notes	Schools broken down by type of school (secondary, primary and special). The indicator monitors an target of the British Government which states that up to 75 per cent of teachers and 50 per cent of pupils should have their own personal e-mail addresses by 2002.
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	Annually. Since 1998
eEurope relevance	2A-1: Provide all schools, teachers and students with convenient access to the Internet and multimedia resources 2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	Matching a specific UK aim
Links to other indicators	The use of external electronic communication services on schools (Indicator no. C1-3)

Name of indicator	C1-2: Use of ICT in areas of the curriculum
Definition	Extent of use of ICT in curriculum subjects, in percentage of all schools
Notes	Amount of use measured as substantial, little or none. Schools broken down to secondary, primary and special. Broken down by subject (Geography, History, English etc). Users not specified
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	Annually, 1998-2000
eEurope relevance	2A-5 Adapt school curricula to enable new ways of learning using information technologies. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Yes
Links to other indicators	-

Name of indicator	C1-3: Use of external electronic communication services
Definition	Percentage of schools that use external electronic communication services
Notes	The use broken down into: Teaching/learning and/or administration. Electronic communication measured: <ul style="list-style-type: none"> • Electronic Mail • Video conferencing • Bulletin Boards • Other on-line services
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	Annually. Since 1998
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Yes
Links to other indicators	-

Name of indicator	C1-4: Teachers using the Internet for non-computing teaching
Definition	Percentage of teachers actively using the Internet for non-computing teaching on a regular basis
Notes	Regular basis defined as "use at least once a week"
Sources	Sample survey/Eurobarometer
Countries covered	EU Member States
Time series available	Annual, starting 2000
eEurope relevance	Which of the 6 eEurope actions within this topic does the indicator refer to: No direct relevance
Future value	Yes
Links to other indicators	-

Name of indicator	C1-5a: Internet use in teaching
Definition	Average teaching hours (per week) spent on Internet use with pupils
Notes	Additional question if negative answer: Why don't you use the Internet in your teaching?
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU Member States
Time series available	2001
eEurope relevance	No direct relation
Future value	Yes – Actual use is interesting
Links to other indicators	C1-5b

Name of indicator	C1-5b: Computer use in teaching
Definition	Average teaching hours (per week) spent on computer use with pupils
Notes	Schools broken down in: <ul style="list-style-type: none"> • Primary • Secondary • professional/technical education
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-4 Provide training to all teachers to actually use digital technologies in teaching
Future value	Yes – actual use is interesting to measure
Links to other indicators	C1-5a

Name of indicator	C1-6: Teachers' opinion about the Internet as a tool
Definition	Teachers' opinion about the Internet as a tool to support teaching (useful, occasional useful, not useful)
Notes	-
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	No direct relation
Future value	Measures readiness – no so interesting in the future
Links to other indicators	-

Name of indicator	C1-7: Pupils' access to the Internet
Definition	Location where the pupils generally access the Internet for learning purposes
Notes	Answer categories: <ul style="list-style-type: none"> • in the classroom • in the computer lab • in the school's library • at home • other Note that it is the teacher that answer the question, not the pupils
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources.
Future value	Yes
Links to other indicators	B2-7a, b

Name of indicator	C1-8: Teachers' access to computer and Internet at home
Definition	Percentages of teachers who have access to computer and Internet at home
Notes	Supplement Q: How often do you personally use your Internet connection at home: <ul style="list-style-type: none"> • daily • weekly • seldom • never
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-4 Provide training to all teachers, in particular adapt teacher-curricula and offer incentives to teachers to actually use digital technologies in teaching.
Future value	Actual use is interesting to measure
Links to other indicators	D1-7 (teachers confidence in the use of ICT)

Name of indicator	C1-9: Who pays teachers' home access
Definition	Percentages of teachers who have subsidised access to computer and Internet at home
Notes	Also given: information on who pays for the access: government, industry, the school, other organisations, not subsidised.
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachersFeb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-1 Provide all schools, teachers, and students with convenient access to the Internet and multimedia resources. 2A-4 Provide training to all teachers, in particular adapt teacher-curricula and offer incentives to teachers to actually use digital technologies in teaching.
Future value	Knowledge about private sponsorships is limited and interesting.
Links to other indicators	-

Name of indicator	C1-10: Teachers who connect with other schools via the Internet
Definition	Percentages of teachers who use the Internet to connect with other schools via the Internet
Notes	The character of the connection differentiated into: <ul style="list-style-type: none"> • schools in your region • schools in your country • schools in Europe • internationally • no
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachersFeb-May 2001
Countries covered	EU Member States
Time series available	2001
eEurope relevance	2A-2 Connect schools to research networks
Future value	Ensured since the number of available indicators is limited
Links to other indicators	D1-7a (teachers confidence in the use of ICT)

Indicator descriptions in detail in relation to competencies

Name of indicator	D1-1: New ICT and media students in percentages of all students
Definition	New ICT and media students in percentages of all students. Broken down by sex
Notes	"ICT and media studies can lead to a qualification as a Mechanic, Information Technology, Technician Engineer, Engineer, Master of Science, Technology, Licentiate or Doctor of Technology, Candidate and Master of Philosophy in Information Processing, or a Diploma in Systems Design, Business and Administration, ADP Studies or Media Technology, for example. This type of education is provided in vocational schools and colleges, polytechnics and universities." (p 58)
Sources	Statistics Finland
Countries covered	FIN
Time series available	1985-97
eEurope relevance	No direct relevance
Future value	Yes – a lasting indicator (labour market)
Links to other indicators	D1-2, D1-3

Name of indicator	D1-2: New ICT and media students by level of education
Definition	Number of new ICT and media students by level of education
Notes	Broken down by field of study (humanities/aesthetics, commercial and business administration/social science, technology/natural science) and by sex Divided into upper secondary qualifications such as: <ul style="list-style-type: none"> • Diploma in Business and Adm., ADP studies and vocational qualifications. And tertiary qualifications such as: <ul style="list-style-type: none"> • Diploma in Systems Design, Master of Science, Technician Engineer, Bachelor of Information Processing, etc.
Sources	Statistics Finland
Countries covered	FIN
Time series available	1985-97 (published data 1985,-90,-95,-97)
eEurope relevance	No direct relevance
Future value	Yes – a lasting indicator (labour market)
Links to other indicators	D1-1, D1-3

Name of indicator	D1-3: Qualifications and degrees in information technology and media studies
Definition	Number of students with completed qualifications and/or degrees in information technology and media studies. Qualifications and degrees in information technology and media studies as a percentages of all degrees taken
Notes	"Qualifications in accordance with the Vocational Qualifications Act from 1997" (p.63) Does not include comprehensive school education completed in adult upper secondary general schools, folk high schools and adult education institutions
Sources	Statistics Finland
Countries covered	FIN
Time series available	1971-97
eEurope relevance	2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	Yes – a lasting indicator (labour market)
Links to other indicators	D1-1, D1-2

Name of indicator	D1-4: Population with a degree or qualification in ICT and media studies
Definition	Number of persons with a degree or qualification in ICT and media studies
Notes	Degree: Upper secondary, tertiary Field: See Indicator No. D1-2 + the field of transport Broken down by field of study, level of education, age category (15-24, 25-34, 35-44, 45-54, 55-64, 65+) and sex
Sources	Statistics Finland
Countries covered	SF
Time series available	1997
eEurope relevance	2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	Yes – a lasting indicator (labour market)
Links to other indicators	-

Name of indicator	D1-5: Hours/years spent on pedagogical IT-guidance in primary and lower secondary schools
Definition	Numbers of hours primary and lower secondary schools have spent on pedagogical IT-guidance. It also gives the number of hours spent on pedagogical IT-guidance per computer.
Notes	Data available for dividing data per school and per pupil
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Data from 1996 and 1999. Occasional survey.
eEurope relevance	2A-3: Ensure availability of support services and educational resources on the Internet, e-learning platforms, for teachers, pupils and parents 2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	Yes –but not easy to collect the data
Links to other indicators	D1-6

Name of indicator	D1-6: Hours/years spend to technical IT-guidance in primary and lower secondary schools
Definition	Number of hours primary and lower secondary schools have spent on technical IT-guidance. It also gives the number of hours spent on technical IT-guidance per computer.
Notes	Data available for dividing data per school and per pupil
Sources	Danish Union of Teachers, National Association of Local Authorities in Denmark and the Danish Ministry of Education (2000)
Countries covered	DK
Time series available	Data from 1996 and 1999. Occasional survey.
eEurope relevance	2A-3: Ensure availability of support services and educational resources on the Internet, e-learning platforms, for teachers, pupils and parents
Future value	Yes
Links to other indicators	D1-5

Name of indicator	D1-7: Teachers' confidence in the use of ICT
Definition	Percentage of teachers who felt confident in the use of ICT for teaching the curriculum
Notes	<p>Also gives percentages of teachers who:</p> <ul style="list-style-type: none"> • feel confident to use ICT within the curriculum • have received some training in ICT • have received updated training within the last two years • have access to a computer at home or have desktop/laptop computer assigned for their personal use (only data from 2000) <p>Schools broken down by type of school (secondary, primary and special).</p>
Sources	Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Countries covered	England
Time series available	Annually; 1998-2000
eEurope relevance	2A-4: Provide training to all teachers, adapt teacher curricula and offer incentives to teachers to use digital technologies in teaching
Future value	Yes – the competence of the teachers are critical
Links to other indicators	-

Name of indicator	D1-8: Students and teachers knowledge regarding ICT
Definition	Percentage of students and teachers who agree on having "some" or "much" knowledge about Internet programming, e-mail/scheduler programmes, Internet browsers
Notes	Occasional telephone based interview survey sampled in April 2000 among representative sample of the Danish population
Sources	Gallup and Andersen Consulting, Denmark, Andersen Consulting, ICT readiness in three Danish regions.
Countries covered	DK
Time series available	2000
eEurope relevance	2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	Dealing with elements in relation to ICT literacy, makes it an interesting indicator. But the future will result in the need for new or other competencies
Links to other indicators	Indicators dealing with ICT literacy

Name of indicator	D1-9: Specialist ICT teachers
Definition	Are there specialist teachers for the ICT subject at 1) primary and secondary level, 2) lower and upper secondary level, 3) upper secondary education?
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Yes – there is a growing focus on the importance of teachers with ICT qualifications
Links to other indicators	D1-7a, D1-7b, D1-8

Name of indicator	D1-10: ICT courses during initial training of general class teachers
Definition	Are ICT courses compulsory, optional or not included during initial training of general class teachers (or specialists in other subjects)? Schools broken down by type of school: 1) Primary, 2) Lower secondary, 3) Upper Secondary
Notes	-
Sources	Eurydice (Key data on education in Europe) In collaboration between Eurydice, the information network on education in Europe and Eurostat.
Countries covered	Includes EU, EFTA/EEA and the pre-accession countries
Time series available	Year investigated 1997/98, (Key data published once every second year since 1994).
eEurope relevance	2A-4 Provide training to all teachers, in particular adapt teacher curricula and offer incentives to teachers to actually use digital technologies in teaching. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	One easy way to deal with the need for ICT qualified teachers in general.
Links to other indicators	Teachers confidence and qualifications in the use of ICT (D1-7a) + (D1-7b)

Name of indicator	D1-11: ICT trained teachers
Definition	Percentage of teachers who have received official training for the use of computers and/or the Internet in teaching
Notes	-
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001.
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-4 Provide training to all teachers, in particular adapt teacher curricula and offer incentives to teachers to actually use digital technologies in teaching. 2A-6 Ensure that all pupils have the possibility to be digitally literate by the time they leave school.
Future value	Yes
Links to other indicators	D1-10 and others

Name of indicator	D1-12: Change in teaching methods
Definition	Percentages of teachers who say that the Internet will lead to significant changes in the way they teach
Notes	Answers categories: <ul style="list-style-type: none"> • it is already the case • it will probably be the case in the next 3 years • it will probably take longer than 3 years • it will probably never be the case
Sources	Eurobarometer survey flash 101 head teachers and flash 102 teachers Feb-May 2001
Countries covered	EU-MS
Time series available	2001
eEurope relevance	2A-5 ..new ways of learning using IT
Future value	Measures (believed) impact - interesting in the future
Links to other indicators	-

4.2 Innovative indicators under development

4.2.1 Examples of development initiatives

The list of existing key indicators in the education area shows that statistical organisations are progressing. In a short time, indicators have been developed to meet the requirements of politicians and others to measure and understand the impact of ICT on education. However, much work still lies ahead.

The concrete work with developing statistical indicators consists of several phases and is a lengthy process that involves a conceptual framework, a feasibility analysis, negotiation with partners, a methodological study and pilot data collections.

It is important to stress that the challenge is not only to devise the correct indicators. It is just as important to do it in a transnational framework of cooperation. Already here there is a problem that there is no commonly agreed conceptual framework making it possible to produce comparable data.

At the international level the OECD, supported by Eurostat and others, has spent much energy on developing such a common conceptual framework for measuring the different phenomena of the new economy in general.

Because of the EU eEurope initiative and its related Action Plan, 23 indicators are to be developed and four of these are concerning the objective "European youth into the digital age" and in that way dealing with education. Some of these are ready now, more will be tested in the near future.

EU and Eurostat⁵² have initiated a public discussion about the mid- and long-term challenges in research and development for official statistics. This initiative has a clear focus on the knowledge economy and ICT. However, it is striking that the initiative only to a limited degree suggests a discussion of the need for developing new indicators in relation to education. This must be attributed to the fact that the discussion primarily appears to be interested in the economic effects of the information society from a national or business point of view and less on the citizens' perspective. The paper, however, does ask the question whether there is a need for supplementary indicators within public services, including whether there is a need for being able to measure the educational benefits from using information technology in schools and the education sector.

Other education related areas identified by the paper include the citizens' use of information technology, including the use of educational materials and development of indicators measuring business investment in staff development in general.

OECD/Statistic Canada has carried out international development work with a view to measuring adult literacy in the information age⁵³. Thus, the indicator measures on outcome, rather than on access or use. This illustrates the way interest is moving and can be expected to become a primary measurement area.

Other examples of national statistical offices that have initiated general development work with a view to defining and measuring the new economy include the US⁵⁴, Canada⁵⁵, Australia⁵⁶ and the Scandinavian countries, including Denmark⁵⁷.

Statistical agencies in the Scandinavian countries have been working closely for years to harmonise research designs, definitions and methods in business surveys addressing the penetration of information technology, its intensity, motives and obstacles. Moreover, in the European context they claim to have won a pioneering position⁵⁸. Statistics Denmark organised its work on the network society and the knowledge based economy in a number of thematic groups. Education is primarily illustrated under the theme competencies, with headlines such as formal education, learning and mobility; i.e. from the vision of lifelong learning. Other measuring areas under development with certain relevance for education include marginalisation due to lack of ICT competencies and IT-use.

⁵² EU: SINE Statistical Indicators for the New Economy (2000) and Mid and Long-term Challenges in Research and Development for Official Statistics (2001)

⁵³ Literacy in the information age. Final report in the international adult literacy survey (2000)

⁵⁴ Mensbourg, Thomas L.: Measuring the Digital Economy, US Bureau of Census (2001)

⁵⁵ Statistics Canada: Measuring the networked economy (2001)

⁵⁶ Australian Bureau of Statistics: Measuring the knowledge based economy and society (Draft) (2001)

⁵⁷ Statistics Denmark (2001): Strategi for den fremtidige statistik om netværkssamfundet og den videnbaserede økonomi

⁵⁸ Statistics Denmark (2001): Strategi for den fremtidige statistik om netværkssamfundet og den videnbaserede økonomi, p 10 (Strategy for future statistics on the network society and the knowledge-based economy, page 10)

4.2.2 Innovative indicators under development

This section is comprised of an overview table and a table for each indicator which describes these in detail.

Overview table

No.	Name of indicator	Sub-domain	eEurope code	Main Source
NEW EDU1	Share of study places in IT-education or IT-related education	Frame: Economy & Infrastructure	2A-1	Statistics Denmark
NEW EDU2	Share of primary and secondary education institutions with access to the Internet	Frame: Economy & Infrastructure	2A-1	Statistics Denmark
NEW EDU3	PC use distributed according to level and types of education	Use and access	2A-5 and 2A-6	Statistics Denmark
NEW EDU4	IT-use in education system according to purpose	Use and access	2A-5 and 2A-6	Statistics Denmark
NEW EDU5	Education institutions with competence giving courses via the Internet	Use and access	2A-5	Statistics Denmark
NEW EDU6	Speed of interconnections and services available between and within national research and education networks	Frame: Economy & Infrastructure	2A-2	Dante and Member states

Indicator descriptions in detail

Name of indicator	NEWEDU-1 Share of study places in IT-education or IT-related education
Definition	Number of study places in IT-education or IT-related education
Notes	Based on a first draft work initiated by Statistics Denmark
Sources	Statistic Denmark, a new definition of IT-educations ⁵⁹ , combined with existing educational statistics.
Countries covered	Denmark
Time series available	-
eEurope relevance	Not directly
Future value	Yes – even though its an capacity indicator
Links to other indicators	-

⁵⁹ A Nordic definition. It is under further development in accordance with initiatives with development in OECD.

Name of indicator	NEWEDU-2: Share of primary and secondary education institutions with access to the Internet
Definition	The percentages of primary and secondary education institutions with access to the Internet
Notes	Based on a first draft work initiated by Statistics Denmark.
Sources	Statistic Denmark, Data is partly existing, Statistic Denmark do not indicate where. Could be B2-5.
Countries covered	Denmark
Time series available	-
eEurope relevance	2A-1: Provide all schools, teachers and students with convenient access to the Internet and multimedia resources
Future value	Limited – in the near future Internet access on school level will be the standard.
Links to other indicators	B2-5a

Name of indicator	NEWEDU-3: PC use distributed according to level and types of education
Definition	The distribution of PCs according to level and types of education
Notes	Based on a first draft work initiated by Statistics Denmark. A measurement is needed (e.g. PCs per 100 pupils)
Sources	Statistic Denmark, Data is partly existing, Statistic Denmark do not indicate where.
Countries covered	Denmark
Time series available	-
eEurope relevance	2A-5: Adapt school curricula to enable new ways of learning using ICT 2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	To measure the quality of the PCs is important as well; do the PCs have Internet access, are they high speed computers etc.
Links to other indicators	Links the indicator no. NEWEDU-4

Name of indicator	NEWEDU-4: IT-use in education system according to purpose
Definition	IT-use in education system according to purpose ⁶⁰
Notes	Based on a first draft work initiated by Statistics Denmark. Note that the purposes in focus may change/develop over time. At the moment the purposes is not defined
Sources	Statistic Denmark. Data is partly existing, Statistic Denmark do not indicate where. Could be B2-3
Countries covered	Denmark
Time series available	-
eEurope relevance	2A-5: Adapt school curricula to enable new ways of learning using ICT 2A-6: Ensure that all pupils have the possibility to be digitally literate by the time they leave school
Future value	Yes – a lasting indicator
Links to other indicators	Links to existing indicators no. C1-3, C1-7

Name of indicator	NEWEDU-5: Education institutions with competence giving/legally accredited courses via the Internet
Definition	Education institutions with competence giving/legally accredited courses via the Internet ⁶¹
Notes	Based on a first draft work initiated by Statistics Denmark.
Sources	Statistic Denmark, Data is partly existing, Statistic Denmark do not indicate where.
Countries covered	Denmark
Time series available	-
eEurope relevance	2A-5: Adapt school curricula to enable new ways of learning using ICT
Future value	Yes – the importance of e-learning is growing, but so far hardly measured
Links to other indicators	-

⁶⁰ Because of the indicators is still under development the purposes are not yet defined

⁶¹ Courses which lead to a legally accredited exam.

Name of indicator	NEWEDU-6: Speed of interconnections and services available between and within national research and education networks (NREN's)
Definition	Speed of interconnections and services available between and within national research and education networks (NREN's)
Notes	Definition: Speed of interconnections between NREN's already available from Dante web site; this to be regularly updated as TEN-155 is replaced by GEANT. Member states to provide supplementary information of the maximum speed (core speed) of their NREN. Focus to be on the identification of bottlenecks.
Sources	Dante and Member states ⁶²
Countries covered	None so far. Plans: EU Member States.
Time series available	Not yet collected
eEurope relevance	Which of the 6 eEurope actions within this topic does the indicator refer to: Connect schools progressively to the research networks
Future value	Yes
Links to other indicators	-

⁶² Mentioned in Annex 20, November 2000: List of eEurope benchmarking indicators.

5 Summary Of Part A and conclusions

The 'Education' concept is changing. As opposed to the formal and pre-defined curriculum in the industrial society, education is today redefined as lifelong learning in the information society.

Lifelong learning certainly reflects a new comprehension of the need for education in society. The "redefinition" seems to be the conceptual answer to the increasingly complex needs and possibilities for development and learning in the information society. The concept lifelong learning also corresponds with the broad political efforts and initiatives on developing education related to ICT, which becomes clear when examining the respective policy papers of individual countries, the European Commission, and other supranational organisations.

As lifelong learning appears to be an important key concept for education in national action plans it is also evident that a change of focus in education policy have taken place; the emphasis is shifting away from the system to the learner.

This shift of focus underpins the identified gap between existing and needed indicators on education and ICT. The review of the existing indicators listed in this document cannot claim to be complete, but it covers the important key indicators in four sub-areas:

- Policy and strategy
- Economy and infrastructure,
- Use and access
- Competencies

The work at the European level is still in its infancy. So far, focus has mainly been on indicators on infrastructure, counting computers, net-access, etc. In the near future, the central focus is going to be on use and competencies. The technological developments as well as the growing distribution of hardware tends to decrease the importance of this focus. Instead, there is a need for generic, statistical information on citizen and employee behaviour when working and learning in the information society, and for indicators outlining how ICT-related skills are distributed in the information society.

With a very broad understanding of education, the focus of this topic is only a part of what education is all about in the information society. This topic has focused on education up to entering the labour market. To get a complete picture of the visions of education within the information society, the work done in Topic 5, Work, employment, skills should also be taken into consideration.

The key focus points identified from the study of documents on education at the supranational and national level include the following issues:

- Lifelong learning
- e-learning
- ICT infrastructure of the educational system
- Materials and sources - content
- Digital literacy
- Training of teachers – teachers qualifications
- Integration of ICT in curricula
- Flexible educational institutions and virtual mobility
- Networking between educational institutions and public/private collaboration
- Evaluation and research

These policy foci are mirrored in a number of concrete political objectives. Statisticians in the European Statistical System are currently working on how to operationalise these issues in order to make them measurable.

Evaluation and research is an interesting feature of the political efforts regarding information society. Evaluation and research activities are to provide new knowledge and gather experience on education efforts and results in information society in order to ensure double loop learning and durable improvements of information society. Thus, efforts on this area should provide an important contribution to the future policy making on education in information society.

ICT literacy, understood as a fourth of the 3R's emphasising the use of ICT and competency aspects, has high priority in the national policy papers. Education is an important mean to avoid any labour market, social or democratic bias stemming from lack of ICT competencies in exposed societal groups.

One central discussion regarding education in information society is on how ICT is in fact integrated into curricula on the various school levels. Is ICT supposed to integrate as a separate subject or is ICT supposed to mix with subjects as a tool? An other interesting question is how and to what extent the new pedagogical and technological possibilities will in fact implicate innovation in curricula development at all school levels – creating profound changes in subjects.

PART B (D 2.2)

6 Gaps in the statistical coverage of the topic

This Chapter will describe the “gaps”, where official statistics currently fails to provide adequate measures for the issues discussed in 2.1. The aim of the Chapter is to develop the rationale why the SIBIS project develops indicators in the area of education research and how these indicators will complement existing statistics. We distinguish between:

- Main gaps, i.e. areas that are not covered by existing indicators at all;
- Areas where there is a need for qualitative improvements of existing indicators;
- Future gaps, i.e. areas that are not ready for indicators, but will become key areas in the near future;
- Areas that cannot be matched by indicators at a European level, but where inspiration can be obtained from national indicators will, in this relation, be regarded as covered due to the existence of relevant indicators.

The following issues are critical for education and have been discussed in section 2.1. The issues are completely or partially related to the six eEurope actions within "European youth into the digital age". The relationships are illustrated in parentheses.

General issues

1. Lifelong learning (not included in any eEurope actions within "European youth into the digital age").
2. E-learning (eEurope action no 2A-5: "Adapts school curricula to enable new ways of learning")
3. Evaluation and research (not included in any eEurope actions within "European youth into the digital age").

Specific issues

4. ICT infrastructure of the educational system
(eEurope action no 2A-1: "Convenient access to the Internet and multimedia resources.")
5. Support services and educational resources - software (pre-conditions for e-learning)
(eEurope action no 2A-3: "... availability of support services and educational resources")
6. Integration of ICT in curricula
(eEurope action no 2A-5)
7. Training of teachers – teachers qualifications
(eEurope action no 2A-4: " Provides training to all teachers...")
8. Digital literacy
(eEurope action no 2A-6: " Ensures that all pupils have the opportunity to be digitally literate..")
9. Flexible universities/virtual mobility
(eEurope action no 2A-5: " Adapts school curricula to enable new ways of learning..")
10. Networking between educational institutions and public/private collaboration
(eEurope action no 2A-2: " Connect s schools progressively to the research networks")

Some of these general issues not only relate to education, but also to other topics. First, this applies to lifelong learning. Traditionally, this issue concerns education and training after entering the labour market and thus remains outside the scope of this topic.

However, it has become increasingly clear that lifelong learning already starts in the compulsory school system, where it is important to motivate students to engage in lifelong learning. The central question is therefore what kind of knowledge the students must acquire in the school system to continue the lifelong learning process. We see lifelong learning as an umbrella concept that will partly be dealt with here, partly in other topics (see Topic report No. 5).

Another issue of the same overall nature is e-learning. E-learning is relevant for students at institutions of higher education and for students in thinly populated areas in Europe. Again – this is not an issue primarily related to the area of education. E-learning is at least as interesting in relation to upgrading of skills and competencies during the career (e.g. for those living in remote areas where the tutor is remote) as well as those for whom e-learning is more convenient than physically attending courses - e.g. for persons with limited temporal availability and those with mobility restrictions.

The final issue is "evaluation and research". This is the third issue that is attracting more and more attention. It is, however, a universal issue by its nature and will have relevance for all topics in the SIBIS project,

In the following, we will discuss gaps within each of the seven specific areas.

6.1 ICT Infrastructure

Most policy papers and programmes reflect an understanding of the importance of developing an ICT infrastructure in the educational system. The concern is primarily related to the availability of computer hardware, connectivity, and bandwidth of computers.

Many of the indicators available today focus on counting and outlining the technological infrastructure and ICT conditions in the educational system. Thus, this is one of the issues which is best covered by statistics at national as well as EU level. The central indicators include the Internet, wireless/other, ICT strategy/budget, hardware and place.

Technological innovations of hardware and dissemination of ICT throughout society, including schools, will diminish the importance of these indicators or replace them with others. However, currently they serve a purpose, and within the framework of this issue we can point to a need for further development ensuring a higher degree of detailing and qualification:

- Wireless connectivity to the Internet and other networks is expected to gain a wider degree of dissemination and importance in the future. It should be included as one of various possible ways to connect to networks.⁶³
- The indicator "location" is not discussed at a European level, but it is an important element in relation to measuring convenient access (eEurope action no 2A-1) and at the same time for obtaining an indication of when students have access to computers and what they use the computers for. There are examples of indicators for "location", e.g. surveys that ask where computers are placed inside of schools. However, the quality could be improved in this area by including access outside of school buildings, e.g. at home (sub-indicator level A).

⁶³ It was already included in the Eurobarometer Flash survey directed at teachers and head teachers (European Commission 2001).

6.2 Support services and educational resources - software (pre-conditions for e-learning)

From a user point of view, support services are a matter of local resources of support in use of machines and programs or of connection to online or telephone based support. This is relatively well covered as a part of data on ICT infrastructure.

Development of educational resources, e-learning or network platforms via the Internet is closely related to the general development of a European content industry, as well as the actual implementation of ICT in the curriculum. Development of platforms and services could still be seen as individual projects and therefore not subject to general statistics. However, lack of satisfactory content of educational resources as well as network platforms could be a barrier to the use of ICT in education and thereby the creation of digital literacy among pupils and students.

Therefore, it is seen as a gap that there is no data on the status of availability and quality of educational resources on the Internet and of e-learning/networking platforms. Consequently, the teachers general assessment of the existing content and educational ICT resources and platforms should indicate whether this is a barrier to use of ICT in schools and possibly for digital literacy.

6.3 Integration of ICT in curricula

An important condition for the development of ICT skills is the degree of integration of ICT with curricula at all levels. This sub-topic is regarded as a key issue in the eEurope action ("adapt school curricula to enable new ways of learning using ICT").

The sub-topic can be divided according to school levels, where the key indicators are content and pedagogical methods.

The degree of integration of ICT in curriculum, as outlined in legal and policy papers, is relatively well described, for example in data from Eurydice, see also existing indicators A1-5, A1-7 and A1-8.⁶⁴

This is not the case regarding 'pedagogical methods'. Some countries leave the choice of educational methods to the school or the individual teacher. Therefore, educational methods and learning concepts that are practised are not any longer mapped by statistics. Therefore, an indicator measuring changes in pedagogical practices supported by ICT, such as collaborative working, etc., is required. Due to the freedom of selecting educational methods, an appropriate method for data collection would be to survey practising teachers about the methods they use.

6.4 Training of teachers, teachers' qualifications

The value of ICT infrastructure in the educational system is ultimately limited if teachers do not have the necessary skills and qualifications to teach in use of ICT and to include ICT in their teaching practice. Therefore, it is a key issue to include ICT in the initial training of teachers and to offer courses to upgrade their qualifications in order to make them familiar with relevant software, to enable them to plan and manage ICT incorporation into lessons, activities, and sequences to support educational objectives.

⁶⁴ E.g. Key data on education in Europe, Eurydice

This question is clearly important at all educational levels – from the primary to tertiary schools level. Lack of ICT qualifications among teachers reduces the possibilities of pupils/students learning to use ICT, as well as gaining from learning methods and concepts that are made possible due to ICT.

Training of teachers at one educational level includes higher levels in the educational hierarchy. This is because the teachers are trained at higher levels in the educational system, either solely at university level, as for example in Great Britain, or as in Denmark at teachers training college or university. Under all circumstances, the universities serve as the beginning of the 'feeding chain', by education of teachers at lower levels, from primary school (as in Great Britain), college, technical schools, teachers training colleges or university level.

At all levels, the central indicators of teachers training in ICT are exams/certifications in ICT related subjects, ICT in curriculum, ICT strategy and budget, and courses in ICT. To measure these it is relevant to focus on the input, i.e. extent, contents and quality of curricula and courses, as well as focusing on the output, i.e. teachers' formal qualifications.⁶⁵

The main issues presently measured at EU Member State level are:

- ICT courses in initial training;
- Specialist teachers for ICT subject;
- ICT budget;
- The inclusion of ICT in the curriculum.

The following issues are measured at national level in some Member States:

- Percentages of teachers who have reviewed training in ICT;
- Percentages of teachers who have reviewed updated training in ICT within the last two years;
- The extent of use of ICT in curriculum subjects.

We identified gaps in the following areas:

- There is a lack of knowledge about teachers' training after their formal education, i.e. an indicator needs to be developed that summarises ICT qualifications gained and how up-to-date the knowledge of the teachers is. (It is not enough to show that it is included in the curriculum of the initial training. As can be seen from the above, there are national examples of this indicator.)
- At a sub-indicator level (A) there is a need for qualification of the contents of curricula and courses (e.g. on technical, pedagogical ICT skills)

6.5 Digital literacy

There is clear political recognition of the need to ensure that all students be given the opportunity to be digitally literate by the time they leave school, and to ensure that digital literacy programmes must be adapted to the different learning contexts and target groups.

In WP 2.1, the meaning of digital literacy was described in a narrow sense as digital skills, while the broader aspects were labelled "cross curriculum competencies".

- Digital skills relate to the use of concrete programs, the ability to search for and to find information and critical assessment of reliability of information, communicate digitally, etc.

⁶⁵ The aspect of competencies is important and is dealt with in the following issue "digital literacy".

- Cross curriculum competencies relate to more general competencies (re-)actualised by the information society and technical possibilities of ICT. Understanding of the need for lifelong learning, learn-to-learn capabilities, ability to work collaboratively, etc.

Related to this, the central indicators must be able to measure the output, whereas the issue "Training of teachers – teachers qualifications" relates to input. These indicators remain to be defined and put into place.

Some attempts have been made - or will be made in the years to come - to measure the skills and attitudes among pupils which we call "cross curriculum competencies". Attempts have been made in Finland to measure the learn-to-learn capabilities among pupils at various levels⁶⁶. In relation to the OECD/PISA survey, the three traditional types of 'literacy' (reading, math and science) are measured using tests for direct assessment. Besides these types of literacy, some 'soft' or "cross curricular competencies" are measured, i.e. self-directed learning, motivation to learn and preferences for different types of learning situations. Later, in 2003 and 2006, the ability to co-operate and problem-solving will be measured.⁶⁷

Though the cross curriculum competencies indicators are still not fully developed, serious attempts to develop indicators are made, which with no doubt will produce valuable statistical data in the coming years.

But also skills which relate to the narrow meaning of digital literacy (digital skills related to use and critical assess information obtained via the Internet and computers) remain to be properly covered by statistics.

Therefore, the SIBIS project could study this area. There are, however, initiatives in the teaching area.⁶⁸ There are distinct gaps in the following areas:

- Development of indicators for digital skills measured among pupils at the time they leave school.
- Development of indicators for digital skills measured among students at the time they leave school

It can be discussed whether to focus on competencies and confidence for specific groups (pupils, students and teachers) or whether to take a broader view and focus on citizens in general.

Moreover, it should also be recognised that the concept is probably short-lived; i.e. you cannot be sure that the competencies that are necessary now will necessarily be the same in the future. What to measure in the future will depend on future technological developments.

We propose that the following be measured:

- Ability to locate information on the Internet that are suitable for actual needs
- Ability to use digital library bases and other bases for information search
- Ability to quickly identify the source of a piece of information found on the Internet
- Ability to question the reliability of the digital information gathered, e.g. by cross-questioning the information and source
- Ability to get in touch with others via the Internet
- Ability to publish information about oneself on the Internet so that it is accessible to everybody
- Ability to obtain and install digital tools on a computer

⁶⁶ Hautamäki, J. (2001). Learning-to-Learn. A framework. Helsinki: National Board of Education.

⁶⁷ OECD 2001: Knowledge and Skills for Life: First Results from PISA 2000.

⁶⁸ See NAP 2000 and ESDIS members.

6.6 Flexible educational institutions and virtual mobility

Very little data regarding the capacity (supply) and actual enrolment (demand) in virtual educational activities is currently being collected (national or supranational) and registered. The focus has been on physical mobility of students and teachers, while the size of virtual 'mobility' - pupils and students following courses on educational institutions on distance - yet have not been subject of statistical coverage. In order to get a picture of virtual mobility among students and the degree of virtual education, a number of indicators on enrolment and capacity is proposed.

In relation to enrolment, the number of pupils/students, part-time/fulltime activities, educational level and areas of activities and the labour market affiliation of the students would be relevant indicators for measuring the level of virtual mobility. The supply side would focus on study places offered, number and type, as well as indication of virtual education being a specialised institutional activity or integrated in established non-virtual educational institutions.

As this area is not very well covered with existing data, surveys of students and educational experts or central educational administrators are proposed

6.7 Networking between educational institutions and public/private collaboration

As mentioned in WP 2.1 networking could be seen as at least three different things.

- Networking as a skill is included in digital literacy, or rather as a cross curriculum competence.
- Networking the technical meaning of the word (e.g. hardware and software platforms) are dealt with in the section on 'materials and sources – content'.
- Third, network as organisational units, as networks between educational institutions and between educational institutions and private actors, are dealt with in this section.

Several types of networks (divided according to actors and content) could be found:

- Research networks, primarily between researchers, but possibly in connection with practitioners or teachers of the network topic
- Educational networks where pupils/students and teachers at various levels can exchange experiences, do collaborative studies, etc. These could be national as well as international
- Public-private networks for collaboration on specific topics.

The national and international research and educational networks are relatively well covered statistically by national and supranational statistics.

Networking between the public education sector and private companies is not covered very well. This could focus on programming or production of content for educational use. Various sources point out that public-private co-operation or networking can speed up the process of production and diffusion of educational content, as well as enhance the quality of the contents.

A huge number of cases are known at the anecdotal level, though as far as we know there is no statistical evidence on the extent or the content of such co-operative networks. One could

argue that since public-private co-operation is still very limited, data collection should be kept at a case study level. Therefore, there is no proposal for indicators for the extent or frequency as well as the form. Though an indication of the level of co-operation in public-private collaboration is proposed, possibly included in surveys of teachers and head teachers.

7 The hierarchical system of SIBIS indicators

Based on the argument developed in Chapter 2, this chapter will create an overview “map” of key indicators already in use as well as the new SIBIS indicators we consider worth piloting.

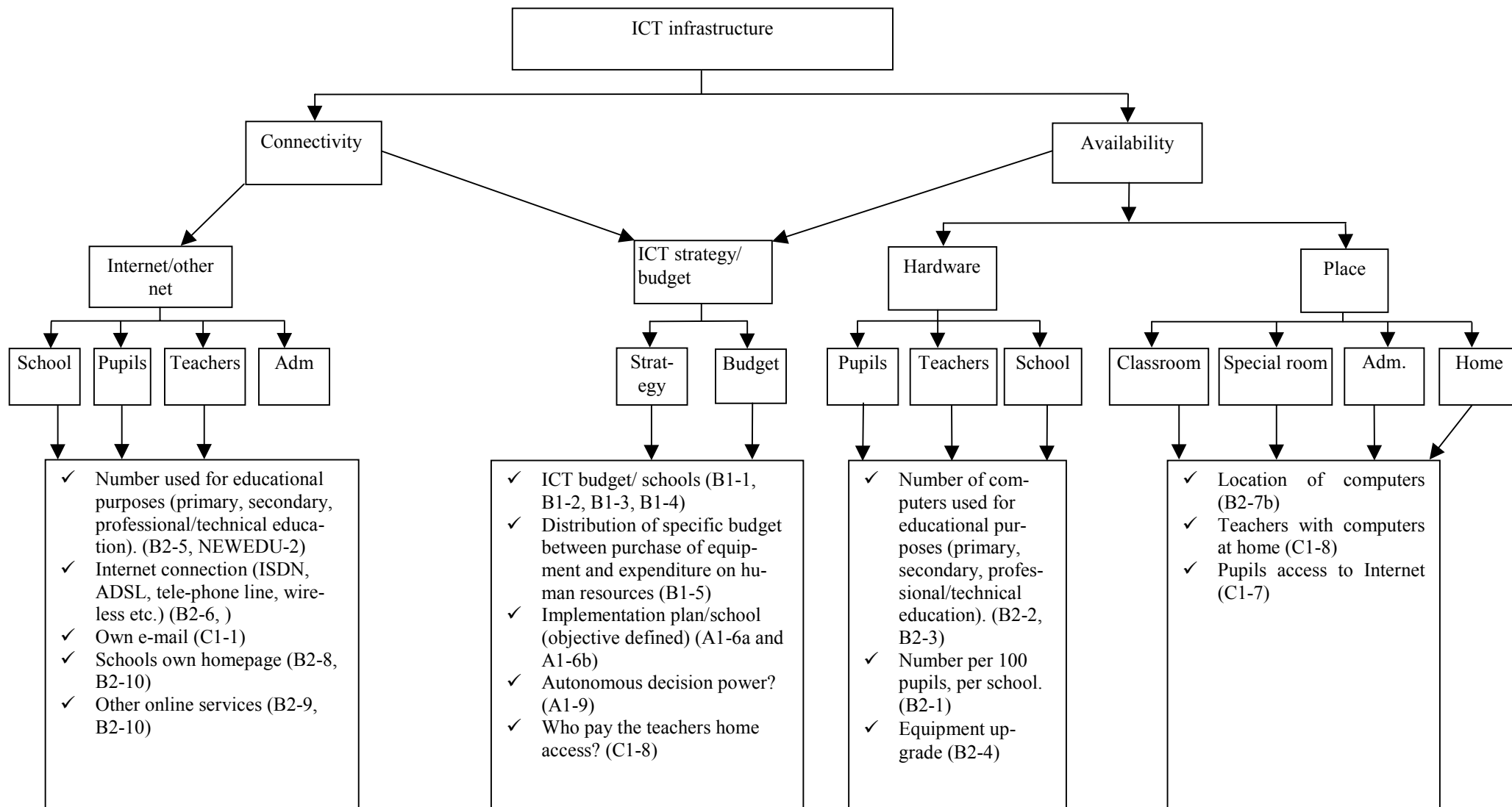
In order to follow a systematic approach and to make clear WHAT the indicators developed in each of the topics actually stand for, the indicators have been organised in a **hierarchically** by grouping them at different levels and relating them to sub-topics and issues.

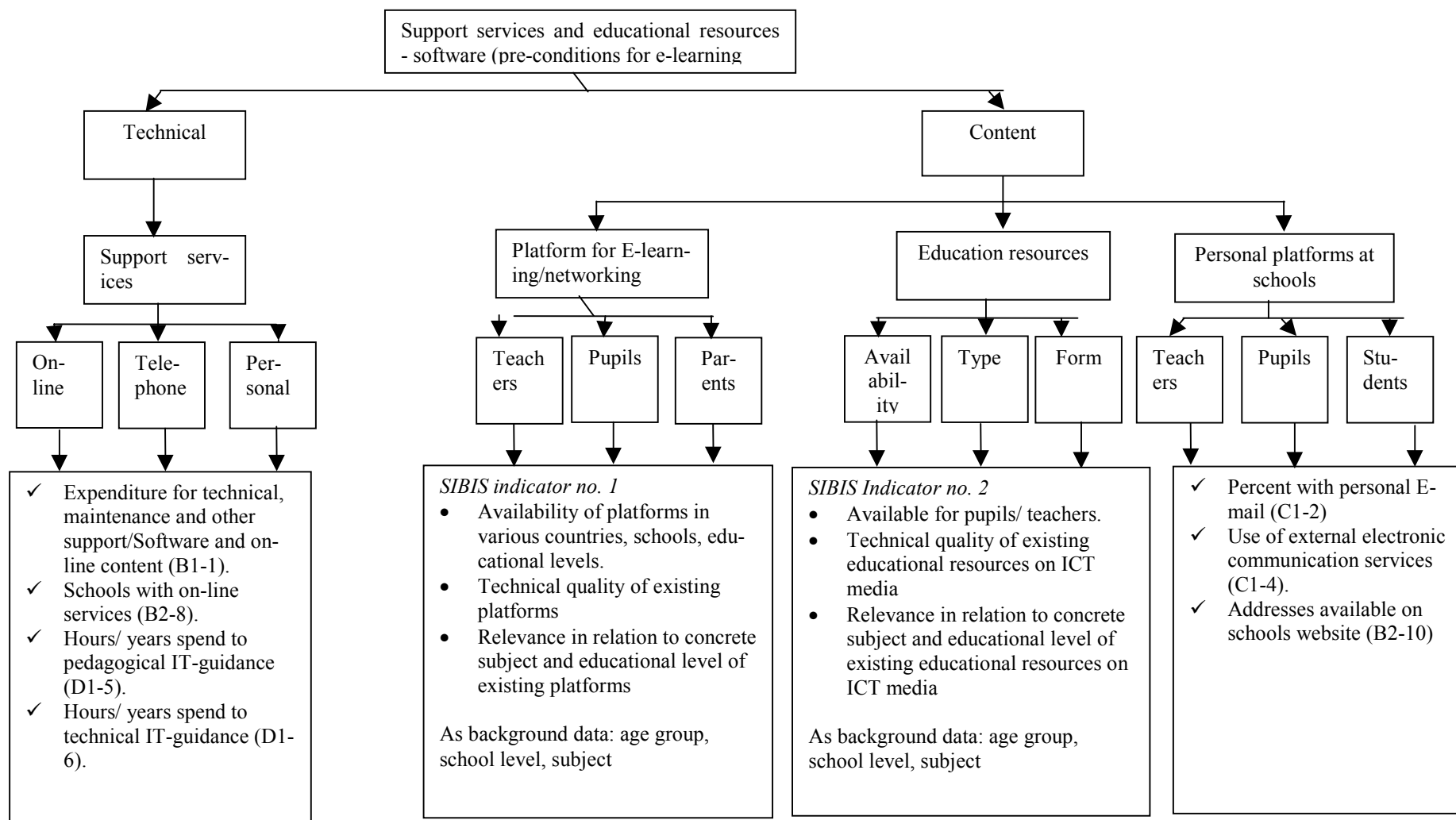
The Topic Analysis Reports (task 2.1) should provide a logical framework for the development of the indicators by breaking down the topic into a structure of several sub-topics and issues related to these sub-topics. Ideally, this structure can be shown in the form of a “hierarchical tree” with several levels of branches, allowing us to define indicators that relate to one (or maybe several) of these branches. We have chosen to illustrate each of the seven issues in individual logical trees.

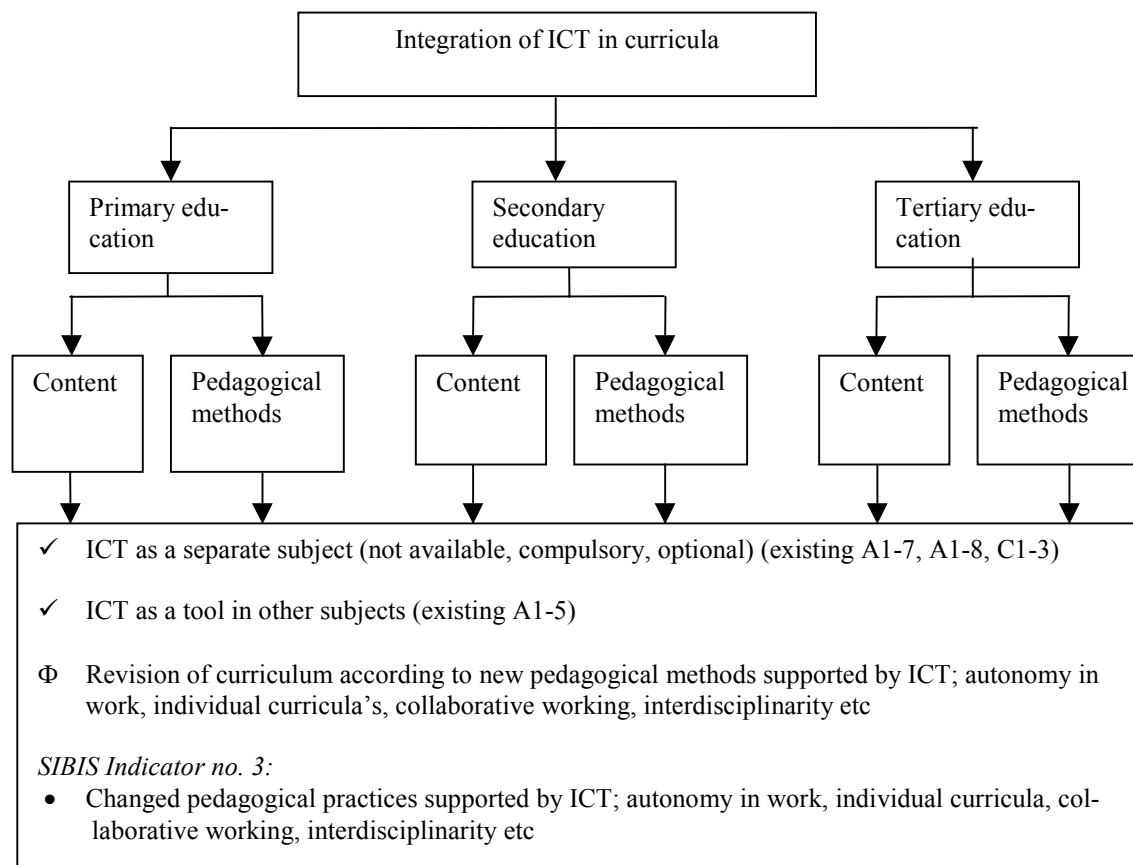
It is clear that, regarding the cost of data collection, an indicator is more efficient the higher it is located in the hierarchy. On the other hand, indicators far down the hierarchy tend to be more precise and may allow more flexibility in composing indices.

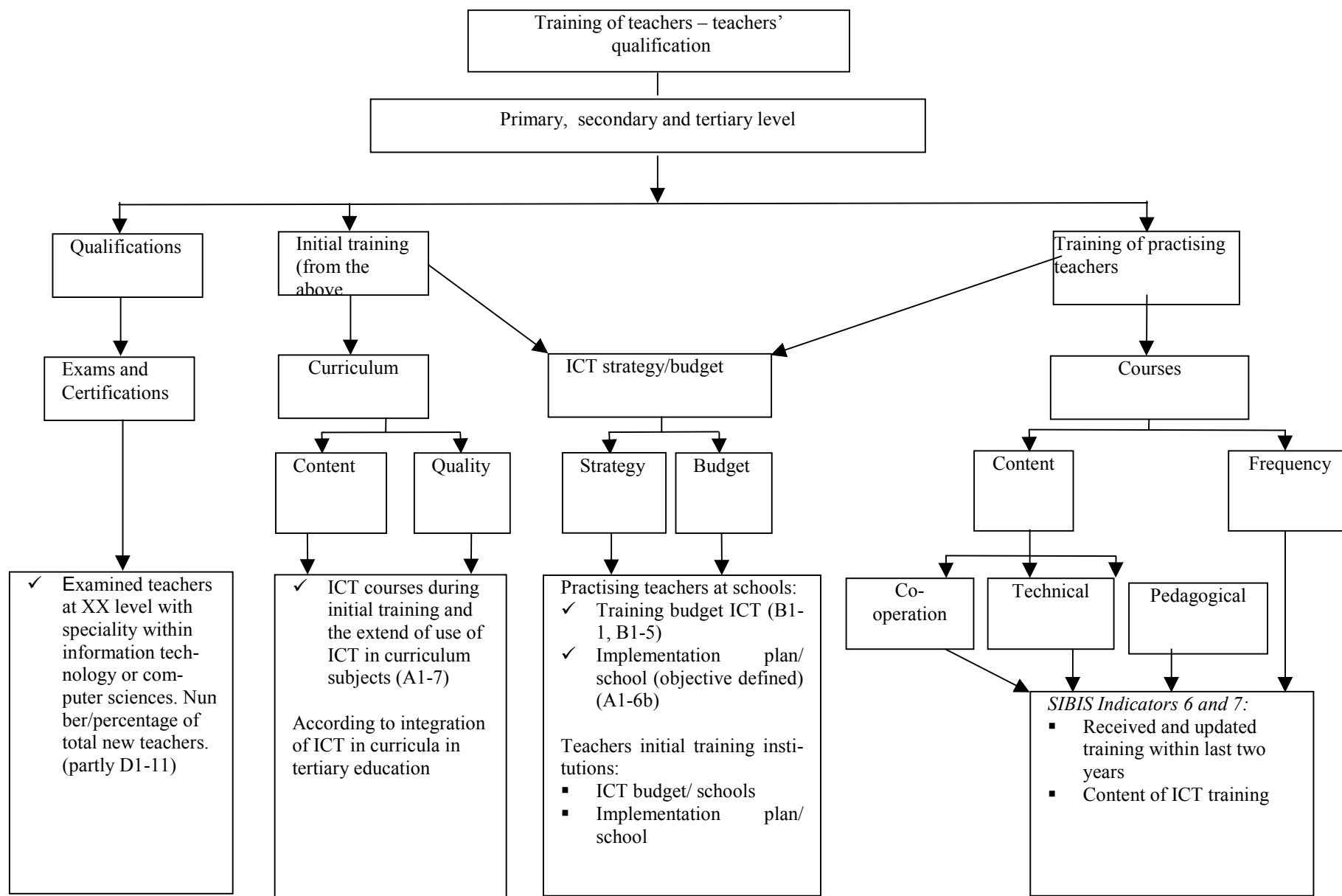
In the trees below, the last level shows the concrete questions or indicators that are known or need to be developed. The indicators are marked according to availability:

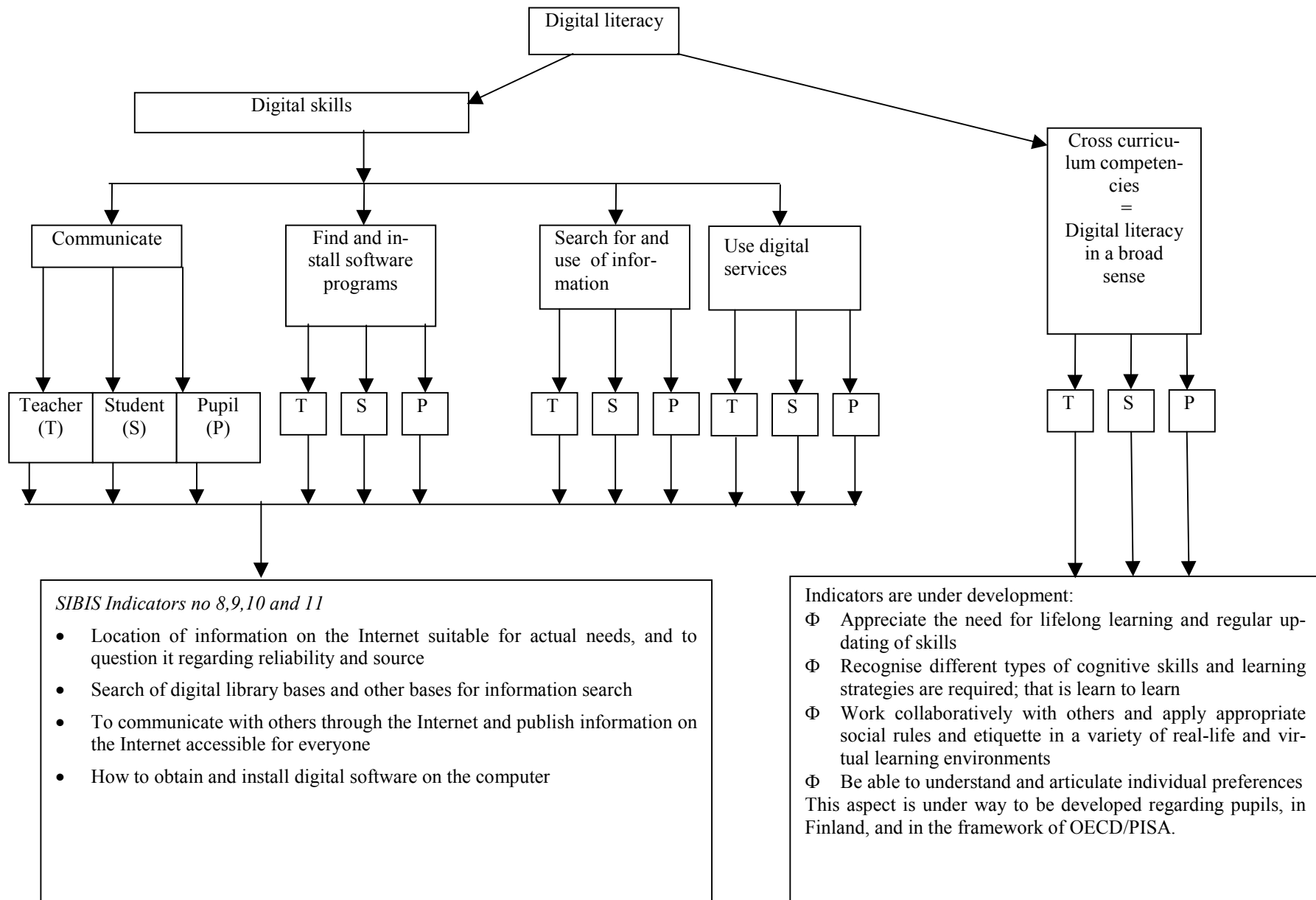
- ✓ These indicator exist. The number in the brackets refers to the list of existing indicators in WP 2.1. Please note that although an indicator is marked as already existing, it could be in one or a few countries only, or part of supranational surveys, which do not necessarily cover all EU countries, or covered only in one-off surveys.
- These indicators are missing. Most are subject to a proposal of how to quantify it and in which relation it could be surveyed (see following Chapter).
- ⊕ These indicators are missing and currently of limited statistical relevance, but considered as indicators which will become increasingly important in the near future.

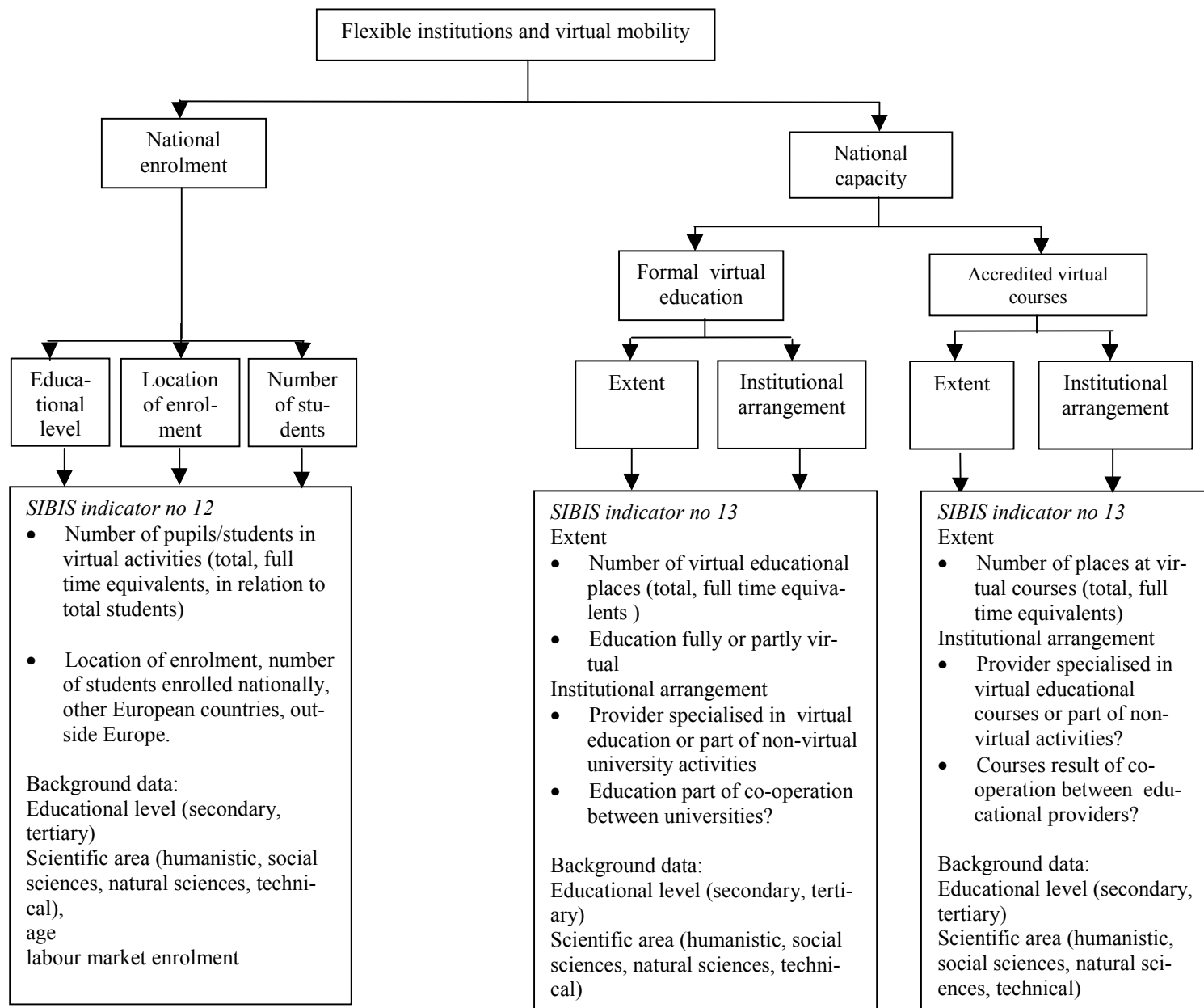


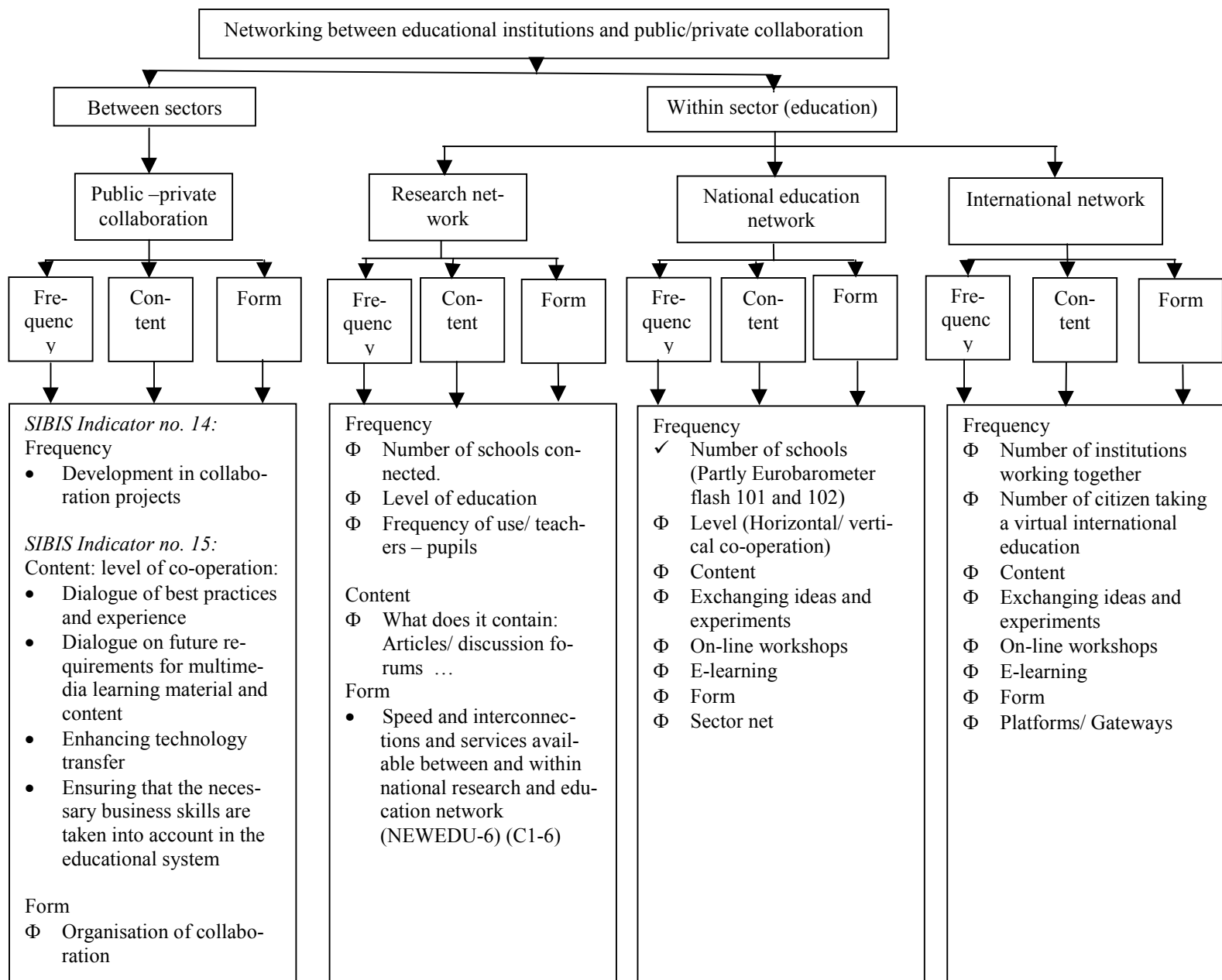












8 Definition of new SIBIS indicators

Based on the logical tree developed in Chapter xyz, this chapter will provide the detailed description of the proposed indicators.

The logical trees have shown a huge number of indicators to measure the status of the information society within the specific issues in the topic education. Several of these are already covered, either at a European level or within one or more Member States. Therefore, we have chosen to focus on a few indicators that are only covered partly or not at all by existing statistical data. The primary issue is digital skills, extent of distance learning within educational institutions and extent and issues of private-public collaborations. Furthermore, supplementing indicators are barriers to use of ICT in schools.

The indicators which we propose to be developed are within the following issues, and we propose that three surveys be developed:

- Digital skills which we propose to be implemented in the SIBIS General Population Survey GPS,
- Indicators for measuring support services and educational resources, Integration of ICT in curricula and training of teachers that we propose be implemented in future teacher/head teacher surveys, e.g. by Eurostat (Eurobarometer).
- Flexible university and virtual mobility and the issues concerning networking, which might be put to Educational experts or Central Educational administrators

For each indicator, a table with the following information is provided:

- Name of the indicator
- Definition
- Sources for data and availability
- Initial suggestion for survey question(s): who needs to be asked:
 - the general population (GPS – General Population Survey)
 - decision makers in organisations (DMS – Decision Maker Survey)
 - other groups, e.g. teachers and head teachers, educational experts, pupils (primary and in some instances lower secondary schoollevel)/students (secondary and tertiary school level).

8.1 New indicators measuring support services and educational resources

SIBIS indicator no. 1

Title	Teachers' satisfaction with existing e-learning/net working platforms
Definition	If teachers do not use the Internet in education: Is the lack of satisfactory e-learning/networking platforms on the Internet one of several possible barriers to the use of Internet in teaching?
Notes	Objective: To learn if the availability of e-learning and/or networking platforms on the Internet is considered as a barrier to the use of ICT in education.
Sources	No knowledge of existing data sources at international level An annual sample survey among European teachers is being launched (Eurobarometer), and could include this question in the questionnaire for teachers (Eurobarometer 102 – teachers)
Question for a teachers' survey	Why do you not use Internet in your teaching? <ul style="list-style-type: none"> • ... • J) there are no e-learning platforms of satisfactory relevance and quality • K) there are no platforms of satisfactory relevance and quality offering links to network relations.
eEurope relevance	2A-3 Ensures availability of support services and educational resources on the Internet, as well as e-learning platforms for teachers, pupils, and parents

SIBIS Indicator no. 2

Title	Teachers satisfaction with existing content in educational ICT resources
Definition	The teachers' satisfaction with the available educational ICT resources measured as one of several possible barriers to use of ICT in education.
Notes	To see if the available educational ICT resources are a barrier to the use of ICT in education.
Sources	No knowledge of existing data sources at international level An annual sample survey among European teachers is being launched (Eurobarometer), and could include this question in the questionnaire for teachers (Eurobarometer 102 – teachers)
Question for a teachers' survey	What are the barriers to the use of information technology in your teaching? <ul style="list-style-type: none"> • There are no (not enough) high quality educational resources available for the pupils/students • Not sufficient computer capacity • ...
eEurope relevance	2A-3 Ensures availability of support services and educational resources on the Internet, as well as e-learning platforms for teachers, pupils, and parents.

8.2 New indicators measuring integration of ICT in curricula

SIBIS indicator no. 3

Title	Development in pedagogical methods resulting from new possibilities offered by ICT
Definition	Change in use of certain pedagogical methods in teaching resulting from new possibilities offered by ICT
Notes	-
Sources	No knowledge of existing data sources at international level An annual sample survey among European teachers is launched (Eurobarometer), and could include this question if teaching practices were included as a theme in the questionnaire.
Question for a teachers' survey	To what degree does the use of ICT change methods used in your teaching? Please mark if the use of the following methods has decreased strongly, decreased slightly, not changed, increased slightly or increased strongly <ul style="list-style-type: none"> • class teaching/instruction • individual work • collaborative working between pupils/students in the class • collaborative working between pupils/students in the class and external pupils/students • interdisciplinary projects
eEurope relevance	2A-5: Adapts school curricula to enable new ways of learning using information technologies.

New indicators measuring training of teachers – teachers qualifications

SIBIS Indicator no. 4:

Title	Teacher training institutions with ICT implementation plan
Definition	Teacher training institutions that have drawn up an ICT development plan in percentages of all teacher training institutions (i.e. educational institutions which train persons for teaching in schools at primary, secondary or tertiary level) ⁶⁹
Notes	<p>Teacher training institutions broken down by type of teachers educated (for primary, secondary or tertiary level).</p> <p>Factors included in schools' ICT development plans:</p> <ul style="list-style-type: none"> • Percentage of institutions which have an ICT development plan • Percentage of institutions which included in their plan: <ul style="list-style-type: none"> • acquisition of new software and content and sharing with other teacher training organisations • development of new curriculum opportunities using ICT • financial planning for the development of ICT facilities • development of the hardware provision, equipment upgrades, networking • depreciation cost of equipment and disposal of redundant equipment • staff training and development in the use of ICT • the use of ICT facilities outside lecture hours and including their use for community purposes
Sources	Similar for the primary, secondary and special schools in: Department of Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Survey directed towards headmasters of teacher training institutions	<p>Q: Please mark yes or no to the following questions:</p> <p>Does your institution have an ICT implementation plan?</p> <p>If yes: Does the plan include the following?</p> <ul style="list-style-type: none"> • How to acquire new software and content • Plan for sharing software and content with other institutions • Develop new curriculum opportunities using ICT • An financial plan for the development of ICT facilities • Development of hardware provision, equipment upgrades, networking • Depreciation cost of equipment and disposal of redundant equipment • Staff training and development in the use of ICT • The use of ICT facilities outside lecture hours and including their use for community purposes

⁶⁹ Definition of which institutions depend on the national tradition of where to train teachers to the different educational levels. As an example: In Denmark teachers for primary and lower secondary school is trained in educational institutions specialised for this purpose, while in United Kingdom teachers at this level is educated at the university.

eEurope relevance	Which of the 6 eEurope actions within this topic does the indicator refer to: 2A-4: Provide training to all teachers, adapt teacher curricula and offer incentives to teachers to use digital technologies in teaching
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SIBIS Indicator no. 5:

Title	Total expenditure on ICT in teacher training institutions
Definition	Total expenditure on ICT in teacher training institutions
Notes	Expenditure broken down by: 1) teaching and learning 2) Institutional management and administration 3) Average per institution and per student Institutions broken down by type of teachers educated (for primary, secondary or tertiary level).
Sources	Similar for the primary, secondary and special schools in: Department for Education and Employment, U.K (Title of document: Information and Communications Technology in Schools, England: 2000) Survey of Information and Communication Technology in Schools
Survey directed towards headmasters of teachers training institutions	Q: How are the total expenditures on ICT divided between the following three domains (please mark per cent of total ICT expenses): 1) teaching and learning 2) Institutional management and administration 3) Average per institution and per student
eEurope relevance	Which of the 6 eEurope actions within this topic does the indicator refer to: 2A-4: Provide training to all teachers, adapt teacher curricula and offer incentives to teachers to use digital technologies in teaching

SIBIS indicator no. 6

Title	Teachers' ICT training
Definition	Number of teachers who have received training in ICT and updated training within the last two years as a percentages of all
Notes	-
Sources	No knowledge of existing data sources at international level An annual sample survey among European teachers is launched (Eurobarometer), and could include this question if teaching practices were included as a theme in the questionnaire. The Department of Education and Employment, UK collects the data and publishes them in "Survey of Information and Communication Technology in Schools".
SIBIS survey: Q and group to be asked	Q: Have you received training in ICT Please mark one of the following possibilities <ul style="list-style-type: none"> • not at all • in the initial training only • courses after the initial training more than two years ago • courses after the initial training within the last two years
eEurope relevance	2A-4 Provide training to all teachers (..) use digital technologies in teaching

SIBIS Indicator no. 7

Title	The content of teachers' ICT training
Definition	The number of teachers who have received training in technical ICT skills and/or in pedagogical skills in relation to use ICT in teaching
Notes	Data for this indicator can be combined with data on the initial training of teachers
Sources	No knowledge of existing data sources on supranational level An annual sample survey among European teachers is launched (Eurobarometer), and could include this question if teaching practices were included as a theme in the questionnaire.
SIBIS survey: Q and group to be asked	Q: Was the purpose of the training mainly to gain technical skills or pedagogical skills in relation to the use of ICT in teaching? Please mark one of the following possibilities: <ul style="list-style-type: none"> • mainly technical skills • mainly pedagogical skills • both in equal amounts
eEurope relevance	2A-4 Provide training to all teachers (..) use digital technologies in teaching

8.3 New indicators measuring digital skills

SIBIS Indicator no. 8

Title	Skills in using of digital communication tools
Definition	Number of pupils/citizens who, according to their own assessment, know <ul style="list-style-type: none"> • how to get in touch with others through the Internet • how to create their own personal webpage or website • as a percentages of all pupils/citizens
Notes	Communicate – digital skills
Sources	No knowledge of existing data sources. There are plans for launching a "pupil survey" at EU level in regi of Eurobarometer. Details of this survey are not known ⁷⁰ .
SIBIS survey: Q and group to be asked	SIBIS GPS: We would like to ask you a few questions in relation to your experience and knowledge about using the Internet. Please indicate for each question whether you have: no knowledge at all (0), little knowledge (1), good knowledge (2) or very good knowledge (3) <ul style="list-style-type: none"> • I know how to get in touch with others through the Internet • I know how to create my own personal webpage or website
eEurope relevance	2A-6 Ensure that all pupils have the opportunity to be digitally literate by the time they leave school

SIBIS Indicator no. 9

Title	Skills in choosing and installing digital tools
Definition	Number of pupils/citizens who, according to their own assessment, know how to choose and install digital tools as a percentages of all pupils/citizens
Notes	Choose and update tools – digital skills
Sources	No knowledge of existing data sources at supranational level There are plans for launching a "pupil survey" at EU level under the auspices of Eurobarometer. Details of this survey are not yet available ⁷¹ .
SIBIS survey: Q and group to be asked	SIBIS GPS: We would like to ask you few questions in relation to your experience and knowledge about using the Internet. Please indicate for each question whether you have: no knowledge at all (0), little knowledge (1), good knowledge (2) or very good knowledge (3) I know how to obtain and install software on my computer
eEurope relevance	2A-6 Ensure that all pupils have the opportunity to be digitally literate by the time they leave school

⁷⁰ According to SIBIS meeting with EC representatives responsible for e-Europe evaluation and benchmarking, June 2001.

⁷¹ According to SIBIS meeting with EC representatives responsible for e-Europe evaluation and benchmarking, June 2001.

SIBIS Indicator no. 10

Title	Skills in searching for information on the Internet
Definition	Number of pupils/citizens who, according to their own assessment, <ul style="list-style-type: none"> • know how to locate the information on the Internet that I require • know how to use a search engine as a percentages of all pupils/citizens.
Notes	Search for information – digital skills
Sources	No knowledge of existing data sources at international level There are ideas of launching a "pupil survey" at EU level
SIBIS survey: Q and group to be asked	SIBIS GPS: We would like to ask you few questions in relation to your experience of and knowledge about using the Internet. Please indicate for each question whether you have: no knowledge at all (0), little knowledge (1), good knowledge (2) or very good knowledge (3) I know how to locate the information on the Internet that I require I know how to use a search engine
eEurope relevance	2A-6 Ensure that all pupils have the opportunity to be digitally literate by the time they leave school

SIBIS Indicator no. 11

Title	Pupils/citizens skills in questioning the information they collect digitally
Definition	Number of pupils/citizens who, according to their own assessment, quickly identify the source of an information I found on the Internet as a percentages of all pupils/citizens
Notes	Search for information – digital skills
Sources	No knowledge of existing data sources on international level There are ideas of launching a "pupil survey" at EU level
SIBIS survey: Q and group to be asked	SIBIS GPS: We would like to ask you few questions in relation to your experience of and knowledge about using the Internet. Please indicate for each question whether you have: no knowledge at all (0), little knowledge (1), good knowledge (2) or very good knowledge (3) I know how to quickly identify the source of an information I found on the Internet
eEurope relevance	2A-6 Ensure that all pupils have the opportunity to be digitally literate by the time they leave school

8.4 Flexible educational institutions and virtual mobility

SIBIS Indicator no. 12

Title	Extension of distance learning as part of formal education
Definition	Number of students or pupils in formal or accredited educational activities based on distance learning (ODL)
Notes	
Sources	<p>No knowledge of existing data sources at national or supranational level⁷².</p> <p>This data appears not to be registered at national level, often not even within the educational institutions. Therefore a survey among students and pupils enrolled at secondary and tertiary educational institutions would cover the main part of the distance learning. However, students which only follows courses at one/more virtual institutions will not be captured in such a survey</p>
Student survey:	<p>If you have been enrolled in formal education higher than primary school the last year:</p> <p>Q: At what scientific area have you been enrolled?</p> <ul style="list-style-type: none"> • Humanities • Social sciences • Natural sciences • Technical sciences <p>Q: How many of the courses were based on distance learning? (Courses provided by institutions other than the university where you are enrolled, which can be followed at distance, e.g. via the Internet)</p> <ul style="list-style-type: none"> • None • up to 25 % of all courses attended • 25-50 % of all courses attended • 50-100% of all courses attended <p>Q: If distance learning has been used: Who offered the distance learning course?</p> <ul style="list-style-type: none"> • an educational institution in the same country • two or more educational institutions in the same country • a foreign educational institution • offered by a cross-national group of educational institutions • other <p>Background data: age of respondent</p>
eEurope relevance	Not directly. Covered by 2A-5: Adapts school curricula to enable new ways of learning using information technologies.

⁷² Some of the distance learning activities might be registered by the educational institutions, where the student/pupil is registered in non-distance studies. The registration will take place when the distance learning activities are part of courses or degrees accredited by the non-distance educational institution.

SIBIS Indicator no. 13

Title	National capacity of virtual education as part of formal virtual education
Definition	Number of educational places in formal virtual education and accredited courses
Notes	-
Sources	<p>No knowledge of existing data sources at national or supranational level.</p> <p>This data appears not to be registered at national level, often not even within the educational institutions. Therefore interviews with national educational experts or central administrators is expected to be the best way to get an indication.</p>
Target group: national educational experts or central administrators	<p>Q: What is the number of students participating in virtual education/distance learning in this country/region?</p> <p>Please mark:</p> <ul style="list-style-type: none"> • Number of students • Full time equivalents • Share of full time students of all <p>If possible, please divide these regarding:</p> <ul style="list-style-type: none"> • educational level (secondary/tertiary) • scientific area (humanities, social sciences, natural sciences, technical sciences) <p>Regarding the national virtual educational institutions:</p> <p>Q: Of all institutions providing virtual education, what is the share of education institutions specialised within virtual or distance learning ?</p> <ul style="list-style-type: none"> • None • up to 25 % • 25-50 % • 50-100% <p>Q: Of all courses provided as virtual education, what is the share of cross institutional co-operation, i.e. courses provided in co-operation between two or more independent educational institutions (could be between national institutions or institutions in two or more countries)?</p> <ul style="list-style-type: none"> • None • up to 25 % • 25-50 % • 50-100%
eEurope relevance	Not directly. Covered by 2A-5: Adapts school curricula to enable new ways of learning using information technologies.

8.5 Networking

SIBIS Indicator no. 14

Title	Development of extension of co-operation between educational institutions and private companies in the content industry
Definition	Development of co-operation between educational institutions and private companies in the content industry
Notes	This indicator focuses on development rather than absolute numbers of co-operation
Sources	No knowledge of existing data sources
Target group: National educational experts or central administrators	<p>Target group: National Educational experts/Central Educational administrators</p> <p>Q: how do you see the development of co-operative projects between educational institutions and private companies within the content industry the last year?</p> <ul style="list-style-type: none"> • Decreasing • Neutral • Slowly increasing • Fast increasing
eEurope relevance	Covered by 2A-3: Ensures availability of support services and educational resources on the Internet, as well as e-learning platforms for teachers, pupils, and parents

SIBIS Indicator no. 15

Title	Kind of issues included in co-operation between educational institutions and private companies in the content industry
Definition	The kind of issues included in co-operation between educational institutions and private companies in the content industry
Notes	This indicator focuses on the qualitative content of the co-operation
Sources	No knowledge of existing data sources
Target group: National educational experts or Central Educational administrators	<p>Target group: Educational experts/Central Educational administrators</p> <p>Q: Projects of co-operation between educational institutions and private companies can include one or more issues. Please mark how many of the co-operative projects that you know about that include the following issues: (0-25%, 26-50%, 51-75% or 76-100%)</p> <ul style="list-style-type: none"> • Economic support for educational institutions for investment in ICT • Increase the diffusion of ICT for educational purposes • Dialogue on experiences in order to adjust existing products • Develop future products • Adjust the educational system to provide necessary skills for the industry.
eEurope relevance	Covered by 2A-3: Ensures availability of support services and educational resources on the Internet, as well as e-learning platforms for teachers, pupils, and parents

9 Suggestions for composite indices

In this Chapter, two composite indices are proposed. One is based on a combination of data from existing surveys, the other comprises indicators for which data may be collected in the SIBIS GPS (General Population Survey).

9.1 The COQS-index of digital skills

The aim of this index is to sum up pupils' or citizens' ability to use ICT in selected situations. It is named the COQS-index referring to the elements that it is based on:

Skills in relation to:

- Communication (C)
- Obtain and install software (O)
- Question the information from the Internet (Q)
- Search (S)

Digital skills C-O-Q-S index (pupils at the time they leave school or citizens in general)				
Dimension	Indicator	Definition/Question	Year	Source
Competencies	Skills in using digital communication tools (C)	<ul style="list-style-type: none"> • I know how to get in touch with others through the Internet • I know how to publish information about myself on the Internet so that it is accessible for everyone 	2002	SIBIS GPS
Competencies	Skills in choosing and installing digital tools (O)	<ul style="list-style-type: none"> • I know how to obtain and install software on my computer 	2002	SIBIS GPS
Competencies	Skills in questioning the information they collect digitally (Q)	<ul style="list-style-type: none"> • I know how to quickly identify the source of an information I found on the Internet • I know how to question the reliability of the digital information I collect e.g. by cross-questioning the information and source 	2002	SIBIS GPS
Competencies	Skills in searching information on the Internet (S)	<ul style="list-style-type: none"> • I know how to locate information on the Internet that is suitable for my needs • I know how to use digital library bases and other bases for information search 	2002	SIBIS GPS

For each of the four competencies, one or two questions are to be asked. Answers can be given on a 4-point scale running from:

- no knowledge at all (0)
- little knowledge (1)
- good knowledge (2)
- very good knowledge (3)

The national score or the ranking of an individual on COQS-index is determined as the total score from all the answers, divided by 7 (the number of questions).

The target group for the index is – in a narrow perspective - the pupils at a certain age, e.g. 15 years. However, the questions are also valuable for a broader target group. Therefore, it will be tested in SIBIS General Population Survey in 2002. For the time being, no data are available for the index.

9.2 ICT Readiness Index

The second suggestion is the ICT Readiness Index. The aim of the index is to produce one value which , measures the ICT readiness at a national level for the following educational levels:

- primary education
- secondary education
- professional and technical education.

To be able to teach the pupils how to use ICT, the schools must be ready. Readiness cannot be seen as a matter of infrastructure alone, though infrastructure is important. Readiness is a matter of various elements and to be measured needs indicators that represent the quality of equipment and available computers as well as the extent of ICT-related teacher training and available skills. The following figure shows the elements of the index.

ICT Readiness Index				
Dimension	Indicator	Definition	Year	Source
Economy & infrastructure	Number and quality of computers available for pupils	Number of computers less than three years old, used for education, per 100 pupils	2001	Euro-barometer
Economy & infrastructure	Number and quality of computers available for pupils	Number of computers connected to the Internet, used for education, per 100 pupils	2001	Euro-barometer
Economy & infrastructure	Quality of the Internet connection	Schools with broadband connection as a percentage of all schools	2001	Euro-barometer
Competencies	Teacher ICT training	Percentage of teachers who have received official training for the use in teaching of computers and/or Internet	2001	Euro-barometer
Competencies	Teacher confidence	Percentage of teachers who felt confident using ICT for teaching the curriculum	2001	Dep. of Education & Employment, UK

It will mainly be based on existing data from the Eurobarometer surveys, flash no. 101 and 102. One element is based on a national indicator from Education & Employment, UK, but we recommend that it be added to the next annual Eurobarometer Teachers survey.

The score can be calculated as shown in the example:

Definition	Score
Number of computers less than three years old, used for education, per 100 pupils	0-100 points
Number of computers connected to the Internet, used for education, per 100 pupils	0-100 points
Schools with broadband connection as a percentage of all schools	0-100 points
Percentage of teachers who have received official training for the use in teaching of computers and/or Internet, as a percentage of all teachers	0-100 points
Percentage of teachers who felt confident in the use of ICT for teaching the curriculum, as a percentage of all teachers	0-100 points
TOTAL	0-500 points

10 Conclusion

The purpose of the report is to analyse and find the gaps in statistical coverage of the information society in the topic education.

The previous report SIBIS task 2.1 unfolded the general tendencies and policy concerns regarding the topic Education in relation to the Information society, and the existing and future indicators on the development of the topic education in the information society were discussed. The basis for statistical indicators is therefore broader than the original eEurope action plan, including topics and issues not directly related to the points in the action plan.

The development of indicators is based on the seven specific issues identified in work task 2.1. These issues within education are all related to the eEurope action plan but most include a broader perspective. The seven issues are:

- ICT infrastructure of the educational system
- Support services and educational resources - software (pre-conditions for e-learning)
- Integration of ICT in curricula
- Training of teachers – teachers qualifications
- Digital literacy
- Flexible educational institutions and virtual mobility
- Networking between educational institutions and public/private collaboration

Chapter xyz gives a brief discussion of the gaps within each of the seven issues found in the official statistics currently. In this relation (and the following), the emphasis is on real statistical gaps, e.g. areas without existence of supranational *or* national statistical indicators. WE have chosen to define an issue to be statistical covered *even if only national indicators and surveys are available*.

In Chapter xyz the statistical indicators covering each issue analytically divided into seven 'logical threes', each consisting of issues, sub-issues and indicators. The main part of the issues is well covered statistically by the existing indicators presented in WP 2.1. The gaps are thus briefly described in the logical structure of the threes.

The indicators developed to cover the gaps were described in details in Chapter xyz.

Each indicator is described by:

- Name of the indicator
- Definition
- Sources for data and availability
- Initial suggestion for survey question(s) and
- Who and where to put the question

Finally, Chapter xyz consists of a suggestion for two composite indices, which will be a more general indicator of elements of development of the information society within the topic of education. The composite indices cover:

- Digital skills
- ICT readiness index

More composite indices are expected to be developed later in the process.

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