ICT LEARNING AND TRAINING:

DATA, POLICIES AND PRACTICE IN SELECTED EU

COUNTRIES

FINAL REPORT

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Table of Contents

Executive Summary

This report provides key findings arising from a study that set out to explore Information and Communication Technology (ICT) learning and training data and policies in selected EU Member States. The project was designed to establish policies on ICT learning/education/training and the types of quantitative and qualitative data held within countries of the EU. Extensive documentary analysis and interviews with employers and other key stakeholders were the main methods of data collection. The target countries were Austria, Belgium (French Community), Denmark, France, Germany, Ireland, Sweden and the UK. For certain parts of the project, the focus was limited to Denmark, France, Germany and the UK.

Policy, initiatives and data

♦ In all eight target countries there have been initiatives to develop ICT learning and teaching with ICT being a compulsory element in primary and secondary schools in most jurisdictions under investigation. In all countries there were curriculum objectives relating to: learning the correct use of computer applications (e.g. word processor, spreadsheet); learning to search for information (e.g. on CD-ROM, network); and communicating via a network. The situation was more varied in relation to developing programming skills.

♦ Across these target eight Member States there were reported to be varying numbers of pupils per computer, ranging from 1 computer for 23 pupils in German primary schools, to 1 computer for 4 pupils in Denmark. At the secondary level, headteachers in Germany reported the lowest number of computers at around 1 computer for 14 pupils. In Denmark, there was estimated to be around 1 computer for just over 1.5 pupils.

♦ Primary teachers in Germany and Austria reported the least amount of time teaching with off-line computers, with those in the UK and Ireland reporting the most. In relation to teaching with the Internet, primary teachers in Ireland and Denmark reported providing the highest average number of hours.   At secondary level, the highest levels of Internet use were reported in the UK, Denmark and Sweden and the lowest levels in France and Austria.

♦ Survey data reveal that in most countries, when asked how often they used a computer *at home*, pupils were most likely to select 'almost every day'. In Sweden, six out of ten pupils reported using computers almost every day. In Denmark, nearly a quarter of pupils reported using computers *at school* almost every day; and in Scotland just under a fifth reported using computers to a similar extent. More pupils in Germany and Ireland than in any other country reported that they 'never' used computers at school (over a third of pupils in each case). Over half the pupils reported using computers to help them learn school material at least a few times a week in Denmark and Scotland. In Belgium, over a third of pupils reported that they never used computers for this purpose (OEDC, 2002).

♦ In all countries there have been initiatives relating to ICT training for teachers. Across countries, according to information provided by Eurydice, ICT was included as a compulsory element in primary and secondary teacher training for most of the eight target countries. In Germany, there is variation in relation to the implementation of ICT training for teachers as a result of the differing regulations of the *Länder*.

3

♦ A Eurobarometer survey (European Commission, 2001b) found that primary teachers in Ireland and the UK received the highest levels of computer training. The lowest levels were reported by primary teachers in Germany and France. For Internet training, the UK had the highest proportion of primary teachers reporting such training (61%) and Germany the lowest (21%).

♦ Secondary teachers in Denmark, Austria and Sweden were the most likely to have received Internet training and those in Austria the most likely to report having received training in the use of computers. The lowest training levels in both off- and on-line computing were found in Germany.

♦ In all eight countries, there were initiatives in place to support the learning of ICT in higher education.

♦ A Eurobarometer survey (European Commission, 2001c) found that the lowest levels of training in ICT received by those who used computers at work, were in Belgium, with the highest levels being in Denmark, Ireland, Germany and Sweden.

♦ The Continuing Vocational Training Survey (CVTS-2) (Eurostat, 2002) revealed that training in 'computer science/computer use' accounted for 17% of the total course hours (across the 15 EU Member States), the highest proportion of course hours from 11 possible fields. In the UK, computer science/computer use commanded the lowest share of total training hours and in Sweden, Germany and France the highest.

♦ Across the countries in our study, there were a number of similar approaches in relation to other adult learning. In virtually all cases, public libraries and adult education centres play a key role.

♦ A Eurobarometer survey (European Commission, 2002a) found that private use of the Internet to improve training and education was mentioned by around half of respondents in Germany and Austria; far fewer mentioned this in Sweden or Denmark (21% and 25% respectively).

♦ A Eurobarometer survey (European Commission, 2001d) found that the highest levels of training in both the use of computers and the Internet (in the population aged 15 and over) were in Sweden and Denmark; the lowest levels were in France.

♦ Data on the percentage of the working population aged 15 and over trained in job-related ICT skills (European Commission, 2002b) reveal high levels of training in Denmark and Sweden; low levels were found in Belgium.

ICT training in tax offices, multinational companies and SMEs

Tax offices

♦ In all four target countries (Denmark, France, Germany and the UK), tax returns can be submitted electronically. Help is available to the general public in filling in tax returns, either by way of telephone advice or online advice. Newly appointed staff to the tax offices in Germany and Denmark were expected to demonstrate proficiency in the use of ICT, but this was not generally the case in France or the UK. ICT training was reported to be offered to all, or most staff in Denmark, Germany, UK and France.

Multinational companies

♦ Multinational companies in all four countries reported a need for ICT competence. The basic level required, widely reported, was the Microsoft Office suite of software. Shortages of ICT skills in companies were not reported as being a significant problem, although it was acknowledged that some difficulties existed in a few areas.

♦ ICT training policies were in place in companies across all countries. However, variations were noted regarding procedures and approaches to training.

♦ Companies in all countries reported that ICT learning and training was task related.

♦ Two areas of interest were e-learning and informal learning. E-learning was reported to be utilised by companies across all countries, but questions were raised about its effectiveness. Informal learning was reported in companies in all countries.

♦ There appeared to be a tendency for most training to be carried out by the companies themselves.

♦ Companies in all countries reported that they paid for ICT training, although funding decisions might be taken at a local (or branch) level.

♦ In general, companies appeared satisfied with the standard of ICT teaching in the formal education system. The exception was in Germany, where it was thought that ICT learning in schools could be improved, and ICT as a subject integrated into the curriculum for all students.

♦ Very few data on ICT learning/training were systematically collected, or available.

♦ Formal testing or evaluation of ICT skills was not widespread. In all countries, a level of basic competence appeared to be taken more or less for granted.

Small and medium-sized enterprises

Survey data on training in small and medium sized enterprises (SMEs) were available in all eight target countries (Austria, Belgium, Denmark, France, Germany, Ireland, Sweden and the UK). These data were of limited use, as they were not necessarily ICT specific; they sometimes excluded the smallest enterprises; and they used different definitions and methodologies. Thus, the data were not comparable and the findings reported must therefore be treated with caution.

♦ ICT skill shortages were reported in all countries except Denmark, where recruitment of individuals with ICT skills was not thought to be a widespread problem. A shortage of recruits with basic and/or general ICT skills was reported in two countries (Belgium and Ireland) but advanced ICT skill shortages were more widely reported (Austria, Germany, Sweden and the UK).

♦ Survey data across countries tends to suggest that the smallest enterprises were the least likely to provide training. Survey data across countries suggested that SMEs tended to look to external providers for ICT training.

♦ Data on take-up of ICT training were only available for SMEs in a minority of countries and were not provided consistently.

♦ Survey data on e-learning in SMEs were available in all countries except Sweden and Denmark. The advantages of e-learning, mentioned most frequently across countries, were low cost, flexibility and time-saving. Disadvantages most frequently referred to were that employees were resistant; specialist knowledge and support was required; and there was a lack of awareness, or mistrust of e-learning. Few data on informal learning were available.

ICT perspectives on the future

Interviews with experts in four countries (Denmark, France, Germany and the UK) were carried out. Key findings are presented below.

♦ Higher level or specialist ICT skills and technical skills were more in demand than basic ICT proficiencies. In all countries it was thought that steps taken by governments to increase ICT skill levels had been to a greater or lesser extent successful.

♦ Experts in three countries (France, UK and Germany) spoke of 'outsourcing' and 'off-shoring', practices that were becoming increasingly attractive to companies in terms of accessing the skills market and reducing labour costs.

♦ Experts in all countries thought that ICT learning and training should be embedded, or integrated into the education system.

♦ In all countries, experts thought that more could be done by government to promote ICT learning and training. Experts were also agreed that ICT learning and training should be more tailored to particular needs and groups in the workplace.

♦ In general, it was thought that ICT learning could be encouraged by better recognition, endorsement or accreditation systems. Experts spoke of the need for improved appraisal or recognition of ICT skills outside the formal qualifications structure. The need to train the trainers was mentioned.

♦ Experts frequently made reference to 'mixed' or 'blended' learning for employees who needed flexibility in the workplace.

♦ Target groups for further training included: the older age group and people who were at a social, or economic disadvantage, including the unskilled, the unemployed, people who lacked communication and/or language skills, women and disaffected young people.

♦ There was considerable consensus that some if not all of the following complementary skills were also needed: communication skills; flexibility; adaptability; cooperative or team working (beginning at school level); problem solving strategies; project management (including IT projects); numeracy skills; and higher mathematical skills.

♦ It was noted by one respondent that it was important not to neglect the ethical dimension of the use of the Internet and that pupils and employees should be trained to be critical particularly of source materials.

Current data on ICT access and learning

In several countries data were available relating to: use of computers by young people, teachers and ICT learning and use, continuing vocational training/learning, training in companies, ICT access and learning by adults, differences between specific groups.

Selected indicators are proposed to supplement those already available within the EU. All the associated questions are designed to be collected by surveys, possibly as part of EU-wide data collection systems.

Proposed indicators

1a. Percentage of [target group] using computers/ICT at different locations

1b. Percentage of [target group] using different applications/facilities for different purposes

2. Percentage of [target group] taught by a qualified teacher/trainer

3. Percentage of [target group] who have received specific training

4. Percentage of [target group] whose training costs were met from different sources

5. Percentage of [target group] learning informally about ICT

6. Percentage of [target group] with qualifications in ICT/computing

7. Percentage of [target group] with differing attitudes towards use of ICT

8. Percentage of [target group] who use different assistance when computer breaks down

9. Percentage of teachers/trainers using ICT in their teaching/planning/record keeping

10. Percentage of teachers/trainers who have undertaken ICT training in past 12 months

11. Confidence using ICT in teaching (percentage of teachers/trainers using ICT)

12a. Percentage of schools including ICT in various subject areas

12b. Percentage of schools reporting a positive effect on teaching

13. Percentage of schools/colleges aiming to teach pupils ICT skills

14. Percentage of schools/colleges with ICT security and protection measures

1.   Introduction

This report provides key findings arising from a study that set out to explore Information and Communication Technology (ICT) learning and training data and policies in selected EU Member States. This is an important policy area as ICT is expanding at a phenomenal pace. Given the transformation that is taking place as a result of ICT developments and innovations it is crucial for policy makers at both national and supranational levels to know whether or not policy changes are needed in order to ensure that the EU remains competitive in the global economy and that its citizens are all given the opportunities they need in order to maximise their contribution to society and to reduce social exclusion. This project was designed to establish, via four linked work packages, policies on ICT learning/education/training and the types of quantitative and qualitative data held within countries of the EU. It also aimed to address an issue of key importance in the European Union, namely, what do we know about the prevalence of ICT learning, training and proficiency?

It is important to note that although e-learning is referred to throughout the report, our focus has been on ICT learning not e-learning. There is some overlap between the concept of ICT learning as we are using it and that of e-learning. A useful definition is given by the European Centre for the Development of Vocational Training (CEDEFOP), which defines the concept of e-learning as not just that which relates to 'digital literacy' or the acquisition of IT competence, but also: 'multiple formats and hybrid methodologies, in particular, the use of software, Internet, CD-ROM, online learning or any other electronic or interactive media' (CEDEFOP, 2001). Our focus here is primarily on 'digital literacy' rather than a broader conceptualisation of e-learning.

The following section briefly describes the methods adopted. Section 3 highlights key policies and initiatives and presents relevant data produced by supranational bodies, in particular the European Commission and the Organisation for Economic Cooperation and Development (OECD) in eight EU countries: Austria, Belgium (with a focus on the French-speaking Community), Denmark, France, Germany, Ireland, Sweden and the UK. Section 4 focuses on ICT learning and training in different organisations - tax collecting offices, multinational companies and small and medium-sized enterprises (SMEs). Section 5 explores the views of experts about future needs in relation to ICT. Section 6 focuses on current survey data and possible ways forward for the development of more comprehensive ICT learning indicators that could be developed at a European level. Section 7 concludes the report with a discussion of the findings and their implications of the findings for future policy.

2.   Methods

This study involved the use of several different methods. Extensive documentary analysis of policy documents and statistical material was involved for the work package relating to legislation, policy and data (see Sections 3 and 6). Sources included national and regional Ministries, agencies and statistical offices together with supranational bodies including Directorate-General Education and Culture, Eurostat, the OECD and various other bodies.

For the work package relating to ICT learning and training in public and private sector bodies (see Section 4), interviews with key stakeholders took place: with civil servants in tax collecting offices in four countries; and with employees of a sample of multinational companies in the same four countries. An analysis of survey material relating to ICT learning/training in SMEs was also undertaken. A common set of questions was developed by the project team (and translated as necessary) and this was

used to guide the discussion with interviewees (in the case of the interviews with civil servants and multinational employees) and to guide the analysis of the data relating to SMEs.

The work package relating to the views of ICT experts in relation to the future (Section 5) involved interviews using a common set of questions, agreed by the project team (and translated as necessary), and the questions were used to guide the discussion with the experts.

The final work package (Section 6), relating to the development of indicators, builds on previous survey data and supranational indicators currently available. A set of indicators are proposed which could in theory be used to inform future data collection exercises in relation to ICT access, learning and training.

3. Legislation, policy and comparable data

The aim of this work package was to set up an observatory of quantitative and qualitative data and other information held on ICT training/learning and proficiency and associated policies and initiatives, in the participating countries and at a supranational level.

Whilst there is legislation relating to ICT learning/training at least in some phases of education/training, in some countries, this is not the case in all countries. Notwithstanding the lack of legislation, in all countries/regions there have been policies and/or initiatives relating to ICT in learning/training. We have therefore limited this section to a focus on key policy initiatives and also report on statistics that can be considered to be broadly comparable across the participating countries.

However, it needs to be stressed that the methods adopted do not necessarily match those used by national governments or agencies, so the results may not always be comparable. Nor are the methods necessarily as robust as they could be (e.g. asking headteachers about time teachers spend on activities; collecting information via telephone interviews). Moreover, the methods used for supranational comparisons generally use as the unit of analysis the Member State, which can give misleading results – for example, in relation to Germany and the UK there are marked regional variations that are concealed by an analysis at the level of the Member State. A further problem is that there are differences between types of education and training that can be concealed by aggregating vocational training (under the dual system) with general secondary education.

Whilst there are some national statistics and indicators available relating to ICT access, learning and training we have not included these national statistics and indicators in this section of the report, as they cannot be considered comparable and may therefore be misleading. Instead, they have been included in Section 6.2.

3.1 ICT in compulsory and post-compulsory education

Figure 1 outlines some of the key policy initiatives taken in the eight countries in our study in primary and second level education. The highlighted examples reflect noteworthy initiatives.

Figure 1   Key ICT initiatives in schools in eight EU countries/regions

In **Austria**, initiatives to promote ICT in schools include the 'Ambassador Project', 'Tomorrow Experts in Computing' and the 'Cyberschool Competition'. There are seven ICT-related courses of apprenticeship training in the dual system.

In **Belgium** (French-speaking Community), the cyberschools plan made provision for the installation of 20,000 PCs with Internet access between 1998 and 2002 (Gouvernement de la Région wallonnne, 1998; 2002). The ICT passport, aims to familiarise pupils with using ICT (AGERS, 2004).

In **Denmark**, the focus has shifted towards using computers as a learning aid. All schools catering for pupils of compulsory school age are obliged to have an action plan for ICT learning; the overall aim is to secure a long-term and unified integration of ICT into the school system.

In **France**, the 'Plan d'équipement des écoles et établissements scolaires' was set up in 1998. The Brevet informatique et Internet (B2i) is a certificate indicating ICT proficiency at different levels (primary, collège and lycée) (MEN, 2000). Out of school, apprentices can take a module in IT, multimedia and the Internet. Individuals can undertake personalised training programmes and in particular in relation to ICT in 'Ateliers de pédagogie personnalisée' (Algora, 2003).

In **Germany**, because of the key role played by Länder, there have been many different initiatives to promote ICT. There have also been nationwide initiatives such as 'Schools on the net' and the D 21 Initiative. In full- and part-time school-based vocational education courses, ICT is included according to its relevance for the profession in question and according to the particular focus of the Länder.

In **Ireland**, two main government initiatives promote ICT teaching and learning, Schools IT 2000 and Blueprint for the Future of ICT in Irish Education.

In **Sweden**, a National Action Programme for ICT in Schools has been developed. A key element is the ItiS project (IT in Schools) with the guiding principle 'equal standards between schools and equal quality for pupils'. This covers the whole public school system, compulsory as well as non-compulsory second level education.

In the **UK**, the National Grid for Learning strategy underpins policy and practice in relation to ICT education, training and learning across all phases of education and training including the primary and secondary phases of compulsory education and teacher education.

EU and OECD data

Primary and secondary education

According to Eurydice (2004), in 2002/03 in all eight participating countries, ICT was a compulsory element in primary and secondary schools, with the exception of the UK (England, Wales and Northern Ireland), where there is no compulsory curriculum in upper secondary education (age 16 to 18 years) (although guidance is provided in relation to teaching and learning ICT). In all eight countries there were curriculum objectives relating to:

♦ learning the correct use of a word processor, spreadsheet etc;
♦ learning to search for information on a CD-ROM, network etc;
♦ communicating via a network.

The situation was more varied in relation to developing programming skills as shown in Table 1.

Table 1 Developing programming skills

Country	Primary	Lower secondary (ISCED 2)	Upper secondary (ISCED 3)
Austria			Y
Belgium (F)			
Denmark		Y	Y
France			
Germany	Y	Y	Y
Ireland			
Sweden			Y
UK (E)	Y	Y	
UK (W)	Y	Y	
UK (S)	Y	Y	Y
UK (NI)	Y	Y	Y

Derived from: Eurydice, 2004
Notes: In this and other tables:
Belgium – F: French-speaking Community
United Kingdom – E: England, NI: Northern Ireland, S: Scotland, W: Wales
ISCED is the International Standard Classification of Education (UNESCO, 1997)

As can be seen, according to information provided by Eurydice, two countries (Germany and the UK) mentioned programming skills in primary education; however, it was more common in upper secondary education. In terms of teachers' use of computer resources with pupils, a Eurobarometer survey (European Commission, 2001a) revealed some differences between countries at both primary and secondary levels. At the time of the survey, the Internet was used for educational purposes in at least nine out of ten primary schools in Denmark, Sweden, Ireland and the UK. Usage was lowest in Austria. In secondary education, very high percentages of headteachers reported having at least one computer and Internet access. Over nine out of ten headteachers in all countries reported that the Internet was used for education (see Table 2).

Table 2 Primary and general secondary school computer resources for education, intranet and Internet access (%)

Member State	Use of computers for education		Internet connection		Use of Internet for education		Email		Web page		Internal PC network	
	Pri	Sec	Pri	Sec	Pri	Sec	Pri	Sec	Pri	Sec	Pri	Sec
Austria	82	99	53	95	38	94	47	95	16	73	24	69
Belgium	99	99	90	96	78	93	83	94	35	69	42	73
Denmark	100	99	98	99	97	97	93	94	68	75	63	67
France	90	100	63	97	56	93	54	93	12	54	13	55
Germany	90	99	90	98	67	93	69	90	23	64	26	52
Ireland	100	100	96	99	94	98	90	96	19	58	16	69
Sweden	97	95	100	100	97	95	90	93	75	90	67	78
UK	100	99	93	98	90	97	85	96	37	73	51	83

Source: European Commission 2001a

Turning now to pupils' access to ICT hardware, an EU-wide survey (European Commission, 2001a) asked primary headteachers about the average number of computers per 100 pupils. Across the eight Member States featured in our study there were reported to be (at that time) around 1 computer for 23 pupils in German primary schools, and by way of contrast around 1 computer for 4 pupils in Denmark. At the secondary level, headteachers in Germany reported the lowest number of computers around 1 computer for 14 pupils. This was in marked contrast to Denmark where there were estimated to be around 1 computer for just over 1.5 pupils (see Table 3).

Table 3 Primary and secondary headteachers' estimates of number of computers

Member State	Average number of computers per 100 pupils		Average number of pupils per computer	
	Primary	Secondary	Primary	Secondary
Austria	9.3	11.7	10.8	8.5
Belgium	9.0	12.4	11.0	8.1
Denmark	23.5	66.9	4.2	1.5
France	6.4	10.5	15.6	9.5
Germany	4.3	7.1	23.3	14.1
Ireland	8.6	12.1	11.6	8.3
Sweden	10.1	23.1	9.9	4.3
United Kingdom	8.5	15.5	11.8	6.5

Derived from: European Commission, 2001a

Eurobarometer survey data (European Commission, 2001b) revealed that teachers reported using computers with their pupils for varying amounts of time each week (Table 4). Primary teachers in Germany and Austria reported the least amount of time teaching with off-line computers. Teachers in the UK reported providing the highest number of teaching hours with off-line computers, followed by Ireland. In relation to teaching with the Internet, primary teachers in Ireland and Denmark reported providing the highest average number of hours. At secondary level, the highest levels of Internet use were reported in the UK, Denmark and Sweden. The lowest levels were reported in France and Austria.

Table 4 Hours per week on average primary and secondary teachers used computers with pupils

Member State	Use of computers – off-line		Use of Internet	
	Pri	Sec	Pri	Sec
Austria	1.1	1.1	0.2	0.6
Belgium	2.8	3.1	0.6	1.1
Denmark	1.9	2.1	1.2	1.8
France	2.3	1.7	0.3	0.5
Germany	0.9	1.7	0.2	0.9
Ireland	5.1	3.2	2.0	1.0
Sweden	3.9	2.9	0.9	1.7
United Kingdom	7.2	5.8	0.9	2.0

Source: Eurobarometer, European Commission, 2001b

The OECD Programme for International Student Assessment (PISA) is of particular interest in the present context (see OECD, 2001, 2002). Table 5 shows 15-year-old pupils' responses to questions about the frequency of their use of computers at home and at school in those countries involved in our study that also participated in this part of the PISA study. In most countries, when asked how often

they used a computer *at home*, pupils were most likely to select 'almost every day' from the range of options provided. In Sweden, six out of ten pupils reported using computers almost every day.

Survey results relating to frequency of use *at school* were more varied. In Denmark, nearly a quarter of pupils reported using computers at school almost every day; and in Scotland just under a fifth reported using computers to a similar extent. More pupils in Germany and Ireland than in any other country reported that they 'never' used computers at school (over a third of pupils in each case).

Table 5 Frequency of use of computers at home and school by 15-year-olds (%)

Country	Use at home					Use at schools				
	Almost every day	A few times each week	Between once a week and once a month	Less than once a month	Never	Almost every day	A few times each week	Between once a week and once a month	Less than once a month	Never
Belgium	38	26	13	7	17	5	26	32	12	25
Denmark	44	25	14	7	9	23	36	26	11	4
Germany	43	23	14	7	14	4	14	25	20	37
Ireland	32	23	10	5	30	4	22	25	14	35
Scotland	38	26	10	4	21	18	39	18	14	12
Sweden	60	21	9	3	6	16	29	27	17	11

Source: OECD, 2002 (from PISA database 2001)
In this and following tables, percentages do not always add up to 100 because of rounding

Data from PISA (see OECD, 2002) on the frequency 15-year-olds who reported using computers to help them learn school material are provided in Table 6. Over half the pupils reported using computers for this purpose at least a few times a week in Denmark and Scotland. In Belgium, on the other hand, over a third of pupils reported that they never used computers to help them learn school material.

Table 6 Use of computers by 15-year-olds to help learn school material (%)

Country	Almost every day	A few times each week	Between once a week and once a month	Less than once a month	Never
Belgium	8	16	21	21	35
Denmark	15	38	28	12	7
Germany	11	23	28	21	18
Ireland	7	20	25	22	26
Scotland	17	39	25	11	8
Sweden	13	26	29	19	12

Source: OECD, 2002 (from PISA database 2001)

A key policy concern is that of gender differences in relation to using ICT. The PISA data reveal marked differences, with more boys than girls reporting that they were comfortable using a computer, felt that it was important to work with a computer and used a computer because they were interested in it (OECD, 2002).

3.2   ICT for teachers and trainers

In this section, we focus on initial and continuing teacher education. The highlighted examples in Figure 2, reflect noteworthy initiatives.

Figure 2   Selected ICT policies and initiatives relating to teachers in eight EU countries/regions

In **Austria** there have been many projects and initiatives to support ICT in teachers training, e.g. an online academy for the further training of teachers, a Self Education Centre for Computer Literacy, special online platforms for teachers, a CD-Rom and handbooks.

In **Belgium**, universities are the main providers of initial and continuing training projects for teachers. ICT training is not compulsory for teachers (AGERS, 2004).

In **Denmark** all of the teacher training institutions have a strategy for implementing ICT. This now concentrates on the integration of ICT into subjects and teaching (PLS Rambøll, 2001). The 'School IT' course teaches basic IT skills (word processing, spreadsheets, Internet) and their use in teaching. It is designed for primary and secondary school teachers and instructors in youth education and training programmes; successful completion results in the award of the 'Pedagogical IT Drivers Licence'

In **France**, a 'plan de formation d'urgence' was adopted in 1998, with national vocational training courses organised (CISI, 1998). The IUFM (Instituts universitaires de formation des maîtres) are in charge for training future teachers and also for continuing training. The 'C2i' certificate, level 1 is obligatory for those going into teaching in the primary sector (MEN, 2002). From 2005 on, the C2i level 2 will be established for all teachers (MEN, 2004a). All teachers and pupils have an e-mail address.

Whilst the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of **Germany** *(KMK)* determined in 1998 that media pedagogy should be compulsory in teachers' training courses there is no guarantee that every teacher has had an introduction to ICT. There is variation between the universities in different *Länder.* Evidence from studies confirms that there is a lack of ICT competence among teachers.

In **Ireland**, ICT is compulsory in some, but not all, teacher training colleges.

In **Sweden**, there is no legislation and no recommendations provided by the government. The teaching of ICT is decided by teacher training colleges. The focus of training has shifted over the years and basic proficiency in ICT technology and basic programs are no longer taught. The training of such skills is integrated into the teaching of all subjects. During the 1990s teachers were given courses in software programs and interactive courses. The later part of the Action Programme was designed to enhance the *didactic* use of ICT by offering: in-service training for 50% of teachers and other school staff; a computer for participating teachers; state grants to improve the school's accessibility to the Internet; e-mail addresses for all teachers and pupils; special funds to train teachers working with pupils with special needs; and support to develop a Swedish School net and a European School net (Delegationen för IT i skolan, 1999).

ICT is part of the Initial Teacher Training Curriculum in **England** and new teachers (since 2001) have to have passed a test in ICT (Department for Education and Skills, 2002h). Continuing training programmes in ICT are in place for serving teachers. In **Northern Ireland**, an initiative is in place to provide all teachers with laptop computers (Department of Education, Northern Ireland, 2002).

EU data

Initial teacher training guidance

Table 7 presents data collected by Eurydice relating to 2000/01, which revealed that ICT was included as a compulsory element in primary and secondary teacher training for most of the eight European Union countries featured in our study. However, in Germany at the time the data were collected it was recommended as an option and in Ireland there was reported to be institutional autonomy.

Table 7 Inclusion of ICT in initial teacher training of teachers (except specialist ICT teachers) (2002/03)

Country	ICT compulsory training	Core curriculum option	Institutional autonomy
Austria	PLU		U
Belgium	PL		
Denmark	PLU		
France	PLU		
Germany		PLU	
Ireland			PLU
Sweden	PLU		
UK (E, W, NI, S)	PLU		

Source: Eurydice, 2004
Notes:
P primary
L lower secondary
U upper secondary
Austria – variation according to school type in upper secondary education

Statistics on teachers and ICT training

A Eurobarometer survey (European Commission, 2001b) sought information from teachers on official training in the use of computers and the Internet. It found that primary teachers in Ireland and the UK received the highest levels of computer training (see Table 8). The lowest levels were reported by primary teachers in Germany and France. For Internet training, the UK had the highest proportion of primary teachers reporting such training (61%) and Germany the lowest (21%).

Secondary teachers in Denmark, Austria and Sweden were the most likely to have received Internet training and those in Austria the most likely to report having received training in the use of computers. The lowest training levels in both off- and on-line computing were found in Germany (see Table 8).

Table 8 Official training to use computers and the Internet in teaching (% of primary and secondary teachers)

Country	Computers		Internet	
	Pri	Sec	Pri	Sec
Austria	56	74	34	53
Belgium	46	58	25	49
Denmark	69	67	58	58
France	39	46	27	29
Germany	38	35	21	23
Ireland	82	70	57	45
Sweden	66	61	54	51
United Kingdom	79	68	61	48

Source: European Commission, Eurobarometer, 2001b

3.3   Higher education

In all eight countries, there were initiatives in place to support the learning of ICT. A selection of these are highlighted in Figure 3. The highlighted examples reflect noteworthy initiatives.

Figure 3   Selected ICT policies and initiatives in higher education in eight EU countries/regions

In **Austria**, ICT courses of study are being increased especially at universities of applied science (Fachhochschulen). Funds have been provided to promote the interchange between science and economy, e.g. the 'AplusB' program ('Academia plus Business') supports the installation of competence centres and networks.

In **Belgium (French-speaking Community**) higher education institutions organize their own timetables and develop their own programmes. The majority of universities and 'hautes écoles' have in place a 'virtual campus'. Centres of ICT excellence have been developed via collaborative ventures between university research centres and businesses (Gouvernement de la Région wallonne, 2004).

All **Danish** universities have prioritised increased use and integration of IT in education and research as part of their contracts with the government. The use of computers in university teaching must be accompanied by thorough consideration of how this tool affects the learning process, teaching methods, and ways of handling the theoretical and practical problems presented by the subjects.

In **France**, the *Grandes Ecoles* provide the majority of Information Technology professionals. Universities have been developing new diplomas to meet ICT needs in different specializations. Internet schools have been created which deliver IT engineering diplomas. In 2002, a certificate of computing and the internet (C2i) was developed for students and school teachers (MEN, 2002). All universities have been connected to the broadband RENATER network (MEN, 2004b).

In **Germany**, legislation and administration of higher education are the responsibility of the *Länder.* The implementation of ICT into the learning and teaching process in higher education has been supported by several programmes, initiatives, model projects and portals. At present there is a focus on refining the integration of new media into the courses of studies in order to improve the teaching and learning process in higher education.

In **Ireland**, policy relates to increasing the number of computer graduates to help meet the demands of business for more highly qualified IT specialists.

In **Sweden**, there are a number of projects to stimulate and enhance the use of ICT. Most universities have policy plans that state educational goals for development of ICT in teaching. These goals are supported by

development projects and courses for teachers to develop their skills.

In **England and Wales**, current ICT policy includes the planned and ongoing development of New Technology Institutes (Higher Education Funding Council for England, 2002).

EU data

Higher education statistics

For the purposes of international comparisons using the International Standard Classification of Education (ISCED), higher (tertiary) education or ISCED 5, is divided into two main types, ISCED 5A and ISCED 5B. Entry to these programmes normally requires the successful completion of upper secondary education. ISCED 5A programmes are largely theoretically based whilst ISCED 5B programmes are typically shorter than those in 5A and focus on occupationally specific skills geared for entry into the labour market. The percentages of students studying 'computing' at these levels in selected countries are given in Table 9. At ISCED 5A the highest percentages were found in Ireland. At ISCED 5B wide variations are in evidence with Germany showing the lowest percentage of individuals with computer qualifications and Sweden and Ireland the highest of those countries in our study.

Table 9 Tertiary graduates with 'computing' (% of all fields)

Country	ISCED 5A Percentage	ISCED 5B Percentage
Austria	2.8	0.6
Belgium*	1.0	4.2
Denmark	1.8	2.7
France	2.7	3.3
Germany	2.8	0.3
Ireland	8.4	17.8
Sweden	3.1	20.5
United Kingdom	4.2	7.1

Derived from: OECD, 2002
Notes:
*Certain programmes are excluded (see OECD, 2002)

3.4   Workplace learning

Figure 4 outlines some specific features of ICT training and learning in work-related continuing training. The highlighted examples reflect noteworthy initiatives.

Figure 4   Selected ICT initiatives and features of continuing training

In **Austria**, ICT has been identified as the most popular area for further training (Kailer et al., 2001, Statistik Austria, 2003).

In the French-speaking Community of **Belgium** the PCIE-ECDL (le permis de conduire informatique européen-European Computer Driving Licence) is offered, which provides a qualification for ICT (Fédération des Associations Informatiques de Belgique, 2004).

'IT-Jump' is a project in **Denmark** that, since 1998, has given 3,500 people working in the public sector a free home computer and Internet access. The employees were in return obliged to take an IT-drivers licence. The IT-Jump thereby supports home computers and education (Ministeriet for Videnskab, Teknologi og Udvikling 2002a). Significantly, 83% of the participants in the IT-jump project say their IT competence has improved and 45% of the participants in the IT-jump project use the computer for educational purposes.

In **France**, the B2i continuing training certificate-GRETA (MEN, 2001), the PCIE (Euro-Aptitudes, 2004), and the Certificate of Internet Navigation mark the successful completion of ICT training (Ministère de l'Emploi, 2001).

In **Germany**, ICT-related further training has been introduced in the framework of '*Aufstiegsweiterbildung',* which defines further training courses in the ICT sector and was set up by the employers, the unions, and the state; 35 training courses are offered.

In **Ireland**, workplace initiatives include government-funded Skillnets to help firms develop ICT training. There is also an e-business training initiative for managers and technical staff in the ICT sector and SMEs.

In **Sweden**, there is no *general* agreement about work place education for people in employment but municipally employed teachers have employment contracts that allow them 104 hours per year of in-service training. These hours were used for ICT training during the period of the "Action program for IT in schools" 1999 – 2002. In 1999 employees in the private sector got more staff training in ICT than other countries in the EU (Statistics Sweden, 2002; Personalutbildning i privat sector, 1999).

In the **UK**, ICT training is managed by the ICT sector skills council, which advises on the development of workplace IT skills. Government-sponsored Learndirect Centres provide online IT skills training courses for adults over the age of 16 who wish to improve their workplace skills.

EU data

A Eurobarometer survey (European Commission, 2001c) collected information on whether training in ICT had been received by those who used computers at work (see Table 10). The lowest levels were found in Belgium, whilst the highest levels were found in Denmark, Ireland, Germany and Sweden.

Table 10 Respondents who have received ICT training (of those who use computers at work)

Country	Percentage
Austria	59.6
Belgium	37.7
Denmark	69.9
France	51.1
Germany	64.8
Ireland	65.5
Sweden	64.5
United Kingdom	57.5

Source: Eurobarometer, European Commission, 2001c

The Continuing Vocational Training Survey (CVST-2) (Eurostat, 2002) revealed that training in 'computer science/computer use' accounted for 17% of the total course hours (across the 15 EU participating Member States), the highest proportion of course hours from 11 possible fields. From Table 11 we can see that in Denmark and the UK, computer science/computer use commanded the lowest share of total training hours and in Sweden, Germany and France the highest.

Table 11 Share of total course hours in CVT courses in 'computer science/computer use'

Country	Percentage
Austria	16
Belgium	16
Denmark	15
France	20
Germany	21
Ireland	17
Sweden	23
United Kingdom	15

Source: Eurostat, 2002 (data from 1999)

While Eurostat provides data on basic indicators such as participation in training activities from the Community Labour Force Survey (LFS), it has been argued that the results may not be 'entirely valid as the survey instruments…for this survey used widely diverging concepts and terminology' (SIBIS, 2003). As part of a survey by SIBIS individuals were asked whether they participated in work-related training provided by their employer or another organisation or had been involved in any self-directed learning related to their work. Table 12 provides figures on those who reported using e-learning to receive work-related training (SIBIS, 2003); e-learning was used to describe both off-line and on-line applications. Amongst those in the labour force, those in Germany reported the most use of e-learning and France the least. Of those who participated in any work-related training, it was found that over four out of ten of those in the UK reported e-learning compared with under a quarter in France.

Table 12 Use of e-Learning for work-related training (%)

Country	Base: labour force	Base: all who participated in work-related training
Austria	17.7	32.1
Belgium	11.6	34.9
Denmark	17.1	37.7
France	5.7	23.9
Germany	18.9	32.3
Ireland	14.3	40.9
Sweden	16.4	34.9
United Kingdom	17.0	42.3

Source: SIBIS, 2003
EU average weighted by EU15 population

3.5 Unemployed and adult returners

Figure 5 presents some of the measures and initiatives set up by governments and other bodies in the eight countries included in our study. The highlighted examples reflect noteworthy initiatives.

Figure 5   Selected ICT measures and initiatives for the unemployed and adult returners

In **Austria**, a programme for meeting the skills gap in ICT was initiated by the Federal Employment Office (AMS). The AMS provides several measures, e.g. 'tele.soft', to improve and ensure ICT further training for the unemployed and adult returners, especially female adult returners.

In **Belgium** (French-speaking Community), the Plan mobilisateur (PMTIC) provides free access to 48 hours basic ICT training (Laboratoire de Soutien à l'Enseignement Télématique, (2004). There are specialist centres and open learning centres with modern equipment for the use of training organisations, businesses and jobseekers. The training of unemployed people is also supported through the Formatic programme, which provides training leading to ICT qualifications and is followed by work experience (Office wallon de la Formation Professionnelle et de l'Emploi (Forem Formation), 2004a, 2004b).

Each region in **Denmark** has its own labour market council, which decides an ICT policy. The local labour market council analyses and decides which kinds of strategies are needed in each region. In its action plan for ICT, the labour market council for Greater Copenhagen states that it will focus on special target groups among the unemployed that are particularly suited to take part in IT qualification training; under this action plan, while companies' own employees receive in-service training, the company is committed to replace its staff with unemployed persons.

In **France**, the re-training of jobseekers is directed towards a personalised Action Plan, established in a 'back to work' initiative (PARE – Plan de retour à l'emploi). Several institutions organise this training (GRETA, APP, AFPA). Fourteen hours (and up to 28 hours if necessary) of Internet training is available for the unemployed. It is accompanied by CD-Rom and booklet. It leads to a Certificate of Internet Navigation (Ministère de l'Emploi, 2001). PCIE is also delivered by recognised centres (Euro-Aptitudes, 2004).

In **Germany**, there are several measures to improve and ensure further training of people who have fewer opportunities to take part in workplace training in companies, for example, less qualified workers, unemployed, adult returners and others. Further training courses in the ICT sector are open to the unemployed as well.

In **Ireland** there is a national programme linking literacy with ICT learning and training which aims to provide participants with a qualification such as ECDL (Government of Ireland, 2001b) Equalskills provides online computer training for adults who may never, or seldom have used a PC (Information Society Commission,

20

2002b).

In **Sweden**, unemployed adults and adult returners without upper secondary schooling have the right to register at municipal schools to obtain an upper secondary education; they then receive the same type of ICT education that is provided in schools. A substantial number of labour market training courses for the unemployed are computer courses. Unemployed people requiring *basic* computer skills are referred to municipal computer centres (Datortek).

In the **UK**, ICT training is available under active employment measures (New Deal programmes). Most training is at a basic to intermediate level, but some programmes are designed to equip people with higher level ICT skills. For adult returners, some specific policy measures relate to teachers in shortage subject areas; these include financial bonuses and incentives for ICT teachers (Department for Education and Skills, 2002f).

3.6 ICT for particular adult groups

Figure 6 outlines some of the initiatives and policies in the eight countries in our study in relation to ICT initiatives for particular adult groups.

Figure 6 Selected ICT initiatives for particular adult groups

In **Austria**, specific initiatives include an ICT-related training programme for the blind and a project to encourage women to take new qualifications. There is an 'ICT academy' particularly for adult returners and a virtual consultancy and web-site focusing on the further training of older employees.

In the French-speaking Community of **Belgium**, the Electronica and Ada projects have been established which aim to improve access to new technology for women (Interface3, 2004). The University of the Third Age in Namur has set up a project for ICT training for the older age groups (Ministère wallon de l'Economie, des PME, de la Recherche et des Technologies nouvelles, 2001).

In **Denmark**, there are a number of ongoing experimental projects that aim to develop educational methods to enhance IT competence among the elderly. (www.forsk.dk/forskpro/index.htm). The action plan 'Disabled No Obstacle' is a new overall policy to secure better conditions in the IT and telecommunications area for disabled and handicapped (www.tst.dk).

In **France**, there is provision for public Internet sites to be accessible, particularly for the blind. A project has been set up to train young offenders in ICT and prepare them for resettlement on release (CLIP, 2004).

In **Germany**, 'The Internet for Everyone' (1999), covers measures for women, children, senior citizens, people with disabilities and other groups (including minority ethnic groups). Several initiatives and projects are aimed at preventing the 'digital divide'. A recent Action Programme re-emphasises equal opportunities, particularly for women (Federal Ministry of Education and Research/Federal Ministry of Economics and Labour, 2004).

In **Ireland**, the New Connections Action Plan has focused on enabling measures in the community, e.g. ICT use in libraries and other public access points. Some particular measures have been taken to provide basic IT skills to people over 55 years of age funded by the Department of Enterprise, Trade and Employment (Government of Ireland, 2002b).

In **Sweden**, there is a general obligation for all education/training programs (compulsory and post-compulsory) to include the under-represented sex, those with disabilities or those from socially excluded groups.

In the **UK**, various measures are in place to improve access to ICT in the UK, in particular the National Grid for Learning strategy (see WP1 report). There is a clear digital divide (see Section 6.2) in terms of access, which these measures are aiming to address. General objectives include increasing access to IT via a full network of UK Online Centres in the most disadvantaged communities (DfES, 2002a).

3.7   Other adult learning

Across the countries in our study, there were a number of similar approaches in relation to other adult learning. In virtually all cases, public libraries and adult education centres play a key role in relation to ICT access and learning and for adult learners in England, Wales and Scotland, LearnDirect Centres have been established to extend learning opportunities via online learning, ICT facilities and e-learning.

EU data

Access and use of ICT

If one acknowledges that proficiency in ICT is gained through regular use of computers, the share of the workforce with access to ICT is likely to be an important indicator of proficiency. A recent Eurobarometer survey (European Commission, 2002a) asked respondents whether their household had access to the Internet and also whether the respondent personally used the Internet. Access can be seen to vary across the EU Member States represented in our study, ranging from 36% in France to 65% in Denmark (see Table 13). A high proportion of respondents in Denmark and Sweden – around seven out of ten – reported personal use of the Internet. Around half of respondents in Belgium and France reported personal use of the Internet.

Table 13 Access and use of Internet (% of respondents)

Country	Household has access to Internet	Respondent personally uses Internet
Austria	49	61
Belgium	41	49
Denmark	65	73
France	36	49
Germany	44	56
Ireland	48	57
Sweden	64	70
United Kingdom	45	61

Source: Eurobarometer, European Commission, 2002a

The same Eurobarometer survey (European Commission, 2002a) asked respondents about their private use of the Internet. Communicating via e-mail was the most frequently mentioned of the options given as shown in Table 14. Private use to improve training and education was mentioned by around half of respondents in Germany and Austria; far fewer mentioned this in Sweden or Denmark (21% and 25% respectively).

Table 14 Private use of the Internet (% of respondents)

Country	E-mail	Improve training and education
Austria	87	46
Belgium	74	36
Denmark	86	25
France	75	41
Germany	75	51
Ireland	82	40
Sweden	86	21
United Kingdom	83	43

Source: Eurobarometer, European Commission, 2002a

Overall figures for the 15 EU Member States revealed that broadly similar proportions of men and women reported using the Internet to improve their education and training (47% versus 45%). However, it was found that young people used the Internet the most for this purpose with a gradual decline with age (ranging from 58% of 15 to 24 year olds to 31% of those aged 55 and over).

It is also noteworthy that more individuals who had left education at a later age used the Internet for education and training purposes than did those who left at a younger age (51% of those who completed education at 21 or above, 45% who completed their education between 16 and 20 and 39% who had left education at 15 or below).

ICT training in the population

A Eurobarometer survey (European Commission, 2001d) sought information on ICT training in the population (individuals aged 15 and over). The highest levels of training in both use of computers and use of the Internet were in Sweden and Denmark; the lowest levels were in France (see Table 15).

Table 15 Percentage of the population who have undertaken ICT training

Country	Training in use of computers	Training in use of Internet
Austria	36.8	18.0
Belgium	36.3	13.2
Denmark	50.9	25.0
France	33.3	9.2
Germany	38.7	13.4
Ireland	48.5	20.1
Sweden	53.8	30.8
United Kingdom	45.9	17.8

Source: Eurobarometer, European Commission, 2001d

Data on the percentage of the working population aged 15 and over trained in job-related ICT skills (European Commission, 2002b) are also available (Table 16). Once again high levels of training were found in Denmark and Sweden; low levels were found in Belgium.

Table 16 Percentage of working population trained in job-related ICT skills

Country	Percentage
Austria	35.5
Belgium	17.7
Denmark	53.2
France	25.3
Germany	35.6
Ireland	29.0
Sweden	45.5
United Kingdom	33.8

Source: European Commission, 2002b (source Eurobarometer Oct 2001)

4. ICT training: tax offices, multinationals, SMEs

The aims of this Work Package were to establish the extent to which ICT training/learning is undertaken, the type of training undertaken and the characteristics of the participants. Data relating to these issues and to the need and demand for training, the reasons for training and perceived effectiveness of the training were also sought.

4.1 Tax collecting offices

This section presents the responses made by interviewees in tax collecting offices in each of four countries – Denmark, France, Germany and the UK (more details are provided in the individual country reports). In Denmark, two people were interviewed from different departments in the tax office. In France, one person was interviewed in the central office in charge of the reform of different departments of the Tax Office, with input provided by several other colleagues. In Germany, two people were interviewed, one in the Federal Ministry of Finance and the other in one Land. In the UK, one person in the tax office was interviewed.

In all countries, it was reported that tax returns may be submitted electronically. Help was available to the general public in filling in tax returns, either by way of telephone advice or online advice. Newly appointed staff to the tax offices in Germany and Denmark were expected to demonstrate proficiency in the use of ICT, but this was not generally the case in France or the UK. ICT training was reported to be offered to all, or most staff in Denmark, France, Germany and the UK.

Denmark

The annual income tax return in Denmark is now fully automated. Income tax is deducted at source and the tax collection office (CCTA) sends a statement with all information received from employers, banks, social welfare offices and so on. For the majority of tax payers no further information has to be added. If additions or amendments are necessary the tax payer must make corrections by telephone, via the Internet or by mailing the corrections to the tax office. Since 1995 it has been possible for taxpayers to correct their tax return either via the Internet or by telephone. The number of people using the automated options to amend their tax return continues to increase. In 2001, 50% of tax return corrections were made via the Internet and 8% via telephone.

When individuals receive their tax return, it is accompanied by information on how to amend the return by telephone or the Internet. In addition, commercials are run on television and the press publishes information on how to use ICT to correct tax returns. Individuals can call the regional office for help if needed.

The work of the CCTA is based on extensive use of ICT. As a minimum, all staff in the CCTA must be able to use a computer, and, depending on their position, a large number of employees also need to have a flair for working with databases. All groups of staff are able to participate in ICT training. If an employee working on an assignment lacks the necessary skills, he or she receives training. There are not perceived to be great variations in the need and demand for ICT training among different groups – all categories of staff take up the opportunity for training although it was suggested that there might be a small difference between the younger and older staff.

France

In 1998, the French government launched PAGSI, a major project for implementing ICT in all parts of society. Several measures were approved for e-administration, updated in 2004, with a 'Plan stratégique de l'administration électronique' (2004-2007). In 2001, the project Copernic was launched and the 'Compte fiscal simplifié' (CFS) was set up. In March 2002, the first electronic tax declarations were put in place. In 2004, 1.25 million tax payers submitted a declaration electronically. All civil servants are recruited competitively, although ICT competence is not tested. However, a certain number of expert contract staff have been recruited, and in 2003 and 2004, ICT specialists were recruited to the civil service. Consultancies selected after calls for tenders have helped the Ministry with more technical aspects. All civil servants have also been trained in ICT according to the needs of their jobs. The training has taken place in various locations during working hours. Tools to enable e-learning have been developed: a CD-ROM and an intranet. All the fiscal documentation is available on the Ministry's intranet.

Germany

In 2000, the Federal Government launched '*Bund online 2005*' with the aim of placing all administrative services on the Internet by 2005. Data on the rate of electronic tax submissions in Germany are not provided by the Federal Ministry of Finance. Nevertheless, a few Finance Ministries of the *Länder* make reference to the proportion of electronic tax submissions on their homepages, e.g. 4% in North Rhine-Westphalia, 12% in Thuringia and 6% in Brandenburg. About 4% of all income tax declarations were transmitted electronically by means of ELSTER (the electronic tax program, a joint project of the supreme Federal and State finance authorities) in 2003 (personal communication, 2004). Communication skills, work organisation, conflict resolution, the Internet, intranet and word processing were the most popular areas for further training for civil servants. Participants tend to belong to the higher grades of the civil service; there is evidence that older civil servants doubt the value of ICT courses (Bundesakademie für öffentliche Verwaltung, 2002). The role of ICT processing is crucial because the requirements and tasks of the tax office are continuously changing and limited resources force cost reductions.

Nearly every civil servant and employee requires basic knowledge of standard software packages, the Internet, intranet and e-mail. For certain tax-related tasks, knowledge of specialist programmes is required. ICT specialists are required to have sound knowledge of standard software applications, network and data base administration. There is a trend for some ICT specialists, especially systems analysts to be recruited externally, but this poses problems as wage levels are lower in the public sector. ICT further training is organised by special in-house trainers and is open to all civil servants and employees; it is carried out during working hours and the costs are covered by the tax office. A

modular training concept is adjusted to meet the current needs. Training in ICT skills is task-related. For specialists in data processing centre, for example, outside ICT providers are used.

UK

The introduction of electronic services delivery in the public sector is part of the UK government's e-Government programme. The tax collecting office, the Inland Revenue, has developed an e-strategy, based upon the key elements of the government's e-Government Programme 2000-2005. There are a range of staff training initiatives including the European Computer Driving Licence (ECDL) and National Vocational Qualifications in Information Technology. New staff are not generally required to have ICT qualifications. Internal recruitment often requires specific ICT skill sets to match job profiles, but externally recognised qualifications are not generally requested. All staff receive some basic ICT training on business systems and some receive additional training. A significant number of staff each year are trained in the use of applications such as Microsoft Office and e-mail. Training needs are, essentially, 'business-based'. Applying for training is negotiated through formal procedures. Perceived barriers to training are mainly related to the availability of time and costs. The funding of training tends to be linked to new projects. Training is predominantly carried out in-house, on-site and during working hours. There is some evidence to suggest that a substantial amount of training is undertaken on an 'informal' basis.

4.2   ICT learning/training in multinational companies

This section analyses the responses made by interviewees in a sample of multinational companies in each of four countries – Denmark, France, Germany and the UK. There was variation in terms of the numbers of companies that agreed to participate in each country and our final sample consisted of five companies in Denmark, two in France and three in Germany and the UK (see individual country reports for more details). It is important to stress that information was not provided for all companies in all countries, with the result that responses reported do not always cover every country.

Need for ICT competence

Transnational companies across all countries reported a need for ICT competence. The basic level required, widely reported, was the Microsoft Office suite of software. In Germany, basic ICT qualifications (MS Office standard software packages, the Internet and e-mails) were expected of every employee and they had, in effect, become a standard qualification. In France, companies expressed a preference for new recruits who understood how to use a PC. Apart from the frequent mention of Microsoft, in the UK it was also thought important that employees should be able to cope with the companies' particular ICT requirements as they arose, and in Denmark it was reported that some companies expected their employees to be IT literate from the outset, while others accepted that some initial training was necessary.

Skill shortages

Across all countries, shortages of ICT skills in companies were not reported as being a significant problem, although it was acknowledged that some difficulties existed in a few areas. In Germany, for example, where it was reported that because of economic slowdown, the ICT skills shortage of previous years was no longer as severe, there was still thought to be a gap in relation to special ICT requirements. In UK companies, difficulties had not been experienced regarding basic or general skills, but shortages were reported in higher level and advanced ICT skills.

Training policies

ICT training policies were in place in companies across all countries. However, variations were noted regarding procedures and approaches. The question of whether training was standard was of interest. In Denmark, Germany and the UK, standard ICT training was frequently offered to all employees. In Germany, a reduction in the number of training courses concerned with basic ICT skills has been noted in recent years. In the UK, one company required all employees to do a standard course as part of their induction, with additional courses negotiated on an individual basis. The situation in France appeared to be less clear cut, with ICT training offered on a more selective basis, for example, as part of a re-training programme.

Task-related ICT training

Companies in all countries reported that ICT learning and training was task related. In Denmark, some specific ICT training on internal systems and special programs took place in companies. In France, on-the-job training was reported as part of mixed learning, where tutored training sessions were followed up by sessions at one's place of work (or at home) and in Germany and in the UK, training was always reported to be job-related and usually tailored according to different groups within companies.

Meeting the needs of particular groups

In Denmark, Germany and the UK, training was reported as being oriented according to different needs within some companies. In Denmark, for example, it was reported that different groups of staff needed to have skills in different aspects of using Microsoft Office. In German companies, training was tailored according to different groups and in UK companies, training was differentiated according to the jobs that people were doing.

Training strategies

Two areas of interest were e-learning and informal learning. *E-learning* was reported to be utilised by companies across all countries, but questions were raised about its effectiveness. In Germany, its success was thought dependant upon the availability of information and the self-motivation of employees. In the UK, there was a similar ambivalence about its effectiveness if used just on its own. In France, it was reported that e-learning was thought useful for training maintenance technicians and commercial engineers and that it was considered by companies to be less expensive than tutored learning, although requiring an initial heavy investment.

Informal learning was reported in companies in all countries. In France, it was as part of a 'mixed learning' package. In Germany, it was acknowledged that it was an important training form in addition to internal and external courses. In the UK, its extent was thought to be underestimated in terms of acquiring ICT skills. In Denmark, informal learning, where 'super-users' who had undergone training in a specific area trained their colleagues, was reported to be widespread in multinational companies.

Perceived benefits of training

General benefits of ICT training were reported across countries. In France and the UK benefits were linked with gains in productivity, and German companies reported that it was beneficial in terms of making working processes more efficient and increasing competitiveness. Danish companies similarly reported that ICT training helped employees to do their jobs better and more quickly. Some benefits to employees had been identified in the UK, such as the leasing of computers for home use, which was thought to help motivate employees to learn.

ICT training providers

There appeared to be a tendency for most training to be carried out by companies, but this was not always the case. In Denmark, training was carried out by human resources divisions, sometimes in conjunction with internal departments, such as IT, backed up by 'super-users' (individuals who have been on training courses who in turn train others). In France, it was reported that companies generally used internal training centres for face-to-face sessions, sometimes with additional resources such as cyber centres or cyber-rooms. In Germany, training was reported to be organised in-house by the training or ICT department. In the UK, most training was provided in-house, but some external training was undertaken if required, and sometimes home learning opportunities were offered.

Who pays for training

Companies in all countries reported that they paid for ICT training, although funding decisions might be taken at a local (or branch) level. In the UK, one company's computer-leasing scheme with built-in self training component was estimated at a value of one month's computer training per employees per year. Another UK firm had a loan scheme in place, whereby loans were offered to employees towards the cost of buying a PC.

Adequacy of ICT teaching

In general, companies appeared satisfied with the standard of ICT teaching in the formal education system. The exception was in Germany, where it was thought that ICT learning in schools could be improved, and ICT as a subject integrated into the curriculum for all students. In Denmark where it was reported that overall, the training provided by the education system was adequate, there was felt to be room for some improvement in certain areas, e.g. the ethics surrounding ICT and the way that computers can be used manipulatively. It was also thought that more work could be done on teaching how to make ICT-based presentations.

Sectoral differences

The type or sector of firm influenced the type of ICT training offered; in particular, ICT suppliers looked for a higher level of ICT skills and needed employees with technical competence more than companies outside the IT sector.

Collection of data on ICT learning and training

Very few data on ICT learning/training were systematically collected, or available. In Denmark, it was reported that none of the companies collected any data on ICT learning and proficiency, but that they had other evaluations on how employees managed their jobs, and ICT qualifications were included in these evaluations. In Germany, only one of the companies collected systematic and consistent training data. In the UK companies, although some data were kept on e-learning, other training data tended to be held by departments for budgetary purposes, or kept on personnel files and not available outside the company.

Testing and assessment of ICT skills

Formal testing or evaluation of ICT skills was not widespread. In all countries, a level of basic competence appeared to be taken more or less for granted. For instance, in Germany, proficiency in certain basic ICT qualifications such as Microsoft Office, the Internet and e-mail, was expected by all companies and in the UK, formal testing of ICT skills did not appear to take place in any companies. In Denmark, two companies were considering introducing an ICT test to evaluate training. In France, however, it was reported that in some cases, IT Services carried out internal assessments of competence in specific skills such as computer engineering.

4.3   ICT learning/training in small and medium-sized enterprises

In this section, we present findings from available survey data on ICT learning and training in small and medium sized enterprises in eight countries: Austria, Belgium, Denmark, France, Germany, Ireland, Sweden and the UK. It is important to stress that data were not available in all countries with the result that responses reported do not always cover every country.

Data collection, problems and methods

Survey data on training in small and medium sized companies were available in all countries. However, it was found that these data tended to be of limited use, as they were not ICT specific; they excluded the smallest SMEs; and studies used different definitions and methodologies. Thus, the data were not comparable and the findings reported must therefore be treated with caution.

By way of example, it was reported that in Denmark, statistics on companies tended to be aggregated into one common group. In France, on the other hand, it was reported that statistics tended to focus on narrow group – survey data tended to be drawn from those companies that made the most use of ICT and excluded others which were not so advanced. In the UK, the response rates were sometimes low so affecting the extent to which the findings can be generalised. Notwithstanding these concerns, data can be 'triangulated' with other more reliable sources, such as the CVTS (see Section 3.4).

The areas of our enquiry on which data were available, and which are presented in this summary, are, broadly: skill shortages; ICT training provision; training take-up; e-learning in SMEs; and informal learning.

Skill shortages

ICT skill shortages were reported in all countries except Denmark, where recruitment of people with ICT skills was not thought to be a widespread problem, although it was anticipated that, with the growth of technology, a shortage of people with the right skills would increase in future. Information on the type of ICT skills in demand addressed 'basic' and 'general' ICT skills, 'advanced' ICT skills and 'technical' skills.

A shortage of recruits with basic and/or general ICT skills was reported in two countries (Belgium and Ireland) but advanced ICT skill shortages, such as programming, systems development and website development were more widely reported (Austria, Germany, Sweden and the UK). Technical skills, such as those needed for IT security and medical/industrial technology were reported in Austria and the UK. In the UK, for companies in the IT sector, there was a lack of advanced and technical expertise.

Training provision

Survey data across countries tends to suggest that the smallest SMEs are the least likely to provide training. In Belgium, two-thirds of SMEs with an Internet connection had never provided any training for staff. In Ireland and the UK, the smaller SMEs were the least likely to have provided training. In the UK though, there was some evidence regarding the very smallest firms or 'micro-businesses', where, if training was carried out at all, it was most likely to be in ICT. By contrast, training was offered by most SMEs in Denmark, on a basis of need, suitability or motivation of employees.

External training providers were favoured by the majority of SMEs in Austria, Denmark, Germany, Ireland and the UK. In Austria it was reported that the smaller the company, the clearer the tendency to prefer external training courses. There were few survey data available on whether SMEs used private or

public sector training providers. In some countries, for instance France and Ireland, it was thought that many SMEs, particularly the smaller companies, were not aware of what was available in terms of public funding for ICT training. In the UK, around one quarter of all businesses, large and small, were reported to have asked further or higher education institutions for help with ICT training.

Take-up of training
Data on take-up of ICT training were only available for SMEs in a minority of countries and were not provided consistently. Some data addressed regional differences, some looked at sectors of industry and/or occupational groups and some data looked at other factors, such as gender, age and popularity of ICT courses.

Regional differences were noted in France, Sweden and the UK. In the UK for example, some national data indicated that there was a higher take-up of ICT training by employees in certain regions, e.g. Northern Ireland, than in others. In France, some survey data focused on differences in ICT activity in the capital. In Belgium, survey data on the sectors of industry reported that investment in ICT had increased, notably in the motor repair trade, retail trade and the property market and had decreased in the business service sectors and in heavy manufacturing. However, the data did not differentiate between ICT investment/adoption, and ICT training. In Sweden, it was reported that public sector employers provided more ICT training for staff than private sector employers.

In several countries, (Austria, Ireland and Germany for example) it was noted that fewer people over the age of 50 attended ICT training than younger people. Gender differences were also reported. In Austria some data suggested that women attended ICT training courses less often than men, but the situation in Sweden was reversed, with fewer men than women attending ICT courses. There were indications (from Austria, for instance) that employees with a higher level of formal educational qualifications tended to take part in ICT training courses more often than people with few, or no qualifications.

ICT was reported to be the most popular type of training course in Austria and Germany. One in five employees in German SMEs chose an ICT course in 2000. In Sweden, its popularity had declined between 1999 and 2003 from the most popular, to the third most popular course.

e-learning
Survey data on e-learning in SMEs was available in all countries except Sweden and Denmark. Data tended to focus on the relative advantages and disadvantages of e-learning. The advantages of e-learning, mentioned most frequently across all countries, were low cost, flexibility and time-saving. Other factors were the quality of the multi-media resources available, mentioned by Germany, and in France it was thought convenient (employees did not have to leave their desks). Disadvantages most frequently referred to were that employees were resistant or preferred other methods of learning; specialist knowledge and support was required to implement it; and there was a lack of awareness, or mistrust of e-learning. Other disadvantages were thought to be the high cost of purchasing/installation, which was mentioned by Austria, and poor return on investment, which was a concern for SMEs in France. Poorly-adapted IT equipment was also mentioned in France.

In Belgium, survey data revealed that although SMEs favoured training that was quick and cost-effective, they still preferred to turn to training organisations. However, the more widespread use of broadband might influence future choice. In France and the UK, working 'in isolation' was thought to be a disincentive for employees. In some countries, the lack of awareness of e-learning was reflected in the small number of SMEs reported to use it. In Austria, for example, where a lack of information

about e-learning was thought to be a barrier, around one in five SMEs were estimated to use e-learning. In Germany, the number of SMEs using e-learning was estimated to be around 18%.

In Ireland, where a similar lack of awareness was reported, the percentage of users was thought to be low, but increasing. In the UK, in some SMEs in some regions, the use of e-learning appeared to be linked with e-commerce activity.

Informal learning

Although informal learning has been widely reported to take place in firms of all sizes, and has been documented in the case studies of multinational companies in some countries (see Section 4.2), survey data for SMEs was only available in around half of the countries. In the UK it was suggested that the role of informal learning may go largely unrecorded and that informal learning covers a wide range of activities that do not fit the pattern of more structured learning. Mention was made of 'self-structured learning' in Austrian SMEs, for example, 'learning on the job' in Belgium and 'casual skills transfer' and an 'action-learning process' in Ireland. In Denmark, there was evidence that around a quarter of IT staff working in SMEs had not received any 'formal' training.

5.   ICT perspectives on the future

The aims of this Work Package were to provide for reflection on the skills individuals will need in the future as ICT expands and its use becomes more widespread. Experts were from different types of organisations, including those in the public, private sectors, trades unions and higher education sector. A total of nine experts were interviewed in Denmark, ten in France, five in Germany and seven in the UK. The key issues addressed are discussed in the following sections.

5.1   Skills shortages

There appeared to be consensus amongst experts interviewed that higher level or specialist ICT skills and technical skills were more in demand than basic ICT proficiencies. The type of higher level skills most frequently referred to were computer programmers, software developers and ICT security advisors. Experts also mentioned database developers, multimedia developers, ICT sales advisors and people with technical or technological skills, particularly with regard to the IT industries, where demand for higher level skills was greater than in companies outside the IT sector. Regarding technical skills, the exception appeared to be France, where, following a period in which ICT technicians were highly sought, there was now an over-supply. In the IT sector in the UK, there was a concern that 'people management skills' were lacking. However, in some countries, notably Germany and the UK, experts also mentioned an apparently steady demand from companies outside the IT industries for people with basic to intermediate skills in software applications, such as Microsoft, CISCO and Oracle. In three countries, Denmark, Germany and the UK, experts made reference to a need for university-educated, or highly educated ICT professionals. However, in Germany, it was noted that undergraduates entering the job market might benefit from more practical ICT experience. It was of interest that in the UK, there was a perceived shortage, amongst certain lower-paid workers, of the 'combined' skills of literacy, numeracy and ICT.

5.2   Strategies to increase skills

In all countries it was thought that certain steps taken by governments to increase ICT skill levels had been partly, or wholly successful. Better training measures to address the needs of young people in the

formal education system and of adults in further and higher education in France, Germany and the UK, were reported. The success of 'integrated ICT strategies' was noted by experts in Denmark. In Germany, it was emphasised that the new ICT qualification system provided a good model of ICT training for different target groups.

The need to develop well-focused ICT training for adults, especially in companies, was seen as a priority by experts in Germany and the UK. In the UK, it was reported that this was already being implemented by the use of more diagnostic, screening or assessment tools to develop 'targeted' ICT training programmes that would more closely meet requirements.

Experts in more than one country also identified a range of strategies to increase ICT skills in specific areas. These included more training of teachers and/or trainers and ICT training designed to meet the needs of older people and in Germany, it was thought important to address the skill needs of young people with learning difficulties, for example. Reference was made to widening accessibility to ICT, through more public access training centres, in France.

5.3   Migrant workers

The question of whether employers sought to recruit migrant workers to help meet the demand for ICT skills was addressed by experts mainly in the context of two areas, market demands and changing work practices. Experts in two countries (Germany and the UK) made reference to the swings in labour market demands. In Germany, at times of high demand for ICT skills, measures had been taken to encourage software developers from Eastern European countries or India, for example, (whose income levels were generally lower) to come to Germany, via the 'green card scheme', for the duration. In the UK, where a similar need to attract skilled IT workers had been experienced, special work permits had been issued for a period of time. This was also the case in France, from 1997 to 2001, with the 'millennium bug' and the transition to the Euro, which were mentioned by several experts.

Experts in three countries (France, UK and Germany) spoke of 'outsourcing' and 'off-shoring', practices that were becoming increasingly attractive to companies in terms of accessing the skills market and reducing labour costs. Reference was made to the telecommunications industries in the UK and business services, accountancy and other sectors in France, where relocation of work to countries such as India, North Africa (especially Morocco), and sub-Saharan African countries has taken place. In Germany a more general observation was made on the 'export of projects rather than the import of qualifications'. In Denmark, where it was noted that there had been very little history of recruiting migrant workers by companies, the question was not specifically addressed. By contrast, in the UK, it was reported that in some companies, particularly those whose workforce was 'global', recruitment outside the UK was part of usual practice.

5.4   What needs to be done

Experts in all countries thought that ICT learning and training should be embedded, or integrated into the education system. In Germany, it was thought that this process should begin at school at an early age and, in the case of Denmark and France, that it should be part of a lifelong learning process. In the UK, there was some concern that in post-16 stage of learning and further and adult education, there needed to be clarification of the qualifications structure. Other factors mentioned by France included the importance to schools and colleges of Broadband access; greater flexibility to accommodate ICT learning and training within timetables. A need to ensure that pupils who did not have access to home

computers would be able to learn all they needed at school was identified by interviewees in Germany. Experts in Germany also mentioned the importance of teacher training, and the need to address the ICT gender gap.

In all countries, experts thought that more could be done by government to promote ICT learning and training. This was most marked in France, where several specific measures had been identified, including the setting up of a new agency, perhaps in the form of a new research institution modelled on the Massachusetts Institute of Technology, for conducting high level research into the use of ICT, so that more could be known about its application.. Other actions by government in different countries, of a more general nature, included continued dialogue between government and employers to develop better ICT learning and training as instanced in the UK and better integration of different kinds of learning, including e-learning, into everyday workplace experience which was mentioned by interviewees in Denmark. Tax incentives or other incentives for individuals buying ICT equipment privately were mentioned in Germany. In the UK, there was concern that not enough was being done by government agencies to recognise the ICT training needs of the unemployed and of older age groups.

Experts were also agreed that ICT learning and training should be more tailored to particular needs and groups in the workplace. In Denmark, more specialised ICT training was called for and in Germany and the UK, less reliance on standard packages and more targeted training. In France, a need for 'refresher' courses in technical skills had been identified.

However, expert opinion tended to be divided about what, specifically, should be done by employers to support ICT learning and training. In France, Denmark and the UK, there was a focus on the responsibilities of firms to offer ICT learning and training opportunities, but in Germany, it was thought by some experts that whilst companies should offer support, and be aware of the importance of ICT training, it was the responsibility of individuals to keep their ICT skills up to date. Where specific action to be taken by firms had been identified, this included getting rid of old technology and helping workers to train, and by introducing more and better e-learning facilities which was referred to by experts in France. Integrating ICT learning into normal working practice was identified in Denmark. In the UK, it was thought that better ICT learning and training opportunities might be offered to all staff, not just new arrivals.

5.5 How to encourage ICT learning and training

In broad terms, it was thought that ICT learning could be encouraged by better recognition, endorsement or accreditation systems. Experts spoke of the need for improved appraisal or recognition of ICT skills outside the formal qualifications structure. The following points were made: in Denmark, it was thought that all companies should appraise ICT regularly, preferably as part of an annual staff appraisal programme. In the UK, accreditation was perceived as important in motivating employers to offer, and employees to take up, ICT training and in Germany, it was thought that there should be ways of assessing skills, such as through an ICT portfolio.

Also frequently mentioned was the need to train the trainers. This applied not only to teachers, as in France, and in Germany (where this had been identified as important at all levels of education) but to people in firms whose role was staff training and development, as in France and the UK. It was of interest that views on encouraging ICT learning were not confined to workplace practices. In France for example, other initiatives were mentioned, e.g. linking of the use of ICT with culture and the media, promoting synergy between art, science and technology.

5.6   Types of learning/training needed

Experts frequently made reference to 'mixed' or 'blended' learning for employees who needed flexibility in the workplace. Mixed or blended learning might include class-room based learning, followed up by individual practice sessions, for example, or learning on the job. Also mentioned, by experts in Germany and the UK, was learning which was tailored, or targeted at particular groups or for particular purposes. Other types of learning identified were connected with project-specific ICT, such as project management skills in France and project-oriented 'learning by doing' in Germany. Access to online, remote or distance learning or e-learning was mentioned less often. In Denmark, where generally a high level of satisfaction was expressed with ICT skills in the labour market, it was thought by some experts that university graduates might supplement their skills with a year or two of ICT training, in order to meet the demands of the IT sector.

5.7   Particular groups in need of ICT training

The older age group and people who were at a social, or economic disadvantage, were mentioned in all countries. Those thought to be socially or economically disadvantaged included the unskilled, the unemployed, people who lacked communication and/or language skills and disaffected young people. Women were mentioned, sometimes in different contexts. In France, there was concern that women at home may lack the opportunity for ICT training and in the UK and Germany, an ICT gender gap had been identified. In the UK, it was thought that young women at school might benefit from more ICT careers advice.

5.8   Other complementary skills

There was considerable consensus across interviewees in all countries that some if not all of the following skills were needed:

♦ Communication skills
♦ Flexibility
♦ Adaptability
♦ Cooperative or team working (beginning at school level)
♦ Problem solving strategies
♦ Project management (including IT projects)
♦ Numeracy skills
♦ Higher mathematical skills

One final point made was not to neglect the ethical dimension of the use of the Internet. It was also noted that pupils and employees should be trained to be critical particularly of source materials.

6.   Survey data and indicators

6.1   Introduction

The aims of the final work package were to propose indicators and methods of data collection in relation to ICT learning/training. As we have seen, there are a number of comparable indicators relating to ICT learning and training that are already available. However, these are somewhat limited in terms of their coverage. There are however, other data produced in individual countries. Some of these data, in our view, could be collected more systematically on a Europe-wide basis to provide more policy-relevant indicators.

In the following section we present findings from some surveys carried out and examine their potential for further exploitation as European-wide indicators. We then outline a small number of other potential indicators that could be developed via surveys of various types to meet the information gap that currently exists.

6.2   Current data on ICT access and learning

In this section, we outline some of the findings from survey data in selected countries, that in our view have the potential to be developed further to provide comparable data across the EU.

Use of computers by young people

♦ A survey in Germany found that 7 out of 10 children (age 6 to 13) use the computer at least sometimes in their leisure time. 70% play computer games on their own at least once a week, 53% play computer games together with their friends, 46% prepare for school, 44% use a learning program, 34% paint, 33% write text, 25% use the PC as a lexicon, 30% use the Internet, 20% listen to music and 7% write computer programs (KIM Studie 2003, 2003).

♦ In England, a survey of young people aged 5 to 18 years (NGfL, 2001a; 2002b) found that:
  - 93% of young people reported using computers at school;
  - 56% reported using the Internet at school;
  - 26% used the Internet at school but not at home.
  - The main use of computers was reported to be for homework by children of 14 years and above.
  - 29% of those aged 14 to 16-plus reported difficulties using a computer at school due to the lack of adequate facilities

♦ A study in England (West, 2003) of over 15,000 pupils aged 11 to 12 (and over 12,000 15-16 year olds) in schools in urban areas in England found that the following percentages reported using the following applications 'often' at school:
  - 52% (67%) used word processing;
  - 40% (51%) used the Internet;
  - 30% (40%) used spreadsheets;
  - 18% (14%)used drawing programs;
  - 9% (11%) used CD-ROMs;
  - 8% (14%) used email.

- OECD data (2003) reveal that across 13 countries (amongst them Denmark, France, Ireland and Sweden) the following percentages of students in upper secondary education reported the following activities as part of assignments at least once a month:
  - 94% reported operating a computer (saving files, printing etc.);
  - 93% reported writing documents with a word processor;
  - 63% reported making illustrations with graphical programs;
  - 75% reported calculating with spreadsheet programs;
  - 27% reported writing programs;
  - 55% reported communicating via email with teachers and other students;
  - 80% reported sending, searching for and using electronic forms of information.

Teachers and ICT learning and use

- In Germany, a survey on teachers and the media found that only 15% of the teachers had not taken part in an ICT-related further training measure in 2003 (Lehrer/-innen und Medien 2003, 2003). However, most of the courses referred to basic computer applications (word processing and the Internet) and not to the integration of computers into the teaching process. Thus only 27% of the respondents reported that they used computers in their lessons often and 22% every now and then. Only 11% used the Internet in their lessons often and 21% occasionally.

- In Ireland, since the launch of Schools IT2000, around 75% of primary, and 59% of post-primary teachers, had attended ICT training courses in 2001 (National Policy Advisory and Development Committee, 2001).

- In Sweden, in 1998 close to 75% of all the teachers had participated in at least one course concerned with learning how to use a computer (Delegationen för IT i skolan, 1999).

- In Sweden, a survey found that 74% of the teachers achieving their teacher diplomas in 1998 or later were dissatisfied with the training they were given in ICT. Younger teachers used ICT in teaching less frequently than those graduating before 1998. This might imply that the ICT training has not kept the same standard as the training provided for teachers active in the school system (KK-stiftelsen, 2003).

- In England, surveys have revealed that of teachers in primary schools: 76% feel confident using ICT within the curriculum; 93% have received some training in ICT; 87% have received updated training in the last two years; 87% have access to a computer at home. Of teachers in secondary schools: 75% feel confident using ICT within the curriculum; 73% have received some training in ICT; 84% have received updated training in the last two years; 85% have access to a computer at home (DfES, 2002g).

Continuing vocational training/learning

♦ In Germany, according to the Berichtssystem Weiterbildung, one in five employees taking part in a further training course chose an ICT-related issue. About one sixth of the total further training volume is devoted to ICT issues (Berichtssystem Weiterbildung VIII, 2003).

♦ In Sweden, in recent years, the number of participants in ICT job training courses has been between 5% and 11% of all participants in labour market training (AMS, 2002).

Training in companies

♦ In Ireland, in 2002 the percentage of companies that thought that IT training was 'very important' was around 33%, but 59% reported having no training plan (Information Society Commission, 2003).

♦ In Sweden, in 2001, 373,000 course participants attended computer-related training courses, which accounted for 14% of all the work place education given. Of the participants in computer related training 18% were blue collar workers, 45% were white collar workers, 14% professionals, and 23% other categories (SCB, Labour market statistics, 2002).

ICT access and learning by adults

♦ In Belgium, 28% of the whole population reported having followed a course on the use of ICT (9% in the past 12 months and 19 % more than a year before). Altogether, 12% reported having followed a course on the use of the Internet (5% in the last 12 months and 7% more than a year before) (AWT, 2003).

♦ In Ireland, an estimated 73% of all unemployed people are considered to be without access to the Internet (or use it less than once a month). 85% of all workers in the agriculture, forestry and fishing sector are without access, or use it less than once a month. 90% of all retired people and 78% of women with home duties are also estimated to be without access to the Internet, or use it less than once a month (O'Donnell et al., 2003).

♦ In England and Wales, La Valle and Blake (2001) found: 44% of respondents had used a computer for their course; this figure was higher for vocational (48%) than for non-vocational (25%) courses. Findings for those who used computers for taught learning include: 30% used computers for word-processing or spreadsheets; and 20% use computers to do research for their course.

Differences between specific groups

♦ In Denmark, only 63% of the ethnic minorities have access to a computer at home and 44% have access to the Internet (Ministeriet for flygtninge, Invandrere og Integration, 2002).

♦ In England and Wales, La Valle and Blake (2001) found that certain groups were less likely to make use of, or have access to computers than others:
  • Women were less likely to use ICT than men (52% versus 62%);

- only 27% of people not in paid employment were ICT users compared with 78% of employees and 67% of the self-employed;
- low use was reported by those in the lowest income group (less than £10,400 per year) compared with higher earning households (family income of £31,200 or more) (25% versus 86%);
- fewer people living in the most deprived/disadvantaged areas used computers compared with those in the least deprived neighbourhoods (45% versus 64%).

♦ Another study in England (Russell & Stafford, 2002) found:
- 48% of lone parents used the Internet, whilst the average was 55%;
- 36% of disabled people used the Internet compared with the average of 55%;
- 79% of those aged 16 to 34 reported using the Internet, compared with 21% of those aged 55 and over.

♦ In Northern Ireland, in 2002, 53% of adults over the age of 16 did not have access to computing technology and/or the Internet (Central Information Technology Unit for Northern Ireland, 2002.) Of this group: 91% were aged 65 and over; 70% had disabilities; 64% came from lower socio-economic groups.

6.3 Proposed indicators

This section presents selected indicators designed to supplement those already available within the EU. All the associated questions are designed to be collected by surveys. They could be utilised as part of EU-wide data collection systems. We have presented indicators (and corresponding questions) that relate to use, to learning/training and to attitudes. They are in the main 'process' as opposed to 'input' or 'output' indicators. This complements the DELOS indicators and the work carried out by Pelgrum & Anderson (2001).

One of the key points implicit in the proposed indicators is that learning and training in ICT depends to a considerable extent on informal learning. Merely restricting indicators to what is learnt in informal settings would not be appropriate. The question then arises as to the ways in which ICT is used, both in formal settings (e.g. schools) but also in informal settings (e.g. at home, with friends in cyber cafés).

As there are very few specific surveys on ICT learning and training in SMEs in particular in the different countries, we propose that such a special ICT-related survey could be set up which should include very small enterprises with fewer than 10 employees as well. Particular ICT-related questions could be incorporated into EU-wide studies on training in companies (such as the CVTS-2 survey). Nevertheless, given the problems encountered obtaining reliable data about ICT in SMEs, it might be preferable for surveys concerned with ICT learning/training to focus on individuals as the unit of analysis not companies. The indicators relating to adult learning are thus targeted at individuals not companies. However, some indicators relating to both teachers and schools are proposed as such data are more amenable to collection via surveys than are data relating to companies.

ICT access, learning and proficiency

The proposed indicators in this section can all be tailored so that information is obtained relating to specific target groups – the population, ICT users, school pupils etc.

The following information would be needed for each respondent: sex, age group, ISCED level for adults, self reported disability, ethnic group [to be defined], education/employment status: in employment (occupational group (ISCO)), in education (e.g. primary school, secondary school, (lower, upper general/upper vocational), higher education), not in education/training/employment.

1a. Percentage of [target group] using computers/ICT at different locations

1b. Percentage of [target group] using different applications/facilities for different purposes
Question
a) Do you use a computer?
b) Do you use the Internet?
Yes/No

If Yes:
Where do you use the computer/Internet?
at work
at school/at college/training institution/university
at home
at a friend's house
at a library
at an Internet café
at another public access point e.g. community centre

How often do you use each of the following?
[almost every day/a few times each week/between once a week and once a month/less than once a month/never]

Internet
E-mail
Word processing package (e.g. Word)
Spreadsheets (e.g. Excel)
Drawing/art packages (e.g. CorelDraw, Adobe Photoshop)
Using music packages (e.g. Cubase, Cubasis)
PowerPoint
Search engine (e.g. Yahoo, Google)
Web-design packages (e.g. Dreamweaver, Frontpage)
Programming (e.g. C++, Virtual Basic)
Educational software (e.g. mathematics, language programs)

If Yes to Internet:
      What do you use the Internet for:

Chatting (e.g. using MSN messenger, Yahoo messenger)
Downloading music
Downloading material
Listening to music
Playing games
Searching for information on particular topics
Finding out about education and training opportunities
Searching for a job
Research for school/college/university work
To help my learning
Other activities

If Yes to Email:
How many emails do you send a week? (up to 10, 11 to 20, 21 to 50, more than 50)
Do you send and receive emails from pupils in other schools?

If Yes to word processing:
What do you use word processing for:

School/college/university written assignments (reports, text)
Yes/No
If Yes
How many assignments using a word processor have you written in the past year?

Writing for pleasure (e.g. stories, poems)
Yes/No

Writing letters
Yes/No

Work assignments (e.g. reports, text)
Yes/No
If Yes
How many assignments using a word processor have you written in the past year?

Do you use the 'spell-check' facility?
Yes/Sometimes/No

If Yes to graphics packages:
What do you use graphics packages for:
Illustrations for pleasure
Illustrations for school/college assignments
Illustrations for work assignments

If Yes to spreadsheet packages:
What do you use spreadsheet packages for:
Calculations
School/college assignments
Work assignments

40

2. Percentage of [target group] taught by a qualified teacher/trainer

Question
Have you ever been taught ICT by a qualified teacher/trainer?
Yes/No

If Yes
Do you feel that you need more training in ICT by a qualified teacher/trainer?
Yes/No

If No
Do you feel you need to be trained in ICT by a qualified teacher/trainer?
Yes/No

3. Percentage of [target group] who have received specific training

Question
Have you received training in:
Microsoft Office (e.g. Word, Excel)
Internet use
Web-design
CAD-CAM
CISCO
Robotics
Management systems
Company specific systems
e-commerce
Programming
Other (e.g. video-editing, animation)

4. Percentage of [target group] whose training costs were met from different sources

Question
Who paid for your training?
Me
My family
My employer
School/training institute/college/higher education institution
Government or government body
Not sure

5. Percentage of [target group] learning informally about ICT

Question
Have you learned to use computers with the help of…
Manual/books
CD-ROM
Computer tutorial package
On-line or telephone advice line
Mother

Father
Brother or sister
Friends
Work colleagues

6. Percentage of [target group] with qualifications in ICT/computing

Question
Have you obtained any qualifications in ICT/computing?
Yes/No
Have you obtained any qualifications with an ICT/computing module?
Yes/No

7. Percentage of [target group] with differing attitudes towards use of ICT

Question
How much do you agree with following statement: (Strongly agree/agree/not sure/disagree/disagree strongly/not relevant)

I have good keyboard skills
I am good at word processing
I am good at using spreadsheets
I am good at programming
I am good at searching for information
I am good at using computers
I am confident using a computer
Using computers helps with school/college/university work
Using computers helps with my work
Using computers helps me learn
I enjoy using computers to play games
I enjoy using computers for school work
Using a computer means that I take responsibility for my own learning
Using a computer will increase my career prospects
Using computers helps my learning
Using computers means that I can learn at my own pace

8. Percentage of [target group] who use different assistance when computer breaks down
Question
If your computer breaks down do you:
Try and fix it yourself
Ask a relative to fix it
Ask a friend to fix it
Seek professional advice via a helpline
Call out a computer engineer

Indicators concerned with ICT use by teachers/trainers
Breakdowns: sex, age group, primary, secondary (lower, upper general/upper vocational upper), subject taught

9. Percentage of teachers/trainers using ICT in their teaching/planning/record keeping

Question
Do you use ICT in your teaching?
Yes/No
If Yes:
How often do you use ICT in your teaching?
[percentage of working week]

Does using ICT have a positive or negative impact on your teaching?
Positive/No difference/Negative

Do you use a computer for planning your lessons?
Yes/No
Do you use a computer for record keeping?
Yes/No

10. Percentage of teachers/trainers who have undertaken ICT training in past 12 months

Question
Have you undertaken any ICT-related professional development in the past 12 months?
Yes/No

If Yes
Has this had a positive or negative impact on your teaching methods?
Positive/Negative/No difference

If No
Do you feel that you need in-service training/professional development in ICT?

11. Confidence using ICT in teaching (percentage of teachers/trainers using ICT)

Question
How confident do you feel using computers/ICT in your teaching?
Very confident
Confident
Not confident

Schools/colleges: ICT teaching and learning
Breakdowns: primary, secondary (lower, upper general/upper vocational), number of pupils enrolled, age of pupils/trainees

12a. Percentage of schools including ICT in various subject areas

12b. Percentage of schools reporting a positive effect on teaching

Question
To what extent is ICT used in each of the following subjects [for each: substantial, some, little, none, not applicable]

To what extent has ICT had a positive effect on teaching [for each: substantial, some, little, none, not applicable]

Do teachers in your school use ICT to teach…

Mathematics
Language of instruction
Foreign language(s) [which ones]
Geography
History
Science
Art
Design and technology
Music
Physical education
Citizenship
ICT
Basic literacy
Basic numeracy
Language of instruction to speakers of other languages
Special educational needs
Other

13. Percentage of schools/colleges aiming to teach pupils ICT skills

Does your school aim to teach pupils [primary/lower secondary/upper secondary]

Word processing (e.g. Word)
How to use of spreadsheet (e.g. Excel)
How to use of drawing/art/design packages (e.g. CorelDraw)
How to use of PowerPoint
How to use of search engines (e.g. Yahoo, Google)
How to use the Internet
How to program
How to integrate ICT skills in their learning

At which age does the ICT instruction start at your school?
Is ICT instruction compulsory for all pupils?
Yes/No

14. Percentage of schools/colleges with ICT security and protection measures

Question
Does the school/college have measures in place to prevent access to undesirable materials on the Internet?
Yes/No

Question
Does the school/college have measures in place to prevent viruses/worms affecting computers in your school/college?
Yes/No

It is important to note that the target groups should be asked regularly in order to be able to provide comparisons/to describe developments.

7. Conclusions

7.1 Discussion

This study has revealed that the teaching of ICT skills is a key part of the compulsory and post-compulsory education system in the eight countries that were the focus of this study (Austria, Belgium (French Community), Denmark, France, Germany, Ireland, Sweden and the UK). In all countries, various initiatives to encourage and facilitate ICT learning have been introduced; this is regardless of whether or not the teaching of ICT has been underpinned by legislation. It is apparent that all the countries, at least on the surface, have introduced broadly similar initiatives for school pupils and for adult learners, with broadly similar objectives. However, we cannot tell from an analysis of policies and initiatives exactly what happens in practice; thus material reported by Eurydice, provided by individual Member States, may at times not reflect actual practice in those Member States.

However, on the basis of the information presented, it is clear that there is variation in the extent to which ICT is used as a tool in lessons in primary and secondary education; the general picture that emerges is of Denmark and Sweden, and in some instances the UK, focusing on ICT to a greater extent than other countries in our sample in all phases of education/training. Interestingly, fewer respondents in Sweden and Denmark than in Germany or Austria reported using ICT to improve their training and education; this may reflect the differing focus given to ICT learning and training in both Denmark and Sweden, although high levels of ICT training were reported in both countries amongst the adult population.

Turning to the education and training of adults, one of the major concerns is that there is a 'digital divide' and thus there is a need for further programmes for particular target groups, e.g. older people, young people with low levels of educational achievement, people on low incomes, with disabilities and women.

In general, employers felt that young people had been well prepared in basic ICT skills by the education systems in different countries, although some concerns were expressed in some countries – although notably not Denmark, Sweden and the UK. However, problems finding individuals with more specialised ICT skills were identified.

It is important to note that the need for ICT expert knowledge differs according to different tasks in the workplace. On the one hand, the possession of standardised qualifications appears to be getting more important. On the other, clearly defined training courses will, presumably, decrease. Thus, ICT training will need to be tailored to the special needs of different target groups and their particular learning styles. A need for a certain degree of flexibility appears to exist, for example, to accommodate workers who are not office-based, to gain access to ICT training.

One of the problems encountered whilst carrying out this exploration of data on ICT learning and training in Europe is that the data available in different countries are not comparable because of differing research interests, methodology and samples. Comparable data can only be provided by studies which are designed to compare different European countries right from the beginning as was the case with the CVTS-2 or the Eurobarometer studies. It is for this reason that we have proposed the inclusion of questions on ICT learning and training in surveys commissioned or managed by the European Commission which are then asked regularly so that developments can be monitored. We have also shifted our focus from the quantitative aspects of ICT learning and training (equipment, basic skills etc.) to qualitative concerns with processes (quality of ICT training, learning programmes, e-

learning etc.). This is in line with the current focus of policies/initiatives in at least some of the countries in our sample. More of a problem is measuring outputs of ICT training/learning. Given the varied uses to which ICT is put in schools, the workplace and in social contexts, it would be problematic to carry out cost-effective tests or measures of ICT proficiency. Nevertheless, in our view it is not unreasonable to ask individuals about their use of ICT applications and their own assessment of their proficiency; taken together with information on actual reported use, this should give an good indication of the current state of play in relation to ICT training/learning.

7.2   Policy implications

A number of implications for policy arise from this study.

♦ At school level, it is important that ICT is well integrated into different areas of the curriculum, so that the skills acquired can be generalised to different contexts.

♦ Certain ICT skills are considered essential by employers; these include the use of Microsoft Office applications such as Word and Excel. Given that the use of these applications, with the relevant hardware and software can often be readily included into education/training programmes, their use should be encouraged in school/college work.

♦ There are growing concerns even at school level (West, 2004) about the 'digital divide', with some individuals having greater access and opportunities than others. It is important that public education and training institutions are sufficiently well-equipped and accessible, and staff appropriately trained, so that young people from disadvantaged backgrounds have opportunities to access and learn how to use ICT applications and programs. This should help ensure that these young people are not further disadvantaged compared with their peers from more privileged backgrounds, who are more likely to have computer access at home.

♦ There is scope for a qualification along the lines of the European Computer Driving Licence to be offered across Europe as it is likely to signal competence in the use of ICT to employers; this would foster the movement of labour within the single market.

♦ Education and training systems need to respond to the need for highly qualified ICT experts by employers. More specialised courses, designed in conjunction with employers, may be a way forward in this area. There would appear to be scope for collaborative work across the EU in this area to maximise the likely take up of any such courses and recognition of any associated qualifications.

♦ There is scope for further incentives to be offered to encourage individuals to undertake ICT learning or training (e.g. providing or leasing computers) as in Denmark and Sweden.

♦ Although there is a reasonable amount of knowledge available about policies relating to the learning of ICT, there is less information available about levels of proficiency. Although national testing programmes along the lines of PISA are unlikely to be cost-effective or feasible at present across Europe – not least because of the lack of availability of hardware and appropriate training in certain countries – EU-wide surveys of individuals self-reported proficiency and use are worth serious consideration.

♦ The developments of indicators along the lines of those we have suggested would be a valuable first step in terms of providing information about the current state of play and assist with making evidence-based judgements about the future direction of policy and where any additional resources should be targeted.

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