

COMMON ICT TOOLS USED IN TEACHERS' DAILY WORK: CURRENT STATE DESCRIPTION



2 AgePro
Generational Change in the
Teaching Profession

 Education and Culture DG
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 Education
and
Training

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About the Consortium

The Consortium *Generational Change in the Teaching Profession* (acronym 2AgePro) is a multilateral Grundtvig project funded by the Lifelong Learning Programme under the European Commission. The partners are from the Czech Republic (Charles University in Prague), Finland (the University of Oulu, which is also the Consortium leader), Germany (Ludwig-Maximilians-Universität in München), the Netherlands (Universiteit Utrecht) and Sweden (Umeå University).

The aim of this two year project (it runs from December 2008 to November 2010) is to create collaboration models for interaction between senior and junior teachers in the compulsory school. The models will motivate teachers to remain in their profession and give them opportunities to develop their professional skills as well as to share their competence and knowledge with each other.

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About this report

This public report is written jointly by the 2AgePro Consortium. The aim of the report is to report on common ICT tools utilized in teachers' daily work in the partner countries. Another aim is to make it possible for the reader to examine and compare similarities and deviations of practices between the partner countries. All five country reports are prepared on the basis of the same methodology, allowing for comparative analysis. The chapters are written by teams of local experts in each of the five partner countries. Consultations have been held with a variety of stakeholders. The draft version of the reports were discussed in the Consortium and with colleagues in each country to give an opportunity to critique and comment on it.

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Executive summary

Regarding common ICT tools used in teachers' daily work, the results presented in this report show that:

- the basic ICT infrastructure is good in all partner countries. The amount of computers and software is also rising continuously.
- the schools' resources and possibilities to further develop things are limited and always depend on the willingness and possibilities of Governments and local school authorities to support these development initiatives.
- social communication tools are not popular, or at least not commonly used, among teachers. If they are used, they are used mainly during free time and not for teaching purposes.

Definitions

In the 2AgePro project, there are two terms in particular that needs to be discussed and defined: junior and senior teachers. In this early phase of the 2AgePro project, these terms are defined as follows (the exact definitions may change during the project's lifespan).

Junior teacher – 5 years or less

A junior teacher is defined as a person who has been working as a teacher in the Compulsory School for five years or less. This type of teacher is sometimes also referred to as a new or novice teacher, although we prefer the term junior in this project. The term new is difficult to apply to someone who has been working for 2-5 years and hence is not "new" anymore.

Senior teacher – 15 years or more

A senior teacher is defined as a person who has been working as a teacher in the Compulsory School for fifteen years or more.

ICT-tools used by teachers in the Czech Republic as part of their work

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ICT infrastructures in general

The Czech Republic gives attention to information society development, nevertheless there are several steps that the Czech Government has started in the last ten years that were not very well coordinated and that very often were over for no enough financial budget and incorrect decisions of competent authorities.

The Czech Government approach to importance of ICT in education during the last ten years has been changing depending up which political parties governed. It was the establishment of the Ministry of Informatics in 2003 that after all showed us that the Czech Government began to become aware that ICT are very important for a society development. Unfortunately, the Ministry of Informatics existed only four years. From 2003 to 2007 the Ministry of Informatics was a central organ of the state administration for information technologies and postal services with the aim to coordinate public digital administration development (e-Government) and to support computer literacy of citizens.

From 2001 to 2006 the Ministry of Education coordinated the Governmental Information Policy for Education ¹ (GIPE) that was over in 2007 by the unqualified decision of the Ministry of Education and later the Czech Government. Consequently, the Czech schools nowadays have to deal with their ICT development themselves. There are several supporting activities organized by regional authorities in some counties in this regard schools differ in ICT development and strategies.

What about computer literacy of citizens, local authorities, administrative regions, public institutions, private companies or educational institutions offer to citizens, especially to seniors courses to train them to be able to communicate with ICT to offices and bureaus.

The present-day government under the control of OECD and EU has again to dedicate a great attention to a concept of information society development. In 2007 the Czech Government constituted the Governmental Council ² for Information Society and developed the Strategies for “Information Society” Services Development ³ (Topolánek, 2008).

¹ Sometimes it is titled in English as The National Strategy for ICT in Education.

² Rada vlády pro informační společnost.

³ Strategie pro rozvoj služeb informační společnosti.

The experiences from schools show there is a new demand to support schools in their ICT development. There should be a centralised, goal-directed and state guaranteeing support to integrate ICT in teaching practice in schools to keep competitive strength of pupils and students. Therefore, the Czech Government decided to prepare a new strategy for ICT development in schools for 2009-2013 (MŠMT, 2008).

Governmental Council for Information Society

The Governmental Council for Information Society is an expert advisory body for the Czech Government for questions related to information society, which substitutes a function of the cancelled Ministry of Informatics and affords a knowledge base for the governmental decisions about conceptual questions for information society development with the aim to achieve better cohesion and coordination of departmental and national projects.

The Council was established in 2007. It is managed by a governing committee headed by a Prime Minister. It has 28 members including a minister of finance, minister of the interior and minister of industry and trade.

ICT and Czech citizens

In 2003 the Ministry of Informatics took up a project of the National Program of Computer Literacy aimed to citizens to give them a chance to be trained in using ICT and Internet.

There are big differences among citizens in accessibility to ICT, a computer and Internet and in skills to work with computers. The main difficulties are with seniors, especially with pensioners. Some administrative regions make an effort to help to seniors: they offer services or organise training courses. Some seniors have been supported from their families and younger relatives who train them to work with computers and the Internet and very often help them to equip by a computer to install SW and to arrange the Internet access.

ICT facilities in households in the Czech Republic have been step by step progressively improving thanks to a price-cutting of computer technologies, SW and services of the Internet providers.

In the Czech Republic the most important technology for citizens replace a mobile telephone. The research from 2005 (Sak & Saková, 2006) identified that mobile-phones had the biggest importance for the Czechs (Figure 1). The success of mobile phones is given by a fact that mobiles are a flexible technology integrated a lot of very useful and popular functions of other technologies. In a scale of importance of ICT for the Czechs mobiles are followed by a PC and the Internet (Sak & Saková, 2006). In the Figure 2 you can see how many people by age owned a PC. In 2005 it was about 70% of young people in age 19 to 23 who owned mostly a computer (Sak & Saková, 2006).

A research from 2005 was mapping how people assess a level of their computer literacy: A computer literacy level depends in the Czech Republic on age and education of Czech citizens (Figure 3) (Sak & Saková, 2006). About 75% of young generation has professional or advanced computer literacy. Younger people, higher level of computer literacy. By a research (MI ČR, 2005) we could see, that in the Czech Republic the better users of computer technologies in 2005 were males in age younger than 35, graduated at least in Secondary schools living in municipalities with more than 20 000 inhabitants.

“In the Czech Republic people with only basic education or non-qualified have the lowest level of computer literacy. People with specialised professions – for example lawyers (67%), university teachers (57%), policemen, firemen and soldiers (52%) or public servants (45%) – have at least advanced level of computer literacy. About 58% people have access to a computer and 50% adults have access to the Internet or e-mail. About 84% people have access to mobile phones, 13% people to notebook. People use a computer mainly for searching information on the Internet (76%), for self-study (63%), for music or films (61%) and in job (53%). About 31% people do shopping on the Internet and about 26% people use e-bank services“ (MI ČR, 2005).

Vlastnictví a využívání jednotlivých médií v roce 2005

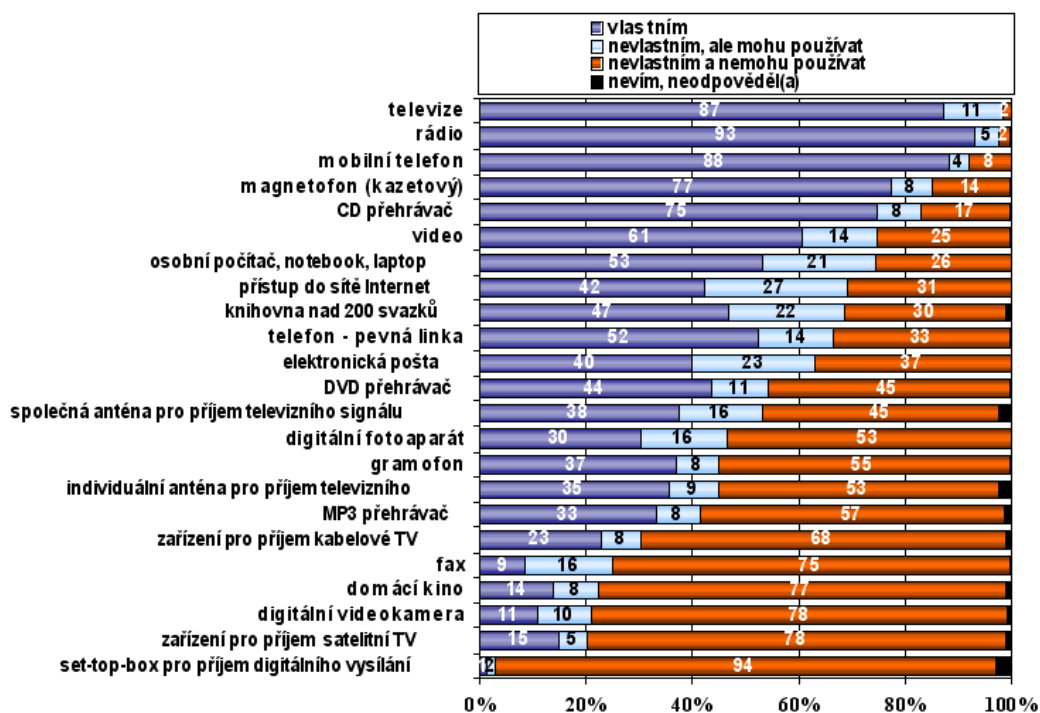


Figure 1 Czech citizens' ICT ownership in 2005 (Sak & Saková, 2006).

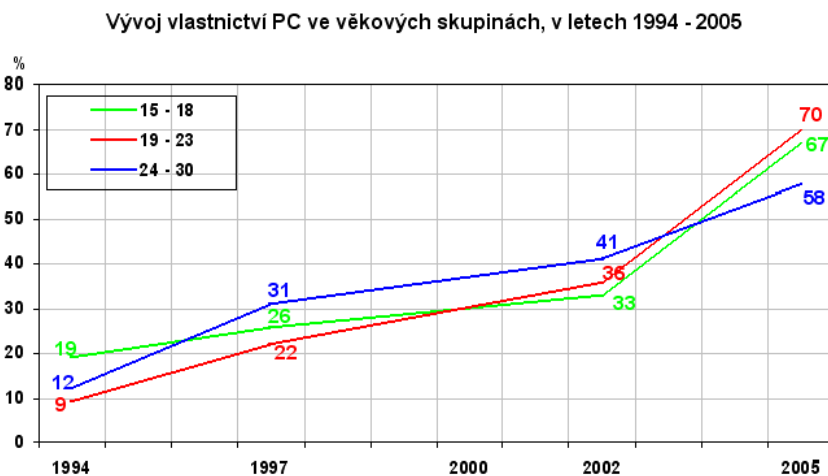
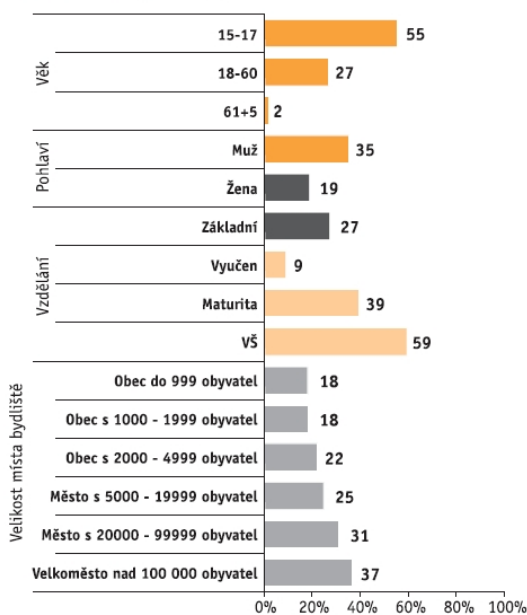


Figure 2. PC ownership among citizens by ages in the Czech Republic in 1994-2005 (Sak & Saková, 2006).

Počítačová gramotnost populace

ZÁKLAD: Všichni respondenti (15+), n=16344



ZDROJ: STEM/MARK, Výzkum informační gramotnosti, 8/2005

Figure 3 ICT literacy of people in age at least 15 in the Czech Republic in 2005 by ages, by gender, by education, by a locality (MI ČR, 2005).

And what we know about the Czech Primary and Secondary school teachers' computer literacy in 2005? Their computer literacy was better than of artists, shop assistants, qualified or non-qualified workers or farmers.

Počítačová gramotnost podle profese

ZÁKLAD: Všichni respondenti (15+), kteří vykonávají profesi
POZNÁMKA: * - označení pro orientační údaj (malý počet respondentů)

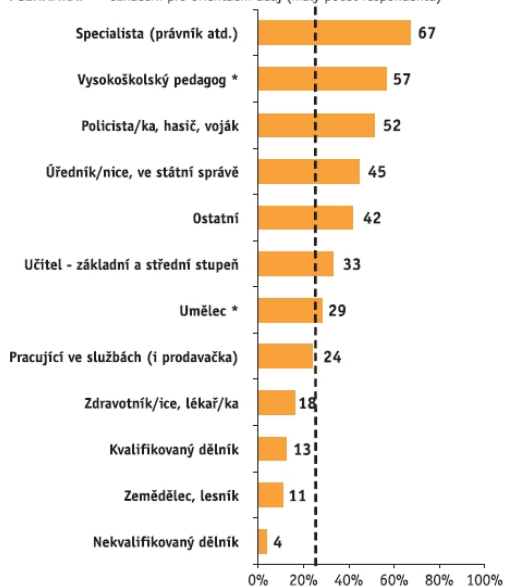


Figure 4. Computer literacy by profession in the Czech Republic in 2005 (MI ČR, 2005).

At the present, the Czech Government starts with its Strategy for service development for information society (Topolánek, 2008, p.3) with the aim to facilitate citizens to have a chance to use user-friendly, safely and credibly electronic communication to public administration on all levels and in a most manner as it could be possible. The strategy is based on three principles (Topolánek, 2008, p.4):

- the most important is a citizen, not an administrative office
- a contributed utility for citizens
- and merits registered by citizens go beyond of costs

ICT infrastructures in schools

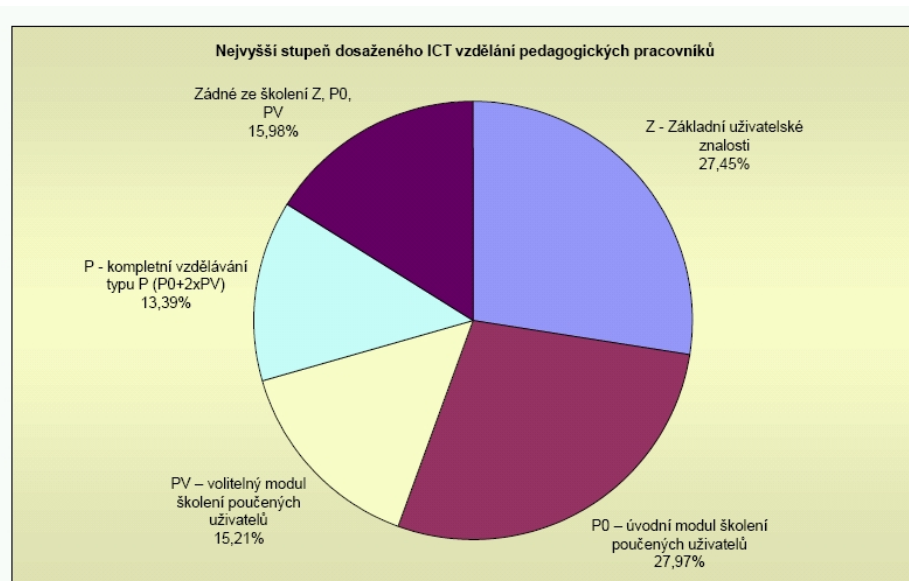
In 2001-2006 the Czech Government accomplished in two phases the Governmental Informatics Policy in education⁴ (GIPE) (MŠMT, 2008).

The first phase of the GIPE proceeded in 2001–2003. Its main goal was a centralised delivery of computers into schools (25 000 pieces) based on outsourcing. The Government thought that it could be the best way how to equip schools and to pay continuously only for services, but for a mistake in the contract there was no possibility to modify the structure of services by later needs of schools or changes of technology prices (MŠMT, 2008). The first phase of the GIPE was very expensive.

In the second phase of the GIPE (2004-2006) schools paid for computers and hardware and SW, access to the Internet, educational sources and for ICT teacher training courses by school plans and needs (MŠMT, 2008). There were more than 700 training centres that offered to teachers a modular system of ICT courses. A modular system offered courses of different levels: introductory courses (how to start to work with computer and Internet), courses for advanced ICT users and a set of courses to support teachers to apply computers in different subjects and to create teaching and study materials including how to design e-learning courses in Moodle. Most of 75% teachers did the introductory courses; about 50% advanced courses and courses how to apply ICT in teaching and learning (see Figure 5).

In a frame of the GIPE, a lot of schools put in practice own educational projects with ICT, most of them achieved a high quality success (MŠMT, 2008). In December 2006 the GIPE was unexpectedly over by the new government. Nowadays the ICT development of schools is depending on headmaster's ability to get a financial support and on local authority effort to support schools in ICT technologies.

⁴ Státní informační politika ve vzdělávání.



Ilustrace 6: Nejvyšší stupeň dosaženého ICT vzdělání všemi pedagogickými pracovníky.

Figure 5. Teachers and ICT teacher training organised in a frame of the GIPE SIPVZ (by the Czech School Supervisors, ČŠI, 2008).

By the data published by the Czech Statistical Office (MŠMT, 2007) we can see that the ICT infrastructure in schools in 2006 was relatively on a good standard. Most of schools were equipped by the ICT technology thanks to a budget in a period of the Governmental Informatics Policy in Education (GIPE). ICT are mostly installed in schools in computer classroom or laboratories (MŠMT, 2007). Some schools started to install a few computers in classrooms that are not specialised to ICT lessons or Informatics. A situation in Czech schools is similar as a situation in another countries – “On average, today 9 pupils share a computer in schools in the EU – or in other words, 100 pupils share 11.3 computers” (Korte & Husing, 2006).

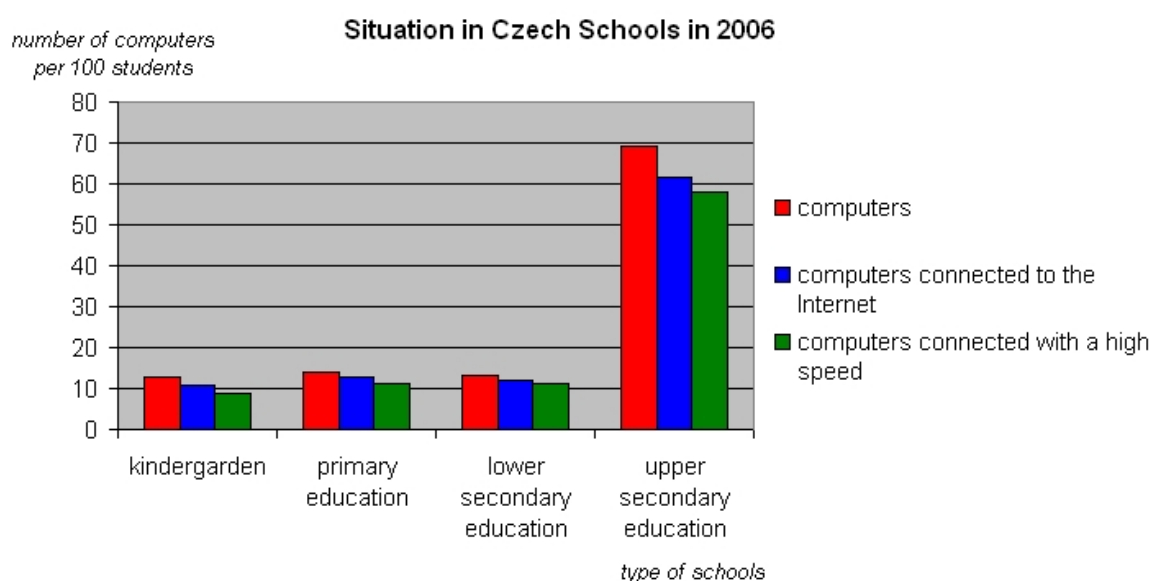


Figure 6. Numbers of computers in basic and Secondary schools in 2006 in the Czech Republic (by MŠMT, 2007).

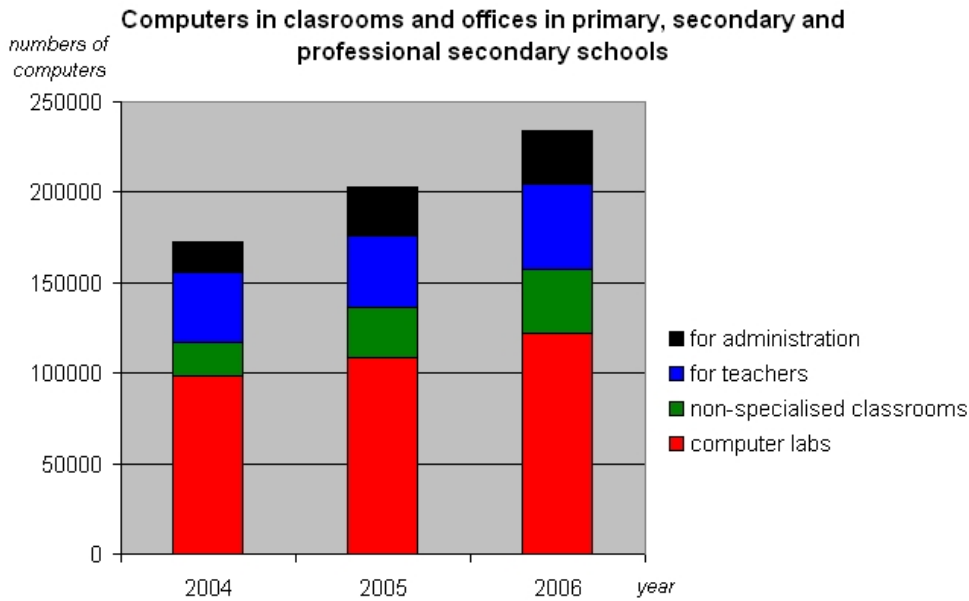


Figure 7. Numbers of computers in basic and Secondary schools installed in 2004-2006 in different places of schools (by MŠMT, 2007).

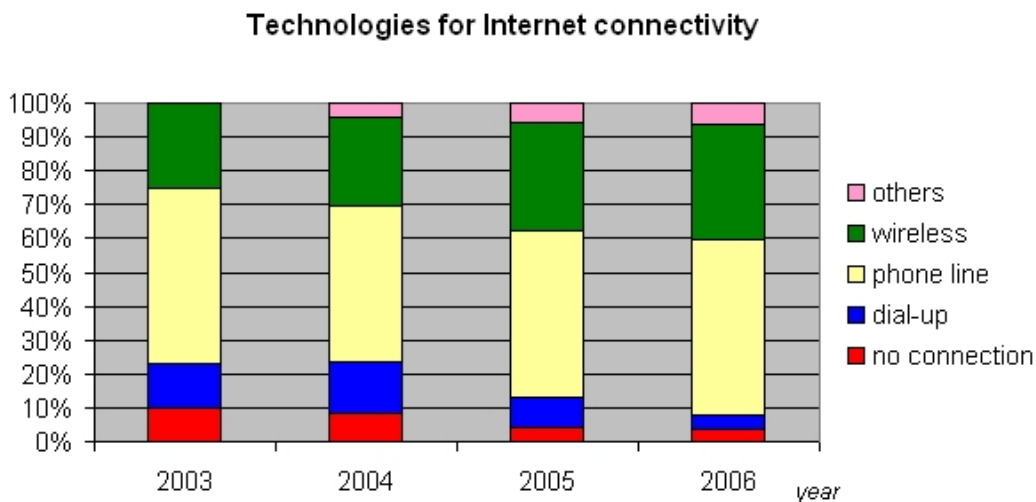


Figure 8. Technologies for Internet connectivity in basic and Secondary schools in 2003-2006 (by MŠMT, 2007).

What is a situation with ICT in Czech schools in comparison with schools in the EU25. Let us to use for this case data published in EC (2006), OECD (2007), and EC (2005) (see Table 1, 2, 3):

Table 1. ICT infrastructure in Czech schools (data from EC, 2006).

	Czech Republic	EU25
Total number of computers per 100 pupils by school type (total)	9,3	11,3
Primary schools	7,6	9,4
Lower Secondary schools	7,2	10,8
Upper Secondary schools	10,9	12,5
Total number of internet computers per 100 pupils by school type (total)	8,2	9,9
Primary schools	6,4	7,7
Lower Secondary schools	6,2	9,7
Upper Secondary schools	10,1	11,4
Percentage of schools which use computers for educational purposes by school type (total)	99,6	98,7
Primary schools	95,2	97,3
Lower Secondary schools	99,6	99,7
Upper Secondary schools	100	98,5
Percentage of schools which have more than 5 computers per 100 pupils by school type (total)	87,2	81,6
Primary schools	84,2	81,3
Lower Secondary schools	79,4	81,4
Upper Secondary schools	93,2	80,7
Percentage of schools having internet access	99,2	96,2
Primary schools	98,8	95,4
Lower Secondary schools	99,2	99
Upper Secondary schools	100	98,4
Percentage of teachers who have used computers in class in the last 12 months in Europe	78,3	74,3
Primary schools	82,4	75,2
Lower Secondary schools	78,9	70,9
Upper Secondary schools	69,5	73
Percentage of schools which offer and use computers in classrooms,		

computer labs and school libraries in Europe in 2006		
in classrooms	48	61
in computer labs	91	81
in school libraries	20	33

Percentage of schools having their own home page or web site (total)	74,8	63
Primary schools	63	54,5
Lower Secondary schools	78,9	75,5
Upper Secondary schools	99,4	87,4
Percentage of schools having a school e-mail address for the majority (more than 50%) of teachers (total)	83,6	65,2
Primary schools	84,2	66,4
Lower Secondary schools	81,4	64,2
Upper Secondary schools	83,3	61,4
Percentage of schools having a school e-mail address for the majority (more than 50%) of pupils	45,4	23,5
Primary schools	45,7	21,2
Lower Secondary schools	44,9	27,8
Upper Secondary schools	43,8	28,3
Percentage of schools having none of the ICTs listed	0	4
Primary schools	0	5,1
Lower Secondary schools	0	2
Upper Secondary schools	0	0,9

Table 2. ICT and Czech Teachers (data from EC (2006))

	Czech Republic	EU25
Access, Motivation and Competence of Teachers for Using ICT and the Internet in Schools		
Percentage of teachers – access	55,6	60,3
Percentage of teachers – motivation	85,5	82,1

Percentage of teachers – competence of teachers for using ICT	69,4	68,4
Percentage of teachers who have ever used a computer, either for work or outside work	99,8	98,6
Primary schools	99,7	98,5
Lower Secondary schools	98,8	98,7
Upper Secondary schools	98,4	99,2

Table 3. ICT in education in Czech schools (data from EC (2006))

	Czech Republic	EU25
Percentage of schools which use computers for education in classrooms	47,6	61,4
Percentage of schools which use computers for education in classrooms by type of locality	47,6	61,4
Schools in densely populated areas	51,4	62
Schools in intermediate areas	46,6	58,2
Schools in thinly populated areas	45,9	63
Percentage of schools agreeing to the statement: "computer science are taught as a separate subject"	80,1	54,7
Primary schools	71,5	47,7
Lower Secondary schools	91,5	72,8
Upper Secondary schools	96,3	77,4
Percentage of schools agreeing to the statement: "computers and the internet are integrated into the teaching of most subjects"	67,3	75,3
Primary schools	70,6	76
Lower Secondary schools	66,3	73,4
Upper Secondary schools	59,3	78,1
Percentage of schools agreeing to the statement: "computers and the internet are used for teaching foreign languages"	80,7	56,6
Primary schools	30,4	51,3

Lower Secondary schools	67,1	68,9
Upper Secondary schools	65,6	74,9

Educational Portal

At the present, there is not yet a complex educational portal for teachers, that could provide all teachers all need and in a high quality teaching materials and educational resources needed for teacher profession and teaching. A lack of the portal with a LOR and methodological materials for teaching practice in schools became evident for example in the EU FP7 Project CALIBRATE when the Czech Ministry of education could not provide to joint a Czech portal to portals of other partners and the Czech teachers had to work with objects of other countries that were interesting from a didactic point of view, but they didn't correspond to requirements of Czech curriculum and they were not understandable for students for being in foreign languages (in Hungarian, Flemish, etc.). Nowadays, the portal DUM⁵ (Digital teaching materials) developed by the Research Institute of Education in Prague and financed by the Ministry of Education and the EU offers learning objects and the whole Methodical portal (www.rvp.cz) focuses on the complex support for teachers.

A new governmental strategy for ICT school development

The Ministry of Education has drawn up a new strategy how to continue in ICT development of schools in 2009-2013 (MŠMT, 2008). A governmental support to schools will be accomplished by eight programs dedicated to Primary, Lower and Upper Secondary schools, music schools and higher Vocational schools:

- Program 1: Connectivity – to support schools to be connected to the Internet.
- Program 2: Infrastructure – to support technical equipment of schools and teachers.
- Program 3: Educational portal – a centralised portal for education.
- Program 4: ICT teacher training – development and sharing of educational content.
- Program 5: Monitoring.
- Program 6: Control Quality – to develop a tutorial team of advisors, collaboration with experts.
- Program 7: Support for entrance exams.
- Program 8: Outcomes of education – a centralized support to measure and collect outcomes of education.

ICT and Czech teachers

More than 5% of all teachers are not using computers because they say they see "no or unclear benefits": Germany (10.5%), Latvia (8.6%), France (7.5%), Belgium (5.8%) and the Czech Republic (5.5%) (Korte & Husing, 2007). In a process of realisation of the GIPE Czech teachers passed out of ICT courses and seminars that influenced on a situation in schools that teachers started to apply ICT in teaching and for learning of their students.

⁵ Digitální učební materiály (<http://dum.rvp.cz>).

Graf 3: Formy využití počítačů ve výuce

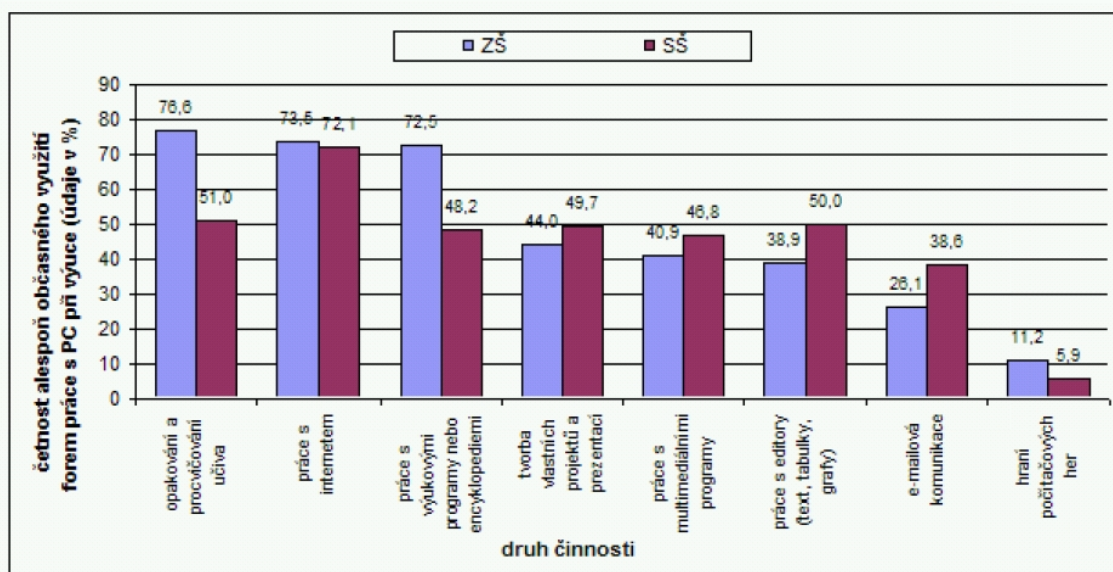


Figure 9 Areas and activities in which Czech teachers use ICT in schools (by the Czech School Supervisors in ČSI, 2008).

Current Governmental initiative for ICT in schools:

At the present, the implementation of ICT in Czech schools has achieved a stable-state level that corresponds to the EU standard. It is a no existing real governmental support at this moment what could be irresponsible for a future ICT development of schools.

In a comparison with countries of the EU or of the OECD in Czech schools we have been achieving only average or subnormal learning outcomes in areas related to information literacy of students.

It should be very important to begin accomplishing a new governmental initiative to achieve a better competitive of Czech education in ICT culture. Teachers are a key for all changes in schools. The Strategy for 2009-2013 (MŠMT, 2008) is also focused on ICT teacher education and training. The Ministry of Education will give support in teacher education to develop their ICT skills and competencies. Teachers will be able to use advanced ICT including interactive multimedia educational programs, learning objects and other resources (a digital educational content).

Social communication ICT tools used by teachers

There is no research that could describe a situation among Czech teachers if and how they joint to virtual communities on the Internet, if the apply social sites (MySpace, Facebook, etc.) or media sites (You Tube, etc.). We can expect that Czech teachers don't use these digital sites so much as their students. Some teachers, including the Czech Minister of Education Ondřej Liška, use Facebook . The Czech Ministry of Education publishes his opinions and ideas also in his blog. Only a few Czech teachers have blogs to publish their experiences.

Nevertheless, some Czech teachers were involved into the EU project CALIBRATE aimed to support collaborative use and exchange of learning resources in schools. It brought together eight Ministries of Education including six from new member states and involved 17 partners in all. Teachers had a chance to use and assess common tools for sharing and creation digital learning objects in LeMill.

Czech teachers are also very active in eTwinning projects. More than five years they organise educational projects in collaboration with colleagues from other EU countries.

Several years ago, the Czech Informatics teachers decided to establish a union of informatics teachers and ICT coordinators in schools (Jednota školských informatiků – JŠI) with the aim to discuss together about problems how to integrate ICT in schools, to share ideas, opinions and experiences from teaching with ICT, to help together how to install HW or SW. The union communicates with the Ministry of Education to present ICT teachers' ideas and visions about ICT development of schools. The Ministry of Education invites members of the Union to negotiate proposals related to ICT development of schools, to ICT education, to implementation ICT into school curriculum or to final graduation exams on Secondary schools.

From 1996 some Czech teachers are involved into the international teachers' community MIRANDA that discuss a lot questions about ICT in education, research activities in different countries and in international projects about ICT in learning and teacher profession. Czech teachers can share ideas with MIRANDA members from different countries. Stephen Heppell, Niki Davis, Avril Lovelace are very well known MIRANDA members.

Problems and solutions for teachers

Generally, the Czech teachers have very good ICT skills and most of them can use a PC at home. They are motivated to use ICT and Internet very often by their personal needs – to communicate with their family, to do shopping, to process digital photos and to save digital data gained by a digital camera, to dispose administrative agenda, etc.

The Czech schools differ very much in ICT tools and experiences in educational applications of ICT. On Secondary schools Moodle is very popular.

References

CALIBRATE. <http://calibrate.eun.org/>

ČŠI. (2008). Užití informačních a komunikačních technologií ve školách za uplynulé dva roky. Tematická zpráva. Praha, leden 2008.
http://www.csicr.cz/upload/uziti_ICT_ve_skolach_za_uplynule_dva_roky.pdf

EC. (2005). Information Society Benchmarking Report.
http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/051222_final_benchmarking_report.pdf

EC. (2006). Benchmarking Access and Use of ICT in European Schools 2006. Final Report from Head Teachers and Classroom Teachers Survey in 27 European Countries. EC, August 2006. http://europa.eu.int/information_society/eeurope/i2010/docs/studies/final_report_3.pdf.

JŠI. Union of Informatics Teachers. <http://www.jsi.cz>

Korte, W.B., & Husing, T. (2006). Benchmarking Access and Use of ICT in European Schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European Countries.

http://www.empirica.biz/publikationen/documents/Learnind_paper_Korte_Huesing_Code_427_final.pdf

Korte, W.B., & Husing, T. (2007). Benchmarking Access and Use of ICT in European Schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European Countries. eLearning Papers, vol. 2 no. 1. ISSN 1887-1542.

<http://www.elearningeuropa.info/files/media/media11563.pdf>

LeMill. <http://lemill.net/>

MIČR. (2005). Ministerstvo informatiky a rozvoj informační společnosti v České republice [on-line]. Praha, 2005. 3. vydání. [cit. 27.2.2009].

http://web.mvcr.cz/archiv2008/micr/images/dokumenty/micr_brozura_cz.pdf

MIRANDA. <http://www.mirandanet.ac.uk/index.htm>

MŠMT. (2006). Indikátory vybavení škol počítači a konektivitou k Internetu v roce 2006.

http://www.msmt.cz/uploads/soubory/SIPVZ_files/indikatory_eEurope_2006.pdf

MŠMT. (2007). ICT v českém školství 2006.

http://www.msmt.cz/uploads/soubory/SIPVZ_files/SIPVZ_2006.pdf

MŠMT. (2008). Návrh koncepce rozvoje ICT ve vzdělávání 2009-2013.

http://app.edu.cz/portal/page?_pageid=33,274091&_dad=portal&_schema=PORTAL&csu=8&cid=97&piref33_274092_33_274091_274091.instance_id=139426

OECD. (2007). Education at a Glance 2007. Highlights. OECD, 2007.

Sak, P., Saková, K. (2006). Technologická vybavenost – primární předpoklad komputizace české společnosti [on-line]. [cit. 27.2.2009]. Lupa- server o českém Internetu. 15. 11. 2006 6:25. <http://www.lupa.cz/clanky/technologicka-vybavenost-primarni-predpoklad-komputerizace-ceske-spolecnosti/>

Topolánek, M. (2008). Strategie rozvoje služeb pro „informační společnost“. Vize. ČR jako jedna z pěti nejlepších zemí EU v úrovni rozvoje e-Governmentu. 2008.

http://www.businessinfo.cz/files/2008/mv_strategie_rvis.doc

ICT-tools used by teachers in Finland as part of their work

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ICT infrastructure in general

Finnish ICT infrastructure is good. Most homes and companies have broadband connections, or at least possibilities to get one. Based on the statistics from year 2006, 89 percent of Finnish population (age 18-64) use computer or internet. Usage has risen significantly in all age groups. 70% of the users use computer and internet daily. (Tilastokeskus, 2006).

Even if generally everything is fine, there are still some geographical differences. Especially in northern and eastern Finland connections are not as good as they should be. Also, the speed of broadband connections could be better, at the moment 28% of connections are 2MB or faster. Mobile broadband connections are more and more popular and they are developed also for rural areas. In 2006, 63% of Finns have used internet for banking and 29% have bought something from online shop (Tilastokeskus, 2009; Kansallinen tietoyhteiskuntastrategia 2007-2015, 2006).

Table 1. Internet users and purposes of use in 2004-2008, percentage of 16 to 74-year-olds (Tilastokeskus, 2008).

	2004	2005	2006	2007	2008
Proportion of Internet users	70	73	77	79	83
Ordering or purchasing online	20	25	29	32	33
Online banking	50	56	63	66	72
Searching information on education and training courses	20	21	23	35	36
Use of browser-based news services	*	*	*	*	19
Reading blogs	*	*	15	26	31
Browsing travel and accommodation websites	42	48	53	57	58
*data not asked					

ICT infrastructure in schools

Generally speaking, technical infrastructure is good in Finnish schools. Finnish National Board of Education has supported the development of technical infrastructure since 1996. Also, the National board of education has supported both technical and pedagogical continuing education for teachers. The National Board of Education will continue the investments in continuing teacher training: In 2009-2011 it gives 10,4 million euros for continuing teacher training. Part of this training will be focused on teacher's ICT-skills, although they will be offering mainly subject related courses. The National Board of Education has also funded several projects for developing virtual schools. In addition, there are several resource banks that offer digital learning materials for teachers.

The amount of computers and software seems to be in order and national investments have improved technical infrastructure very much. In 2006 90% of schools had broadband access to internet and 77% of schools had computers in classroom. On average there are about 17 computers per 100 students in Finnish schools. (Korte & Husing, 2007). Every school has access to computers and internet, but exploitation in everyday teaching has not increased since year 2000. Basic software, for example office applications, email and web-browsers are available in most of the Finnish schools.

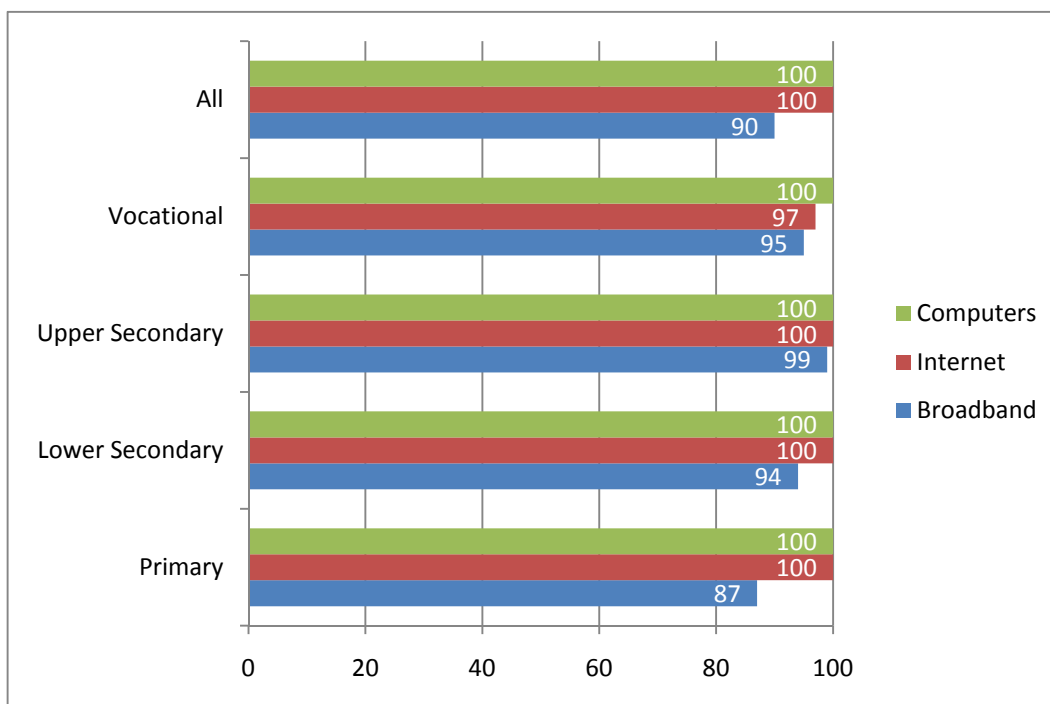


Figure 1. Percentage of Schools Using Computers, Internet Connection, and Broadband Internet Access According to School Type in Finland 2006. (European Commission, 2006).

Although the ICT infrastructure is good in schools, students use ICT more and more at home. Usage in schools has decreased over 10 percent. Students use internet for communication and as information source. Teachers use ICT mainly to support their teaching. Technology is utilized especially in project and problem based learning.

Inequality between small and large schools and municipalities is a fact. Small schools lack hardware and teachers are mainly left alone in technical problems. Bigger schools have more structured support systems and better technical possibilities for the use of ICT in teaching.

In conclusion, even vast investments haven't made any significant change to the everyday life in schools. Piloting new methods and techniques rarely results to long-term effects (Haaparanta & Tissari, 2008; Kankaanranta & Puhakka, 2008).

Social communication ICT tools used by teachers

In the beginning of 2009 there aren't reports that indicate, how teachers use social communication ICT tools in Finland. These tools are mainly used by students. The most popular is probably Wikipedia. Also blogs and podcasts are used. Facebook, YouTube, Flickr and IRC-Gallery are very popular among young people in Finland.

Although students are very active in using social communication tools, there aren't many tools that teachers use. In addition to school's internal communication channels (such as intra- and extranets, discussion areas inside school's LMS's) teachers use mainly discussion areas (for example in www.opettaja.tv) for communicating with other teachers. There are also new networks that have been developed for example around social media in learning (<http://sometu.ning.com/>). This network has almost 800 registered members in the beginning of 2009. One of the newest networks is opettajat.com (<http://www.opettajat.com>), which is developed from Facebook community for teachers, but it isn't very active at the moment.

All tools that are in use at the moment are developed for educational purposes. None of the discussion areas or blogs concentrates on generational change in teacher position. Some new ideas are arising for example in Smart School –projects.

Problems and solutions for teachers

There are some reported problems concerning teachers' use of modern technology in teaching. Most common problem is time. Teachers don't have enough time to learn and utilize new technological tools that they can use in their work. This is linked also to the fact that teachers need new skills and support in pedagogical use of modern technology. The knowledge gap should be filled with continuing education and new support persons are needed. Problem increases, when we study the use of social ICT tools: as an example, only 35% of teachers in natural sciences think their skills in facilitating discussion areas are excellent (Kankaanranta & Puhakka, 2008).

At the time of writing this report it seems like all development and research has focused mainly on integrating novice teachers to schools. Senior teachers are practically forgotten. Teachers' social communication is mainly between colleagues inside one school, there is no wider cooperation. Future development should make new possibilities for open and safe discussion between novice and expert teachers. Small schools need new communication methods for cooperation. No matter what ICT tools are used, they should enable open communication and secure environments for teachers.

References

- Haaparanta, H. & Tissari, V. (2008). Tieto- ja viestintäteknologian hyödyntäminen opetuksessa ja opiskelussa. CICERO Learning – selvitysraportti. Retrieved February 6, 2009, from http://www.cicero.fi/documents/CICERO_TVTV-selvitysraportti.pdf.
- Kankaanranta, M. & Puhakka, E. (2008). Kohti innovatiivista tietotekniikan opetuskäyttöä. Kansainvälisen SITES-2006 tutkimuksen tuloksia. Retrieved February 9, 2009, from <http://ktl.jyu.fi/img/portal/13816/SITES-julkaisu.pdf>.
- Kansallinen tietoyhteiskuntastrategia 2007-2015. Uudistuva, ihmisläheinen ja kilpailukykyinen Suomi. (2006). Retrieved February 9, 2009 from http://www.arjentietoyhteiskunta.fi/files/34/Kansallinen_tietoyhteiskuntastrategia.pdf.
- Korte, W. B. & Husing, T. (2007). Benchmarking Access and Use of ICT in European Schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European Countries. eLearning Papers, vol. 2 no. 1. ISSN 1887-1542. Retrieved March 18, 2009 from <http://www.elearningeuropa.info/files/media/media11563.pdf>
- Tilastokeskus (2006). Aikuiskoulutustutkimus 2006. Retrieved March 18, 2009 from <http://www.tilastokeskus.fi/til/aku/2006/index.html>.
- Tilastokeskus (2008). Number of Internet users up from the year before. Retrieved March 19, 2009 from http://stat.fi/til/sutivi/2008/sutivi_2008_2008-08-25_tie_001_en.html.
- European Commission (2006). Use of Computers and the Internet in Schools in Europe 2006. Country Brief: Finland 6/2006. Retrieved March 19, 2009 from http://europa.eu.int/information_society/eeurope/i2010/docs/studies/learnind_countrybriefs_pdf.zip.

ICT-tools used by teachers in Germany (Bavaria) as part of their work

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ICT infrastructures in Germany

Since the mid-1990s, modern information and communication technologies (ICT) have increasingly penetrated all areas of the society. In Germany, ICT technologies have increased radically within the last years. 60% of all German employees in 2008 use a computer at their work (2003 it was only 14%). 53% of all German employees were connected to the internet, whereas in 2003, only 31% had internet access) (Statistisches Bundesamt, 2008).

The majority of private households in Germany have at least one personal computer and internet access. In January 2003, number of computer-users of over 10 year-olds increased from 64% in 2003 to 78% in January 2008. The degree of utilization also increased in private households: only 62% of private computer-users used their PC every day or almost every day in 2003, whereas in 2008 already 75% used their PC regularly. Furthermore, the internet connection of private households increased drastically: In 2003 only 52% of over-ten-year olds had internet access, in 2007 rose up to 71%. The number of people that use the internet privately every day or almost every day increased from 51% in 2003 to 69% in 2008. Looking at the age of ICT-users: 71 of 100 people have already surfed the internet, with the highest percentage of 96% (10-24 year-olds), followed by 85% (25-54 year-olds) and 37% (55 years and older). Germany has also launched a national programme ("Information society 2006") intending to increase the number of internet users up to 75% of the population (Statistisches Bundesamt, 2008).

In Germany, the market for households and enterprises is largely broadband. Growth is good without being exceptional, but half of internet users still have narrowband connection. In Germany DSL as a tool prevails (Total DSL coverage – as% of total population – is 92%). A drastic increase is also seen in the access of broadband connection in private households: from 9% in 2003 to 50% in 2008 (Statistisches Bundesamt, 2008).

ICT infrastructures in schools

ICT equipment and internet in schools

Computers have become incredibly important tools in today's society. Access to computers in schools exposes teachers and young people to information that they can use to expand their knowledge. Computers also give young people skills to face future challenges in the use of rapidly changing technologies in the workplace.

Computer and internet access in German schools

Almost all German schools now use computers for teaching and have equipped with internet access (Table 1). In Bavaria, all schools have computers and internet access (Bildungsstatistik, 2008). The computer access in schools varies slightly. On the average, 9 pupils share a computer with 100 students (Table 1), ranking below average with respect to other European schools (Korte & Hüsing, 2007). Primary schools have the lowest computer/pupil ratio whereas Upper Secondary schools the highest. There is a slight variation of internet access within the different school systems, whereby the Upper Secondary schools have 100% internet access and the Lower secondary, Primary and Vocational schools a little less (99.6, 95.5% and 98.8 respectively) (EU, 2006a).

Table 1: ICT equipment in German schools 2006 (EU, 2006a).

	Total	Primary school	Lower Secondary school	Upper Secondary school	Vocational school
Computers per 100 pupils	8.9	10.6	8.3	8.0	9.4
Percentage of schools having...					
Computers for teaching	99.6	99.5	100.0	100.0	98.8
Internet access	97.5	95.5	99.6	100.0	98.8
Broadband internet access	62.9	54.1	72.0	82.5	68.1
Percentage of schools using computers for education in...					
Computer labs	85.8	77.5	95.4	94.9	88.8
Classrooms	66.1	80.1	61.2	55.2	56.5
School library	23.0	10.6	28.5	52.7	32.5
Other locations accessible for pupils	29.1	18.9	36.5	49.4	28.8

Broadband connection

In Germany, 63% of all schools are equipped with a broadband connection. Quite a large variation exists between the school systems: only 54% of Primary schools have a broadband internet connection, the Vocational schools 63% and the lower Secondary schools 72%. The penetration is highest among Upper Secondary schools, with 82% broadband connection (Table 1).

There is some variation with regard to broadband access between urban and rural areas: 70% of schools in densely populated areas have broadband access compared to 56% of schools in thinly populated areas. Those schools with a broadband connection to the internet are much more likely to have a more sophisticated ICT infrastructure including a school website, the use of a LAN or the availability of an intranet (EU, 2006a).

Location of computers

Most computers are located in computer labs (average: 85.8%). Approximately 66% of German schools using computers for teaching use them in classrooms, with the highest percentage being achieved in Primary schools (80%). Computers are also located in the school library, but are more or less restricted to Upper Secondary schools

Use of computers and internet in class

Computers are used for various purposes and as part of teaching different subjects in schools. Furthermore, computer science is taught as a separate subject in almost 80% of both, lower and Upper Secondary schools and in almost 60% of Vocational schools. According to the survey of the European Commission for Information Space Innovation & Investment in R&D Inclusion in 2007, 78% of German classroom teachers had used computers in class within the last 12 months prior to the study. Little variation exists between school types and between urban rural areas.

Most teachers use computers for presentation purposes but also let the pupils use them in class. Only small deviances occur with respect to the subject of teaching. Furthermore, the computer is seen as a means for preparing lessons among 89% of the teachers. Most of the teachers using computers in class use them in less than 10% of all lessons (Table2). Only 6% state that they use computers in more than half of their lessons. Vocational school teachers use computers much more frequently in class than their general education colleagues (EU, 2006a).

Table 2: Frequency of computers use in class Germany 2006 (EU, 2006b).

Percentage of all teachers using computers in class who...	Total	Years of teaching experience			
		< 5y	5-9y	10-19y	20+y
...use computers in 5% and less of all lessons	23.2	27.9	28.7	21.2	22.3
in 6 to 10% of lessons	32.6	28.4	27.5	33.4	33.7
in 11 to 24% of lessons	25.6	26.5	25.7	27.2	24.9
in 25 to 50% of lessons	12.8	11.6	8.7	12.0	13.8
more than 50% of lessons	5.9	5.6	9.5	6.3	5.3

German teachers use a great variety of different material from a multitude of sources for teaching purposes. Furthermore, they are also very active (88%) in searching for material themselves in the internet. The higher the school level, the more use of computers – especially in terms of frequency and intensity – is made by teachers and pupils. Around a quarter of the teachers using computers in class in Upper Secondary and Vocational schools use these in more than 25% of their lessons, whereas the figure only reaches 16% in Primary schools. Looking at table 2, it is evident that there are hardly any differences according to age of the teachers. The overall pattern is rather similar across all groups (EU, 2006a).

Source of educational material used in class

In Germany, 90% of all teachers using computers use offline learning materials, such as CD-ROMs. Approximately 70% of teachers use prefabricated pedagogical material from existing online sources and material that is made available on the schools' network and databases (EU, 2007).

Moreover, teachers use a wide variety of sites to gather information to structure and enhance their lessons. Many of these sites can also be used by pupils for learning. Table 3 lists some of the major sites used by teachers in Primary schools in Bavaria (personal communication Dr. Heran-Dörr, 2009). The data are derived from a study of Primary teachers in Bavaria to examine how the internet can offer support to specific scientific and general subjects.

Table 3: List of websites for teachers and pupils used by Primary teachers in Bavaria.

German	www.@antolin.de
Math and Science	www.edu.uni-muenchen.de/supra/sachunterricht_home_gesamt.htm
Math and Science	www.blinde-kuh.de
	www.geolino.de
	www.sachunterricht-online.de
	www.cip.physik.uni-muenchen.de/~milq/ www.cip.physik.uni-muenchen.de/~jana.traupel/materie/materie.htm
Physics	www.physikfuerkids.de
	www.leifi.physik.uni-muenchen.de
All topics	www.grundschulideen.de
	www.lehrproben.de
	www.vs-material.wegerer.at
	www.kidsweb.de
	www.arbeitsmaterial-schule.de
	www.zzebra.de
	www.biber@schulen-ans-netz.de
	www.trampeltier.de
	www.sendung-mit-der-maus.de
	www.schule.bayern.de
	www.wasistwas.de
	www.labbé.de

Furthermore, hundreds of wiki-platforms are offered in the internet and are used by teachers. Examples include [Wikipedia](#), MediaWiki, [Wiktionary](#), the original [Portland Pattern Repository](#) wiki, [MeatballWiki](#), CommunityWiki, and [Wikisource](#).

Social communication ICT tools used by teachers

Social sites used by teachers for work

Teachers use open social software i.e., software that enables them to collaborate, interact and connect with each other. This software is public and so can be used, modified or re-distributed by its users. Examples of websites for teachers are the following:

- Lehrer online (www.lehrer-online.de/) is a online site with a multitude of information for teachers: new projects, new digital media, new lessons...
- Schulen ans Netz e.V. (www.schulen-ans-Netz.de) Is an online organization which assists to incorporate digital media into schools.
- Bildungsserver (www.bildungsserver.de) one can find information on internet resources concerning all aspects of education.
- Schulportal- Boerse für Unterrichtsmaterial: (www.schulportal.de): is an internet exchange forum to download exams and teaching materials.
- 4teachers (www.4teachers.de/) can also be used for lessons, study material and exams.

Social sites used by teachers for private communication

Open social software, i.e., software that enables teachers to collaborate, interact and connect with each other is more and more used by teachers. Most social networking sites provide multiple services to the users such as email, instant messaging, chat, video, blogging, file sharing, photo-sharing, etc. Furthermore, these sites provide a database of users so people can find their friends, form communities, and connect with others who share similar interests with them. Also, they allow users to create their profiles online and articulate their social networks. An advantage of social networks is that the majority of social networking services are free of charge. Examples of social networking sites for private communication are:

- MySpace (social networking) <http://www.myspace.com>
- Facebook (social networking) <http://www.facebook.com>
- Flickr (social photo-sharing) <http://www.flickr.com>
- Google Docs (social writing) <http://www.google.com/docs>

Problems and solutions for teachers

Motivation for and interest in using ICT in class

In Germany, the older the teachers, i.e. the more years of teaching experience, the less use they make of computers and the internet in schools. 22% of teachers in Germany still do not use computers in class. When asked why, these teachers state: lack of computers in the school (49%), no benefit of using computers in class (48%) and 46% believe that they lack the necessary skills to utilize computers in their teaching (EU, 2006a).

Better technical ICT maintenance and support

Although, the majority of German teachers are more or less satisfied with the technical access means at their schools: 81% state that their school is well equipped with computers and 79% express the opinion that their internet connection is fast enough (EU, 2006a), there seems to be a lack of technical ICT maintenance and support (EC, 2006a).

References

Bildungsstatistik (2008). Schule und Bildung in Bayern 2008, Zahlen und Fakten. 1 Reihe A Bildungsstatistik, Heft 50. München: *Schriften des Bayerischen Staatsministerium für Unterricht und Kultus*.

EU (2006a). *Use for Computers and the Internet in Schools in Europe 2006. Country Brief: Germany*. Available online at (Last retrieved on 20.02.09):
http://europa.eu.int/information_society/eeurope/i2010/docs/studies/learnind:countrybriefs_pdf.zip

EU (2007b). *Benchmarking Access and Use of ICT in European Schools 2006. Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries*. Brussels: European Commission. Retrieved February 25, 2009, from
http://ec.europa.eu/information_society/.

EU (2007b). *Germany- i2010: Annual Report 2007*. Brussels. European Commission. Retrieved February 25, 2009, from http://ec.europa.eu/information_society/eeurope/i2010/.

Korte, W. B, Hüsing, T. (2007): *Benchmarking Access and Use of ICT in European Schools 2006*. Brussels: European Commission.

Statistisches Bundesamt (2008). PC und Internet prägen zunehmend Berufs- und Privatleben (Pressemitteilung Nr. 452). Wiesbaden. Statistisches Bundesamt Pressestelle.

ICT-tools used by teachers in the Netherlands as part of their work

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ICT infrastructures in general

87% of all Dutch people have home Internet access

The Netherlands has the highest percentage of households in the European Union with home internet connections. Only one in eight Dutch people have either no access to the internet from their own home (1.2 million), or do have access, but do not use it (0.5 million). Two-thirds of people with no home connection have a relatively low education level. Around half are over 65 years of age and/or single. Youngsters aged up to 25 years nearly all have access to the internet from home: only 2 percent of this age group do not.

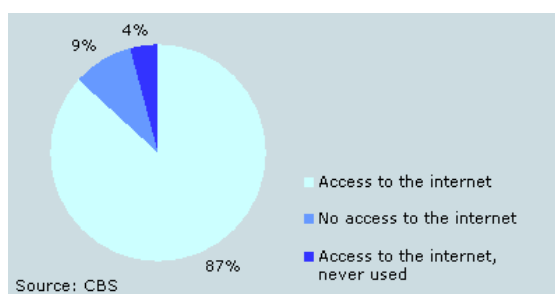


Figure 1. People (12–75 years) with internet access from home, 2008.

No interest

Nearly six in ten people who do not have internet access do not want it or are not interested in access. (People who do not have internet access at home are also less likely to use other modern technologies such as mobile phones). 12 percent think it costs too much. Privacy considerations and physical handicaps are mentioned by only very few people as reasons for not having an internet connection at home.

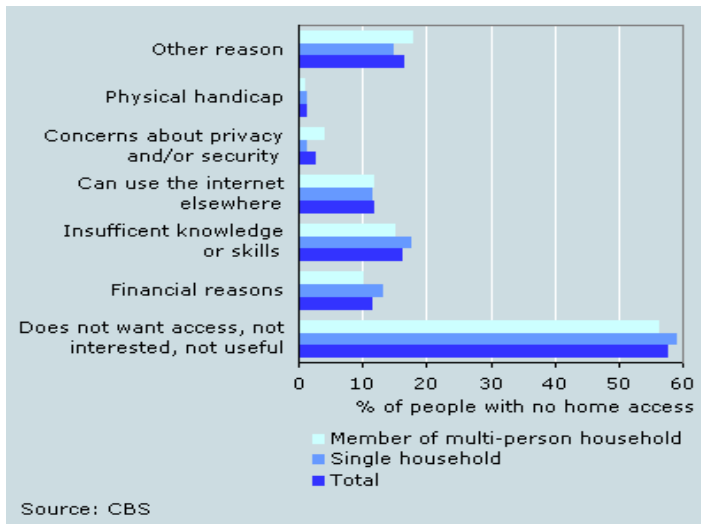


Figure 2. Reasons for not having an internet connection, 2008.

Functional use of internet

84% of all Dutch is actually a greater or lesser degree online. This brings the Dutch one of the leaders of the world. From their free time Dutch people spend one fifth part on the Internet.

Dutch use of the Internet compared with other countries is largely functional and less for fun, like viewing video clips, online dating or listening to audio. Functional does mean: searching for information, the online purchase of products and online payment of bills. 75% of the Dutch uses the internet mainly to find information. Email is also a very important use. Only one quarter uses the internet as a social network. Despite reports of leaks in the security, Internet banking is now widely accepted. New applications appear to be hardly used.

Digital illiteracy in the Netherlands still 1.6 million people

Despite the high percentage of access to the internet still 1.6 million Dutch people are digital illiterate; they hardly don't (know to) use the possibilities of digital tools as the internet. That means that almost 10% of the Dutch population misses access to all kind of information and communication possibilities. 33% of the households have no or few computer skills, such as copying a directory or installing new devices, like a printer. And almost 50% of the internet users in 2007 didn't have the basic skills, such as the use of a search engine, sending an email with annex or chat. Using the internet to develop themselves or their position is not possible for this group. Digital illiterates – people without or with limited computer and internet skills – are mainly find between senior citizens, low educated, unemployed and immigrants or ethnic minorities.

The use of digital tools does also bring risks. The Dutch government wants to stimulate Dutch citizens who use digital tools to be aware of the possible dangers and able to take action to avoid material, financial or emotional damage. These are also digital skills.

Current initiatives regarding ICT in the Netherlands

Regarding the digital illiteracy and the risks in using ICT, the focus in the latest national initiatives regarding ICT in the Netherlands is both on *digital skills for all Dutch citizens* and *digital safety*.

A growing network of the ministry of Economic Affairs, ICT business and civil organizations started in January 2009 a big national program "Digi Skilled & Digi Conscious". The purpose of this program is to make it possible for as much as possible Dutch to use ICT in a safe way and to participate in the Information Society. This program is open for and brings together all organizations and initiatives who support this purpose.

Besides, there are still local projects to promote access to internet as part of poverty policy and as a way of tackling social deprivation. A number of municipalities in the Netherlands make computer facilities available to families of pupils who doesn't have internet access at home for socio-economic reasons (OECD, 2006).

ICT infrastructures in schools

Computer facilities in Primary and Secondary schools

Over the last few decades, the public education system in the Netherlands has invested heavily in purchasing infrastructural ICT facilities. Between 1997 and 2005, the Dutch government invested more than € 1.5 billion integrating ICT into education. The main focus for investment in this period was equipment, educational software, and Internet facilities.

The scale of computer facilities has risen by some fifteen times over the last twenty years. At present, schools in Primary and Secondary education on average have access to one computer to every seven pupils. With this pupil-computer ratio, the Netherlands occupies a midrange position internationally, comparable with that of Belgium and Italy.

More computers

The average number of pupils per computer has not changed from that in 2005-2006. The distribution in the pupil-computer ratio shows that there is an increasing number of schools which have a pupil-computer ratio of 4-1 or better. This may be an indication that some schools are aiming to increase the availability of computer applications for educational purposes.

The general trend on schools however, is to invest less in increasing the number of computers and more on quality improvement of the ICT facilities available.

Computers at home

Concerning the availability of computers for pupils in their homes, the Netherlands is internationally in the upper level. More than 95% of pupils in the Netherlands have a computer at home. Dutch households are, with regard to computers and Internet access, the best equipped in the EU. The availability of broadband Internet in Dutch households (62%) is considerably greater than in the rest of the EU (on average 23%).

Broadband Internet

Almost all computers in Secondary education have Internet access. In Primary education, this is 87%.

Of all Primary and Secondary schools in the Netherlands, 25% and 41% respectively have a broadband connection to the Internet. Most Secondary schools which do not yet have broadband access to the Internet are interested in it, or are planning to install it. About 30% of the Primary schools are planning to switch to high speed Internet access (TNS-NIPO, 2006).

Intern network

Almost all schools in Secondary education have an intern network; in Primary education about 90%. The access to this network at school is for most users good; from home, the access is less well regulated.

Digital blackboard

Digital blackboards are very popular. At the end of 2006, 11% of all Primary schools and 42% of all Secondary schools had these blackboards. Of the schools that did not yet have them, four out of ten intend to acquire one or more in the coming two years.

Experience of teachers in using ICT

Teachers are increasingly technically skilled in operating computers. According to ICT management, about 90% of the teachers have sufficient basic skills for the use of standard applications, such as Internet and word processing. Pedagogical skills are also improving. More than 80% of the teachers in Primary education and almost two thirds in Secondary education are sufficiently skilled in the use of ICT in their teaching.

The number of teachers who, according to ICT management, are moderately or poorly informed about the possibilities of ICT, has decreased to 19% in Primary education, and to 39% in Secondary education. ICT managers believe that teachers in their schools are well informed about the possibilities of ICT in education.

Teachers are less confident than are ICT managers in their competency in the use of ICT in teaching. About half of all teachers consider themselves competent in the use of the computer as a pedagogical aid. Fewer than half of all teachers believe that they derive additional pedagogical value from ICT at their level of competence in the use of ICT in their teaching.

Preparation and instruction

Almost all teachers use the computer at home to do their schoolwork, especially word processing and Internet. Teachers in Secondary education use their computer at home more intensive than teachers in Primary education.

For the instruction to pupils, the computer is less frequently used. Software related to the teaching method of a certain school subject is the most used in both Primary and Secondary education.

Use of ICT in following school careers of pupils

ICT is very variable used for following the school careers. Two-thirds of teachers in Secondary education register the figures and results of pupils complete digitally, in Primary education this hardly happens. In Primary education however, almost half of the teachers use the "pupil tracking system" complete digital.

In Secondary education most teachers use ICT to develop tests. Pupils make their tests however almost always on paper.

Absenteeism is registered complete digitally by a large proportion of teachers in Secondary education; in Primary education this is much less.

Digital communication

In Primary and Secondary education teachers occasionally use e-mail, the internet or an electric learning environment (ELE) to communicate with and support pupils. About half of all teachers in Secondary education *can* make use of an ELE; one in five teachers *does* really make use of it. In Primary education less than 10% of the teacher *can* make use of an ELE and half of them really *do* use it.

Cooperation by teachers

About two-thirds of the teachers in Primary and Secondary education works together in ICT matters with colleagues of their own school. It is about exchanging ideas en information about the use of ICT in education. Cooperation in developing knowledge and skills or cooperation in an ICT project happens much less.

A very small proportion of teachers cooperates with teachers of other schools. They especially exchange knowledge and ideas.

Current initiatives to stimulate use of ICT at schools

Local initiatives at schools

Schools try to stimulate their teachers in different ways to use ICT. The majority of the schools consequently promote the value of ICT. Also content support by the ICT-coordinator and stimulating peer exchange of knowledge and experience are important stimulus. On many schools teachers get the space to experiment with the use of ICT. Rewarding innovative ICT-use is sporadic.

National initiative: The Kennisnet Foundation

The Kennisnet foundation is a public ICT support organization in the Netherlands. Kennisnet encourages and supports the use of ICT in the daily curriculum of Primary education, Secondary education and Vocational training. Their principle is: offer schools and educational institutions the right support to realize innovation in education with ICT.

The foundation stimulates in different ways renewing projects for schools, for instance by *Stimuleringsgelden* (promotion funds). Teachers or schools can write grant applications for a specific ICT project at school. Example: promotion fund for supporting novice teachers in the use of ICT.

On teacher training the basis has to be laid for the didactical use of ICT in education. The Kennisnet foundation contributes to this goal – commissioned by the Ministry of Education – by starting a multi-annual project to stimulate ICT expertise among teacher trainers. Pilot projects resulted in enthusiastic colleague teachers and more consultation between the schools and the teacher training about new ways of didactical use of ICT. The program is now extended to Secondary schools.

On the website of Kennisnet (<http://projectenbank.kennisnet.nl/>) every school or teacher can easily find useful ICT applications and materials developed in different promotion fund projects.

National initiative: Innovation program SURFnet/Kennisnet

The SURFnet/Kennisnet Innovation Programme is a collaboration that started in 2004.

SURFnet is a subsidiary of the SURF organisation, in which Dutch universities, universities for applied sciences and research centres collaborate nationally and internationally on innovative ICT facilities. SURFnet enables groundbreaking education and research. It designs and operates the hybrid SURFnet6 network and provides innovative services in the field of security, authentication and authorisation, group communication and video.

Together, SURFnet and Kennisnet aim to facilitate ICT innovation for the education sector, ranging from Primary education to higher education. They also develop applications which are available for all schools in the Netherlands (see examples at <http://www.surfnetkennisnetproject.nl/resultaten>).

The SURFnet/Kennisnet Innovation Programme focuses on the following fields of interest:

- video services for educational use
- the findability of digital learning materials, through new methods, such as tagging by users, assigning metadata and the use of social networks
- using virtual environments in educations, such as Second Life and Active Worlds
- mobile learning, using personal digital assistant (PDA), laptop or mobile phone in the curriculum
- identity management in an educational setting

Social communication ICT tools used by teachers

It appears to be very difficult to find information about the communication tools used by teachers. All investigations and all activities are related to ICT use in education directed to pupils. Communication tools always are described as tools for communication between pupils or between teacher and pupil. There is no attention paid to digital tools especially used for communication between teachers.

However we know that teachers do use digital tools in the communication with colleagues. The most used tool in Secondary education is email.

Another tool that is especially used by a small proportion of the teachers in Secondary education is a digital "subject community", to obtain information and exchange experience about the subjects they are teaching.

Social sites that are used by teachers are for example MySpace and Facebook.

Problems and solutions for teachers

Teachers in the Netherlands are generally satisfied with the means and support regarding ICT. However they still need useful learning materials. In Primary education teachers need software for independent pupil learning.

The high costs of educational software (licenses) needs attention. The infrastructure is still developing, but stays also in the future an important focus:

- computers who have to be replaced for technical reasons often are not replaced

- shortage of available finances to maintain ICT facilities
- external access to internal network
- appropriate space available to place computers
- access to computer labs in Secondary education.

However last year the amount of teachers who are ICT-skilled have risen, promotion of expertise in this area is still an important issue.

Teachers and managers both want to use more ICT in the near future to improve the quality of education. Interesting is that they disagree about what the best approach is to further this integration of ICT into education.

Financing ICT is, according to management, the most important obstacle for the further integration of ICT into education.

In Primary education teachers believe that the most important issue is the improvement of the ICT infrastructure. Teachers think furthermore that a shared vision within the school team should be high on the agenda. Management believes that, apart from investing in computer facilities, priority should be given to developing the knowledge and skills of teachers. Teachers disagree: they do not believe that their knowledge and skills should be given high priority.

In Secondary education teachers think that developing their skills and knowledge has only low priority. They believe that most attention should be given to adequate ICT facilities. Managers, however, do not give much priority to extra ICT infrastructure. Most attention, they believe, should be paid to the knowledge and skills of teachers.

Indicators for successful computer use by teachers at schools:

- there are sufficient computers (minimal 1:10)
- the quality of the devices is good (max 3 years old)
- there is an on-line connection between intern network en extern internet.
- there is enough space for teachers to use ICT

References

CBS (2008) *De digitale economie*. Den Haag: CBS.

SEO (2008) *Maatschappelijke baten van eVaardigheden*.

SCP (2007) *Achterstand en afstand*.

Programma DigiVaardig & Digibewust 2009-2013 (EZ, European Commission, KPN, Microsoft, etc).

OECD (2006)

TNS NIPO: 2001-2007.

Kennisnet/ICT op school: Four in balance Monitor 2007. Zoetermeer.

Educational Inspectorate: ICT Education Monitor 2005-2007.

ICT-tools used by teachers in Sweden as part of their work

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ICT infrastructures in general

Sweden has a long history of developing and using ICT technologies and solutions and the country has a good ICT infrastructure. In 2008, according to a survey by Statistics Sweden (the main Governmental authority for official statistics in the country), over 80% of the Swedish population aged 16-74 used the Internet on a regular basis (at least once a week) and over 70% of the people in this age span had access to fast broadband connections (Statistics Sweden, 2008). When asked what they use the Internet for, the Swedes stated that they use the Internet mainly “to seek information concerning goods or services”, for example concerning travel and accommodations, and “to send and receive e-mail”, according to the same survey (Statistics Sweden, 2008, p. 21).

ICT infrastructures in schools

General information about the Swedish school system

In Sweden, the responsibility for schools is decentralized to the municipalities (there are approximately 290 municipalities in the country). This includes the responsibility to provide continued professional development for the teachers regarding the use of ICT in education, as well as the responsibility for providing computers in the schools for teachers and pupils. The Swedish curriculum for the compulsory school system stipulates that the municipalities and the schools have a responsibility to ensure that the working environments in the school is organised such that pupils are able to “independently search for and acquire knowledge” by means of “libraries, computers, and other learning aids” (*Lpo94*, 1994, section 2.6).

Recent ICT reforms in the Swedish school system

There have been a number of initiatives and campaigns since the middle of the 1980's and onwards to improve the use of ICT in Swedish education. These initiatives and campaigns all have been different from each other in terms of budget, goals and results.

The Knowledge Foundation has sponsored a number of such projects for teachers' continued professional development in ICT and learning (Riis, 2000, p. 17). The Knowledge Foundation – an organisation initiated in 1994 by the Swedish Government to help strengthen Swedish industry and research – is a financier of new projects. Since 1994, it has invested more than 600 million Euro in over 2,000 projects run by Swedish universities and businesses.

The Swedish Ministry of Education has also initiated a number of projects and reforms to develop the use of ICT in schools, including projects for teachers' continued professional development. In the spring of 1998, the Government submitted a report about learning and ICT and announced comprehensive plans for a national programme for ICT in schools (Swedish Government Communication, 1997). As a result, a Delegation for ICT in Schools was set up and the Swedish National Action Programme for ICT in Schools, abbreviated ITiS, was formed. ITiS was launched and ran between 1999 and 2002. The total Governmental budget for ITiS was approximately 150 million Euro. The programme was for teachers on all levels in the Swedish school system, except for pre-school children at the age of 1–5 (Saúde, Carioca, Siraj-Blatchford et al., 2005), and all Swedish municipalities participated in the programme. The programme had a number of ambitious goals, including the following (Kajlert, 2001):

- 60 000 teachers “corresponding to approximately 40% of all teachers in schools” should take part in the Programme (Kajlert, 2001, p. 112). These teachers were given the opportunity to improve their knowledge and skills regarding ICT and education. More specifically, it meant that they improved their skills regarding writing simple document “using a word processing programme” and to “understand the basics of handling files” and to “be able to search for information on the Internet as well as communicate by means of e-mail” (Kajlert, 2001, p. 114).
- All participating teachers should be offered a computer. This computer would be the property of the ITiS programme but the teachers were able to bring it home and to keep it after the completion of the programme. This idea of making computers available for home use by the teachers was to help them become familiar with the latest developments regarding modern home computers.
- All participating teachers should be offered an e-mail address. This meant that every teacher in school should get their own e-mail address and access to the Internet.
- Swedish schools should get improved accessibility to the Internet.

The exact format of these ITiS projects and continued professional development initiatives varied between the municipalities and schools “depending on the participants’ pre-knowledge, interest and local pre-conditions” (Kajlert, 2001, p. 112).

ICT infrastructures in Swedish schools

In the autumn of 2006, The Knowledge Foundation conducted a survey among 1200 Swedish teachers in the Compulsory School and Upper Secondary School. 100% of the teachers stated that they had access to computers at work, which they could use for work related tasks. 45% stated that they had access to their own computer at work, i.e. a computer that they did not have to share with a colleague (The Knowledge Foundation, 2006).

The autumn 2006 study by the Knowledge Foundation also showed that about 50% of the Swedish teachers in Compulsory School use computers with their pupils, in class, at least once a week (The Knowledge Foundation, 2006).

Another survey in 2006 about ICT in Swedish schools, conducted by the European Commission, showed that almost all Swedish Compulsory Schools (89%) had fast broadband connections to the Internet (European Commission, 2006). The survey also showed that computers are often used in the classroom, as a tool for learning, in the

Swedish Compulsory Schools. Over 90% of the teachers in the Swedish Compulsory Schools stated that they had used computers in class sometime during the last 12 months, with little variation across school types and between urban and rural areas (European Commission, 2006).

Only very few teachers in Sweden report to have no, or next to no, ICT user experience (Korte & Hüsing, 2006).

Social communication ICT tools used by teachers

More than 90% of the teachers in the Swedish Compulsory School and Upper Secondary School state that they have access to the Internet and email for work related tasks, both at home and at work (The Knowledge Foundation, 2006).

Approximately 70% of the teachers in Compulsory School and Upper Secondary School communicate with their pupils via e-mail. 60% of them communicate with the parents of the pupils via e-mail (The Knowledge Foundation, 2006).

Regarding the use of computers at home, approximately 10% of the teachers in Compulsory School and Upper Secondary School use computers more than ten hours per week. Approximately 50% use it three to ten hours per week at home, and approximately 40% state that they use computers less than two hours per week at home (The Knowledge Foundation, 2006).

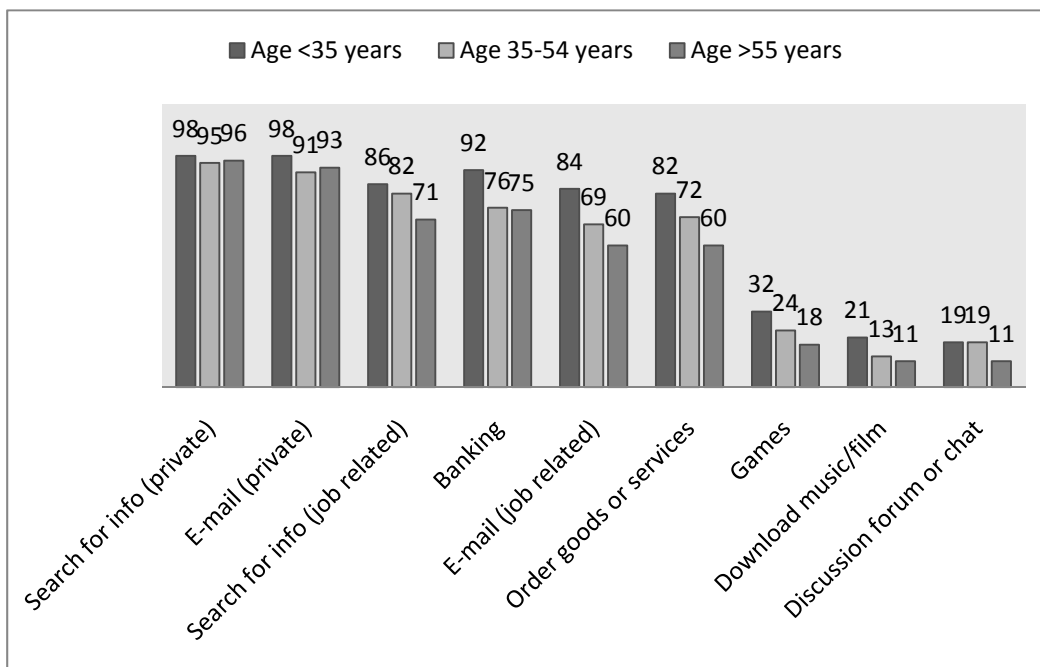


Figure 1. Swedish Primary and Secondary school teachers' reasons for using the Internet while at home. Split by age. Percent. (The Knowledge Foundation, 2006, p. 27).

The data in Figures 1-3 are based on a Swedish survey among 1200 teachers in the autumn of 2006. Figure 1 shows the nine most common reasons for teachers to use the Internet at home. Figure 1 also shows that younger teachers are, in almost all areas, more frequent users of the Internet.

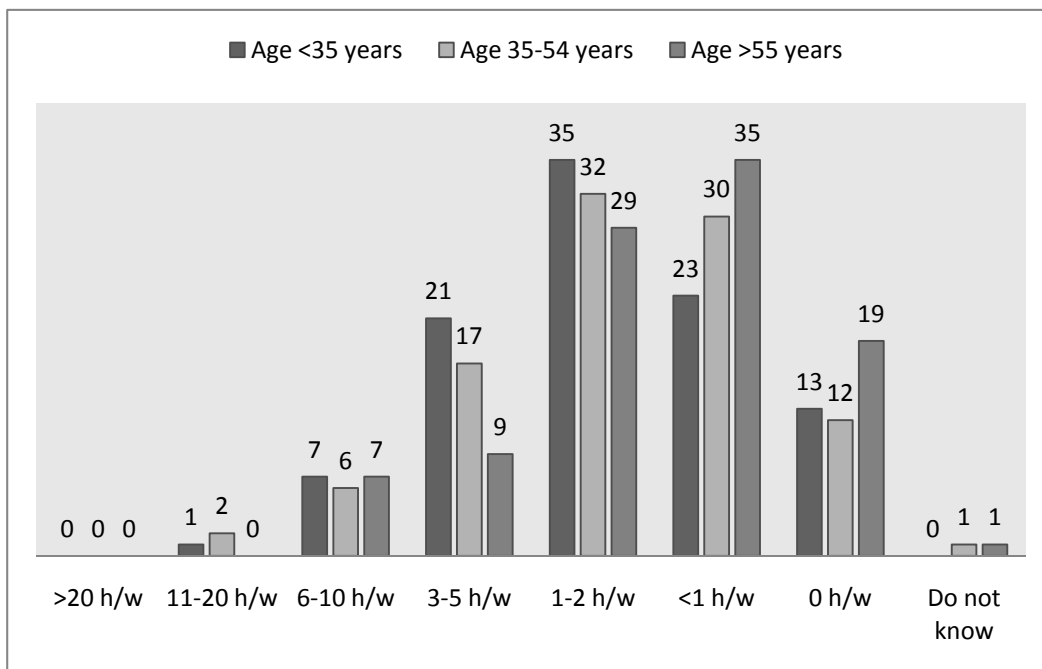


Figure 2. The amount of hours per week (h/w) that Swedish Primary and Secondary school teachers' use their own computers, while at home, for work that is directly related to their job as teachers. Split by age. Percent. (The Knowledge Foundation, 2006, p. 29).

Figure 2 shows, for example, that younger teachers use computers at their homes for work-related tasks more often than older teachers.

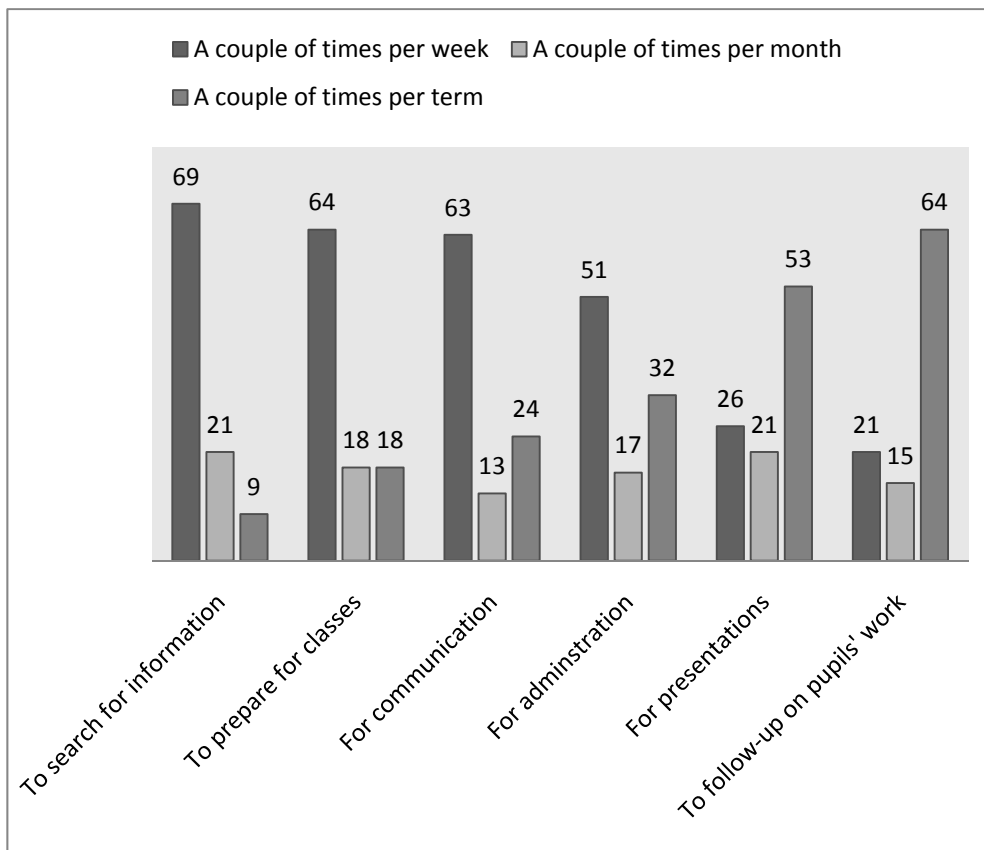


Figure 3. The six most common job-related tasks that Swedish Primary and Secondary teachers use computers for, at their schools, and how often they do it. Percent. (The Knowledge Foundation, 2006, p. 35).

Figure 3 show, for example, that 69% of the Swedish Primary and Secondary teachers use computers a couple of times per week at their schools to search for information that they need in their job. (This data is not available split by age.)

37% of the Swedish Primary and Secondary teachers use the Internet in education (in their classes) a couple of times per week, 19% use it a couple of times per month and 43% does it a couple of times per term. There are only a very small differences between younger and older teachers. 39% of the teachers under 35 years of age use the Internet in their classes a couple of times per week and the corresponding figure for teachers over 55 years of age is 37% (The Knowledge Foundation, 2006, p. 40).

Problems and solutions for teachers

Questions regarding the integrity of pupils and others are important in a society where technology is highly developed. In high tech societies, it is theoretically possible to keep track of each pupil and to create a Big Brother national state. The school has an important role in the teaching young people to be aware of such Orwellian tendencies. Therefore, it is more and more important for the school to teach and prepare pupils so that they can make sure that technology is used for the democratic society (Bengtsson, 2000).

Swedish school pupils – especially in the upper-secondary schools – use the Internet more often than their teachers. Studies have shown that 84% of the upper-secondary school pupils use the net three hours or more per week, whereas the corresponding number for their teachers is 47% (The Knowledge Foundation, 2006). There is a risk that this leads to a divide between pupils and their teachers, at least when it comes to using the Internet.

Most teachers in Sweden see the advantages of ICT use in school, for example for letting pupils “using ICT for letting pupils do exercises and practise”. Teachers believe that “pupils are more motivated and attentive”. However, there are teachers who question the assumption that there is “a pedagogical advantage of computer use in class” and they believe that it “does not have significant learning benefits for pupils” (Korte & Hüsing, 2006, p. 1655). There is a risk that these teachers, and their opinions and arguments, are forgotten or neglected in the general ICT frenzy in Sweden.

In Sweden, important decisions regarding the implementation of ICT in education have been made by politicians and policymakers. Considerable resources have been provided for technical equipment and for professional development. However, these investments mean little if we do not take into consideration that they have to be put into school practice by teachers. It is therefore important to take notice of the human dimension in the implementation of new curricula and new ICT initiatives.

References

- Bengtsson, E. (2000). Den tekniska utvecklingen inom IKT-området [The technical development regarding ICT]. In: U. Riis (Ed.), *IT i skolan mellan vision och praktik: En forskningsöversikt* (pp. 39-55). Stockholm: The Swedish National Agency for Education.
- European Commission. (2006). *Information and Communications Technologies (ICTs) in Schools: Key findings Sweden*. Brussels: Directorate-General Information Society and Media.
- Jedeskog, G. (2007). ICT in Swedish Schools 1984 – 2004: How computers work in the teachers' world. *Seminar.net: International journal of media, technology and lifelong learning*, 3(1).
- Kajlert, L. (2001). The National Action Programme for ICT in Swedish Schools. *Educational Media International*, 38(2&3), 111-118.
- Korte, W. B., & Hüsing, T. (2006). Benchmarking Access and Use of ICT in European Schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European Countries. In: A. Méndez-Vilas, A. Solano Martín, J. A. Mesa González & J. Mesa González (Eds.), *Current Developments in Technology-Assisted Education* (pp. 1652-1657). Badajoz: Formatex.
- Lpo94. (1994). [Curriculum for the Swedish compulsory school system, the pre-school class and the leisure-time centre]. Stockholm: The Government Offices of Sweden.

Riis, U. (2000). Skolans datorisering under 1980- och 90-talen [The computerisation of the Swedish schools during the 1980's and 1990's]. In: U. Riis (Ed.), *IT i skolan mellan vision och praktik: En forskningsöversikt* (pp. 8-18). Stockholm: The Swedish National Agency for Education.

Saúde, S., Carioca, V., Siraj-Blatchford, J., et al. (2005). Kinderet: Developing training for early childhood educators in information and communications technology (ICT) in Bulgaria, England, Portugal, Spain and Sweden. *International Journal of Early Years Education*, 13(3), 265-287.

Statistics Sweden. (2008). *Privatpersoners användning av datorer och Internet 2008 [Use of computers and the Internet by private persons in Sweden 2008]*. Stockholm: Statistics Sweden.

Swedish Government Communication. (1997). *Lärandets verktyg: Ett nationellt program för IT i skolan [Tools for Learning: A National Programme for ICT in Schools]*. Government Communication 1997/98:176. Stockholm: The Government Offices of Sweden.

The Knowledge Foundation. (2006). *IT i skolan: Attityder, tillgång och användning [IT in Swedish schools: Attitudes, access and use]*. Stockholm: The Knowledge Foundation (KK-stiftelsen).

