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OUTLOOK

THE eLEARNER IN 2010*

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In order to share my vision with you, it must be clarified whom we will teach, what we should teach, how we may teach and in what way policy makers can pave the way for the eLearners, young and old, towards digital literacy.

Keywords: ICT, digital literacy, digital culture, education

FROM INFORMATION TECHNOLOGY TO DIGITAL CULTURE

School labs secluded from students, with low performance computers, endless lectures on the history of computing, tedious lessons in programming…

A decade ago, Information Technology in public education was modeled after the**Abstract:** The topic of my talk is to envisage a model of the eLearner in the first decade of the new millennium. This "digital student" is similar to, and, at the same time, very different from those we encounter in the classrooms of today. field of Informatics. Many experts are, unfortunately, still convinced that educational challenges in the Age of Information can be identified with knowledge about hardware, software and applications. The essence of this culture is, however, digital literacy: the retrieval, storage, processing and interpretation of digitally transmitted information.

Up-to-date ICT tools seek to assist these processes with growing efficiency. These applications communicate more than information technology – they share digital culture. Therefore, in the focus of teaching about ICT today we find the user, not the info-specialist. Basic user-skills necessary for participating in knowledge - building environments should be at the core of the curriculum.

Rigid, limited knowledge transmitted in the traditional classroom must give way to flexible knowledge without frontiers. ICT culture is democratic – more so than any other innovation that has reached the classroom before computers did. The same way

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as writing ceased to be the privilege of a small elite group and became the tool of the masses and modern culture based on the written text was born, digital literacy also becomes the daily routine of society very rapidly.

Parallel with this process, the route of learning leads from the locality of the classroom towards a flexible and changeable "virtual universe" of networked communities.

PARADIGM CHANGE IN EDUCATION?

Decades after the introduction of computers in schools, the title of this slide should be affirmative. With a flexible, powerful tool to access practically unlimited knowledge areas, how could education have remained more or less the same as it was in the age of blackboard and chalk?

Or to formulate it in a more optimistic way: what is the secret of educational success stories, places where eLearners feel at home?

Two recent research studies underline both the needs and potentials for change. In the OECD study, "ICT and the Quality of Learning" and the SITES2 survey of IEA (the International Agency for Educational Assessment, primary and secondary schools modeling best practice in computer-supported instruction were selected from all over the world. Their practices are summarized in the following figure.

Industrial society	Knowledge based society
Instruction in facts, data, rules,	Formation of abilities, competencies
Transfer of closed,definitive "textbook knowledge"	Lifelong learning process supported by knowledge networks
Learning in closed homogeneous groups at school	Learning in flexible, heterogeneous groups
"The sage on the stage"	"Guide on the side"
Frontal teaching	Constructivist education

Figure 1. Best practice in computer-supported instruction

In these schools ready made questions and readymade answers are replaced by problem posting and problem solution. The formation of competencies and attitudes is more important than instruction about facts. Learning is a life-long process, rather than a closed-up period of childhood unconnected to adult reality. The teacher is no more the dominant source of wisdom – he or she has learnt how to change the role of the "sage on the stage" for the "guide on the side". Learning is flexible – it occurs both formally and informally, often in heterogeneous age groups that solve authentic problems as a knowledge-building community. After 2000 years of short-lived reforms, ICT forces frontal teaching off the stage. Computer-supported learning environments are best to realize the constructivist paradigm: individualized instruction in life skills.

SCENARIOS AND REQUIREMENTS OF OPTIMAL ICT USE

When ICT fails to deliver at school, we encounter the Technological Paradox: consistent tendency of an educational system to preserve itself and its practices by the assimilation of new technologies into existing instructional practices. Technology becomes "domesticated" which really means that it is allowed to do precisely that which fits into the prevailing educational philosophy of cultural transmission and training for the world of yesterday. Thus, a powerful and innovative technology is trivialized: it is used to serve traditional methods – a task PCs will perform just as well as they can create an authentic, constructivist learning environment.

Peculiarly, low achievement can also be an indicator of the importance of computer-supported education. In the TIMMS-1995 mathematics study, it turned out that students of those teachers who use computers more frequently have lower scores on the mathematics tests. When background data were examined and test quality assessed, the chief educational experts of the study revealed that the difference between the computer user and non-user teachers was in their methodology. ICT users employed much more student-centered didactical approaches, increased motivation and supported self-guided learning. Traditional tests, however, measure functioning of rote memorization skills that can be learnt best through the old-fashioned, frontal "preaching" method. Teachers who taught problem-solving based mathematics in an ICT environment, simply did not have the time to force their students acquire all the facts and data required for a typical international knowledge test. Their students scored low on the test – but were their mathematical skills really less developed? Certainly not, it is just the contrary. If we want computers to have a real chance at schools, the goals of education must seriously be reconsidered. If assessment remains traditional, how can we expect methods to change?

In the THINK Report, a series of interviews and on-site observations in EU member countries, prepared by David Wood for the European Schoolnet, four scenarios were outlined about the future of ICT in education:

Scenario 1: ICT strengthens the centralized regulation of schooling.

Scenario 2: ICT supports the creation of schools as "learning organizations"

Scenario 3: Citizenship at the centre

Scenario 4: ICT fails to deliver – technology melts down.

Scenarios 2 and 3 have been realized in several European, North American and Asian countries.

The networked classrooms of Finland, the ICT-centered teacher training of Singapore, distance education reaching even the remotest village Canada or the international movement of Telecottages where adult education and community building are both supported by ICT are well-known and promising examples. To use the term of Daniel Perkins, we need "smart schools" and must go all the way from training memories to educating minds.

Criteria of success, according to the recent school based case study project of OECD, innovative curriculum and assessment, dedicated leadership, teachers trained in proper use, and, if all these are granted, purchase, upgrade and maintenance of suitable infrastructure – PCs and educational software.

BRIDGES OVER THE DIGITAL GAP

Long-term, repeated monitoring studies are needed to prove the efficacy of ICT for education, because their major benefits may only be observed in the course of several years in life.

In the PIRLS Reading Comprehension Study, it was shown that frequent computer users are better at understanding what they read. The IEA-SITES2 project proved that those who profit most from ICT are low achievers and high poverty students. As we all know, these two groups are often the same. Schools from more than 50 participating countries reported that ICT increases motivation, enhances problem-solving skills, improves text construction and critical analysis.

ICT is expensive and constantly needs upgrading and maintenance. Shall we suggest low-income schools should employ it at the same time? Are its benefits worth its price for promoting equity, or does it widen the social gap? At the inaugural event of the new OECD project, "Promoting Equity Through ICT", at the Budapest workshop in June 2003, speakers showed successful development of low achievers and mentally or physically handicapped children through computer-supported mentoring.

Based on this, the Hungarian OECD research team designed a special, ICT supported training program for Gypsy students to develop their basic thinking skills and help them close the social gap – digitally.

EQUITY AND ICT CULTURE

The great chance of ICT culture is that it is not really technology-dependent. During his recent visit to Budapest, Bill Gates remarked that students of today have incomparably better PCs than he himself had when he launched his company. Abilities are key, not gadgets – every child is endowed with power.

Hole in the Wall – the Power is with Every Child

In the famous experiment by Sugata Mitra, generally nicknamed "the hole in the wall", a computer was placed in a niche of a wall of a house situated in a power-stricken area in India. Even though they were total novices to ICT culture, it took just a couple of minutes for street kids to get to know the basic functions of the machine and start searching, downloading and playing music from the Internet, playing games, and editing images. As they had no keyboard, they copied and pasted letters from the character map one by one, to write the words, "I love India", on the screen.

MIE – Minimally Invasive Education

In this country confronted with a severe shortage of teachers and school buildings, this project initiated the MIE (minimally invasive education) movement, supported by

the Simputer, the low end, cheap computer. For governments, the scope of activities is wider than providing basic access or handing out laptops. Helping the disadvantaged to access ICT is no more a question of social politics – it is an issue of knowledge economy.

Recognition of Unrecognized Intelligences

Traditional pedagogy focuses on verbal and numerical intelligence and leaves unrecognized other relevant intelligences – for example flexibility, critical thinking, meta-cognitive skill. Providing universal access to ICT, we may try to defeat the global knowledge divide through the educational methods inherent in this emerging culture.

SCENARIOS AND REQUIREMENTS OF OPTIMAL ICT USE

ICT acts like a chemical making secret scripts visible: it gives a chance for those traditional schooling leaves behind. In Hungary, we utilize this feature to promote disadvantaged learners from kindergarten through university level.

E-tolerance

E-Tolerance is a secondary school project launched by the Ministry for Informatics and Telecommunications for our largest minority group, the Roma (Gypsy) and Hungarian youth. They share the same digitally supported curriculum and learn about each other through lessons of tolerance and empathy.

We believe that the elimination of stereotypical thinking patters is vital for our admission to the European Union. In order to integrate successfully, it is not just our bureaucracy but also our souls that must be compatible.

Computer-supported Education in Kindergartens

In order to increase the social and economic competitiveness of the country, disadvantaged minorities should be given a chance to make use of the opportunities provided by the information society. The Hungarian government supports one of the best secondary grammar schools in the country to launch a computer-mediated distance education course for members of minority self- government bodies.

"Kid-Smart" is an integrated kindergarten ICT project aimed at the digital socialization of children at an early age, through a playful discovery of computer culture. Between 2002 and 2003, IBM donated 30 PCs developed for use in kindergartens. In the course of 2003, our ministry provided about 500 kindergartens located in disadvantaged areas. The monitoring of the program is continuously carried out through ability tests and adopted questionnaires used in the British KidSmart

Project. A significant development of skills, especially for low ability, socially disadvantaged children was observed. Even less competent youngsters have a holistic concept of the PC. For them, it not only serves as a tool for play, but also as a multifunctional, problem-solving medium.

FOUR PILLARS IN ICT FOR PARADIGM CHANGE IN EDUCATION

The success stories mentioned before show that ICT actually acts as the Trojan horse: in the PC box, up-to-date educational methods may be smuggled within the walls of traditional schooling.

The expansion of the information society within education should rest on four pillars:

Hardware and Software – provision of suitable infrastructure

Internet access – fast, inexpensive, and readily available connectivity

Skills and competencies – necessary for making full use of technology

Content provision – to communicate current and authentic knowledge.

The further down we go on this list, the more we lag behind – both on a national and international level.

THE SCHOOLNET EXPRESS

Four Pillars, Four Programs

Our reinforced project, the Sulinet Express, creates an opportunity to purchase ICT equipment tax deductible with the aim of tripling the number of families possessing a home computer.

The Schoolnet Express also provides broadband Internet access to schools by 2005.

Since we have tools and connection to each other, we have to improve the ability to use these kinds of equipment.

Finally, all the expensive ICT investment is worth nothing without freely accessible digital content.

The Schoolnet Express program is built on these four pillars.

1ST PILLAR: HARDWARE AND SOFTWARE

Number of PCs in 2002

As you may see in Figure 2, Hungary is far behind the average OECD countries in possessing PCs. The government does its best to bridge this gap led by the Schoolnet Express program.

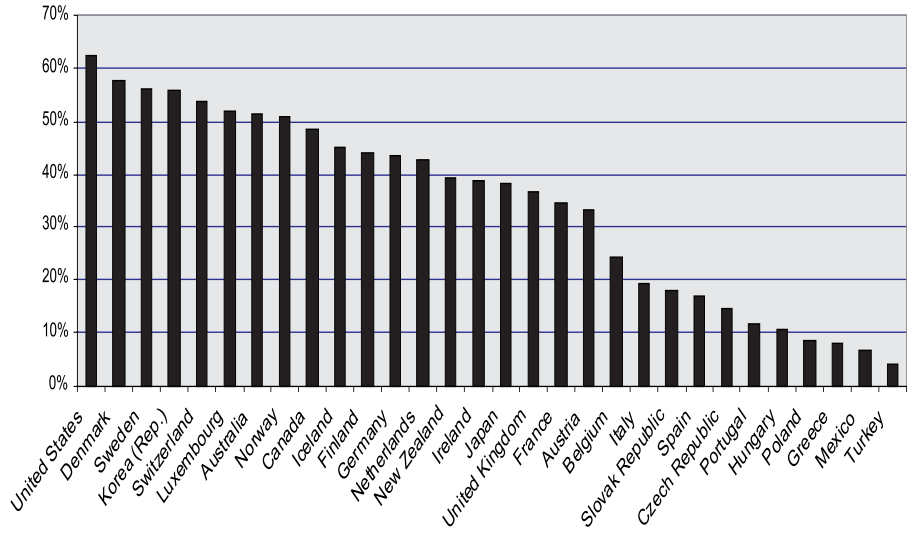

Figure 2. Number of PCs in 2002

Tax Relief for PC Purchase

The Schoolnet Express programme creates an opportunity to purchase ICT equipment tax deductible. 250 euros, 120% of the minimum wage is tax-deductible for purchase of PCs and accessories for teachers, college and university staff members, college and university students, parents of primary, secondary or tertiary level students. Employers (also schools and kindergartens) that purchase PCs or provide Internet access for employees may also do it tax free.

The state-funded project opens the possibility to purchase ICT equipment tax free. More than 1800 outlets around the country offer a selection of 250 types of equipment and 70 software packages and peripherals ranging from scanners to digital cameras. Tax deduction is obtainable for three years, - a measure that renders the leasing of equipment practically free of charge.

We entered the Age of Digital Teaching Aids with a national software development project launched this year. It makes high quality digital teaching aids freely available for both students and teachers. We hope to establish an internationally unique Digital Knowledge Base that covers the whole of our secondary curriculum. Expandable and reusable multimedia and interactive tools in this pool incorporate all areas of learning.

To facilitate home access of teaching materials through ICT solutions can bring more citizens back to adult education, thus turning education and development into a lifelong process.

ICT EQUIPMENT Purchases in the Hungarian Schoolnet Express Program

This figure shows the daily growth in sales since the launch of the Schoolnet Express, the Hungarian tax deductible PC purchase campaign.

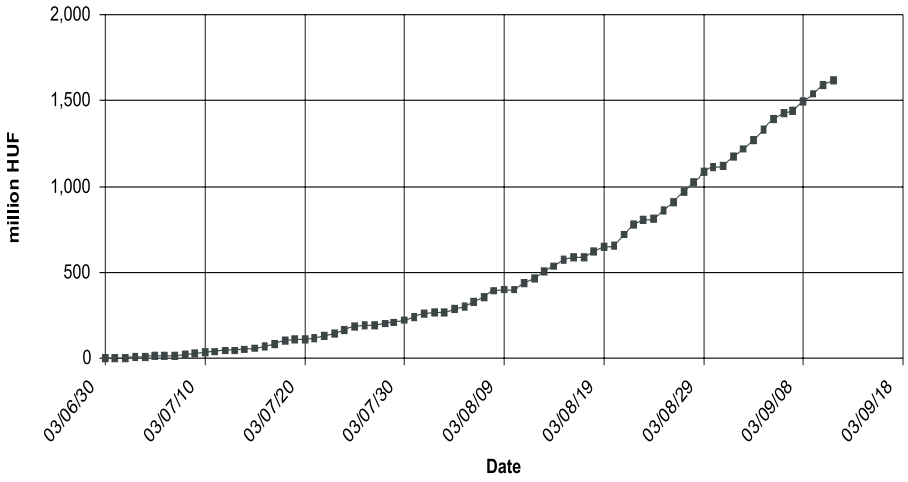

Figure 3. ICT equipment purchases in the Hungarian Schoolnet Express Program

2ND PILLAR: ACCESS

Internet Users in 2002 (% of Population)

Internet access is also a place of forced development in Hungary. Accessing information is a constitutional right – the Information Society makes it a reality. In order to improve our connectivity, massive government initiatives have been taken. We intend to increase the number of both public and private Internet access points.

In the EU, the number of computers per 1000 inhabitants is 400, in Hungary - it is 160.

The student/computer ratio in Hungary is 30 to 1, while in the EU, 9-12 students per one computer. Internet penetration is difficult to estimate correctly. When user numbers per 1000 inhabitants are considered, our figure: 145 is small in comparison to 315, the European average. As for families, the percentages are similar. In Hungary, 16% are connected to the Internet, in the EU, the same figure is 40%.

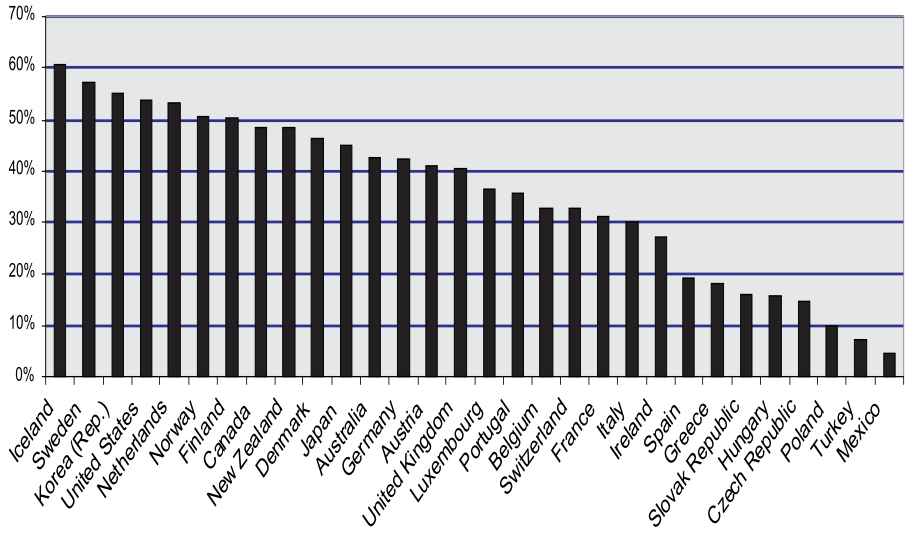

Figure 4. Internet users in 2002 (% of population)

Table 1. Computer supply and Internet connectivity at schools in Hungary and the EU

	Hungary	EU
Computer supply at schools	30 students / PC	9-12 students / PC
Internet connectivity at schools – percentage	100%	100%
Internet connectivity at primary schools	34%	91-100%

Source: TARKI, Ministry of Foreign Affairs – Hungary, OECD 2002

All Hungarian secondary schools and about one third of primary schools have an Internet connection today – in comparison, 100% of secondary schools and 91-100% of primary schools on average are connected in the European Union.

On this map of Hungary, connected schools by the end of 1998 are indicated.

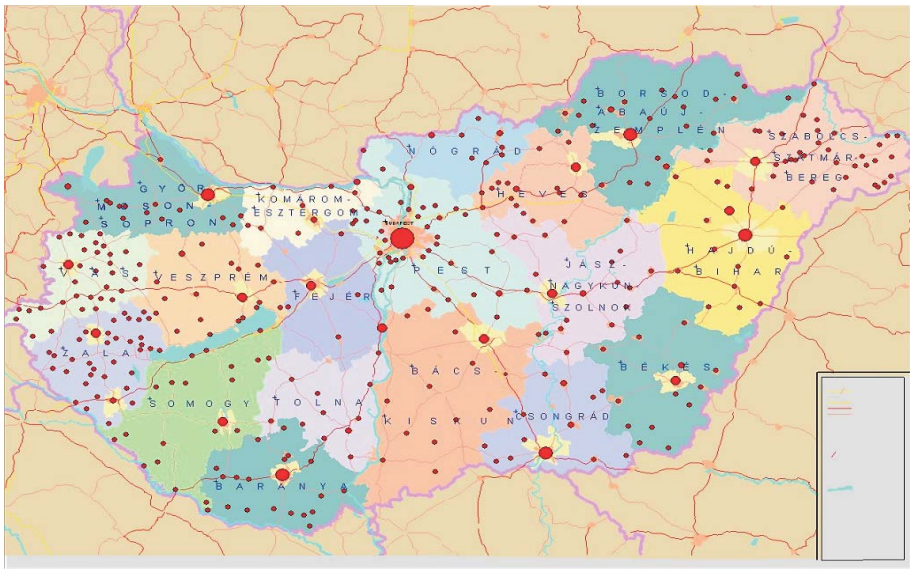

Figure 5. Connected schools by the end of 1998

On the second map you may observe how much the number of connection points at schools increased by the end of 2002.

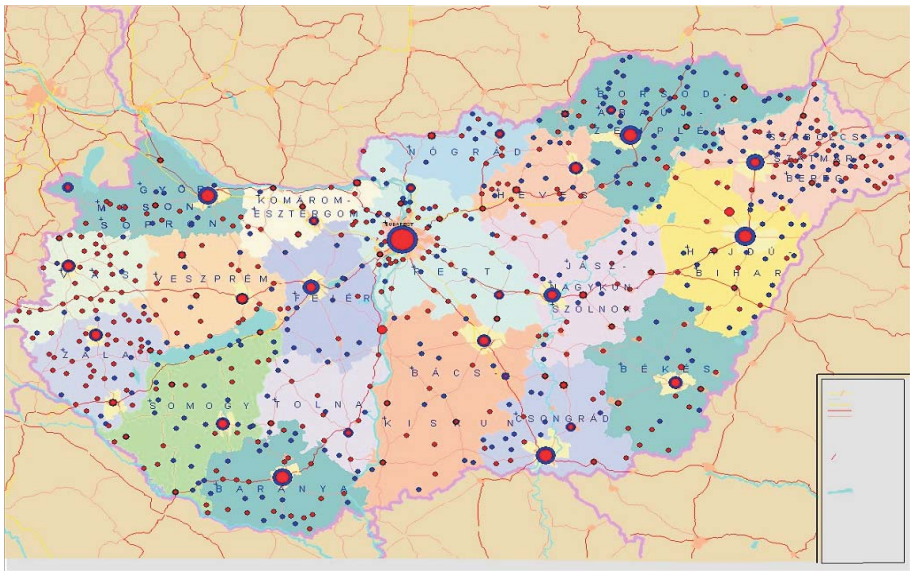

Figure 6. Connected schools by the end of 2002

The third map shows our plans to accelerate this development: by the end of 2005, all primary and secondary educational institutions of the country will have been connected to the Internet.

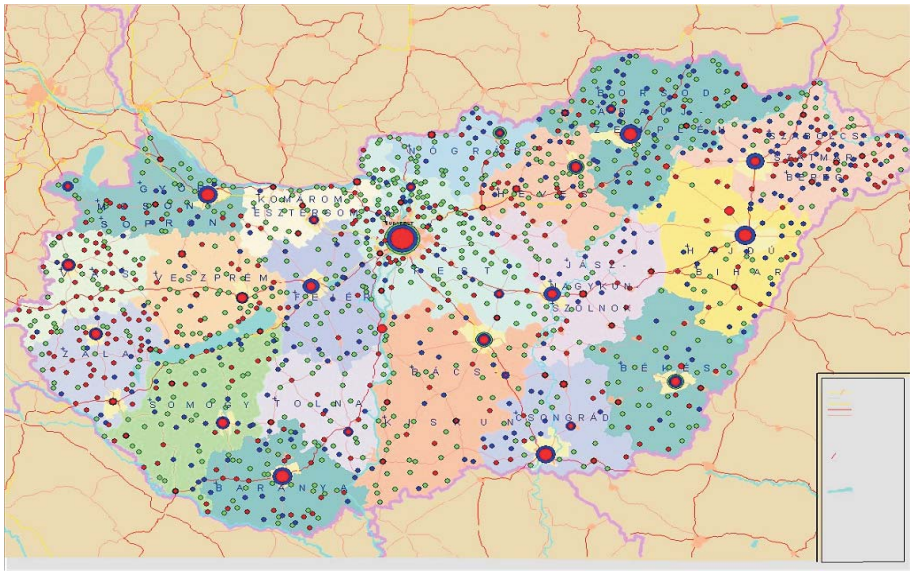

Figure 7. Connected schools by the end of 2005

Let me illustrate the characteristics of our endeavors on two charts, which show the essential features of the Swedish and Hungarian models for the dispersion of ICT culture.

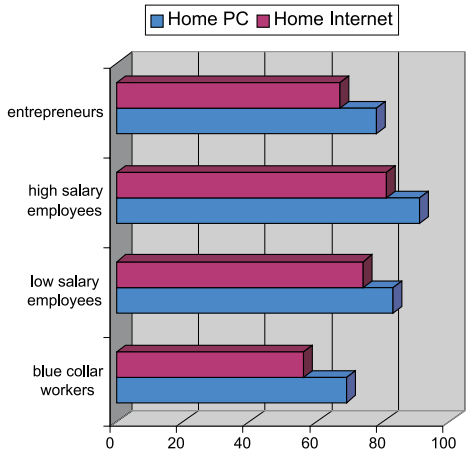

Figure 8. Swedish model

In Sweden, you find no significant differences between the number of computers possessed by university degree-holders and blue-collar workers.

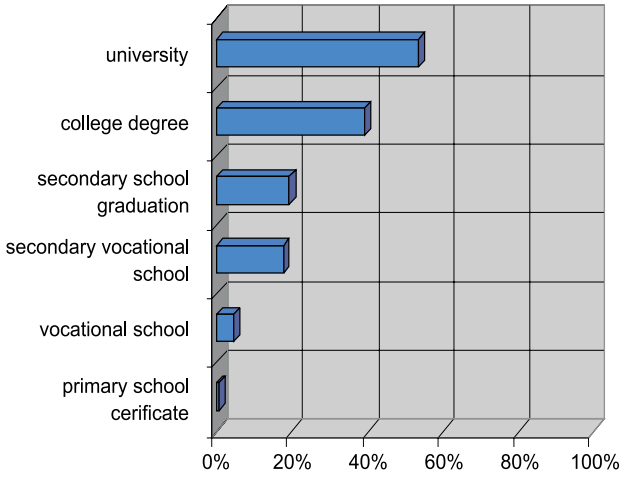

Figure 9. Hungarian case

In Hungary, however, the level of education will determine whether you own a PC or not. Digital culture, apparently, may increase or decrease social differences and thus bridge or widen the social – cultural – digital divide. It is our responsibility to solve this burning policy issue.

Our tax relief model will hopefully reach about half of our population and double the number of PCs in the homes. If so, we will reach the ownership level of Swedish blue-collar workers.

3RD PILLAR: SKILLS AND COMPETENCES

Shift in Teaching Content

On the Information Superhighway, we need well-trained drivers, and not technicians. Therefore, the Hungarian ICT curriculum will change its focus from preparing for informatics as a profession to training for the use of digital culture. At primary level, in grades 4–6, for age groups 10–12, digital literacy will be taught as an introductory course. Grades 7–9 will learn digital culture and acquire important information processing and communication skills.

Provoking the Teacher

We intend to provoke the teachers. We have given them a substantial salary raise, tax free PC and state-financed training. Now there are no more excuses, they have to jump into deep water and try to learn to swim – along with their students.

Teachers as Firewalls

Teachers are often firewalls for change: according to the OECD school-based case study project, in 2000, only 25-30% of teachers in pioneering ICT schools used computers in their regular teaching process. If we cannot convince, motivate and train them, the eLearner of 1010 will still be instructed the same way as his or her great-great-grandparents.

4TH PILLAR: CONTENT PROVISION

Digital teaching materials constitute the intellectual infrastructure for the educational reforms initiated by ICT. The Ingenious, know-it-all Textbook Author has to be replaced by emergent and cooperative knowledge builders. Learning in 2010 will certainly be an interactive process, not a one-way alley – through participation in knowledge building communities, eLearners will both learn and share their experiences with others.

In a more and more globalizing community, we need connected databases of teaching materials developed in co-operation and shared to increase equity and understanding among cultures. The digital construction of learning materials and databases containing them not only redefines the production and use of traditional textbooks, but also alter the whole infrastructure of the teacher's work.

ICT should be invited or even forced to get out of the labs and conquer the classrooms. To achieve this objective, the Hungarian Schoolnet is currently developing high quality digital teaching materials available for students, teachers and parents through a searchable Internet database.

There is no alternative! Teacher training will have to be altered; meta-knowledge, networking capacity and methodology should be in the focus. As an example, we may refer to the Webencyclopaedias. The ever expanding "blogosphere" includes scientific ventures which, due to their size and complexity, may integrate schools as partners. Such synergies may already be observed in space research, oceanography, and meteorology. We should not believe, however, that these developments make offline publications redundant. These changes, however, inaugurate a new division of labor, with new types of publications.

Today, 90% of materials used at school are traditional, printed textbooks. 7% is the share of CD-ROMs and DVDs and Internet content occupies only 3%. These proportions, however, will be radically altered, perhaps even inverted by 2010.

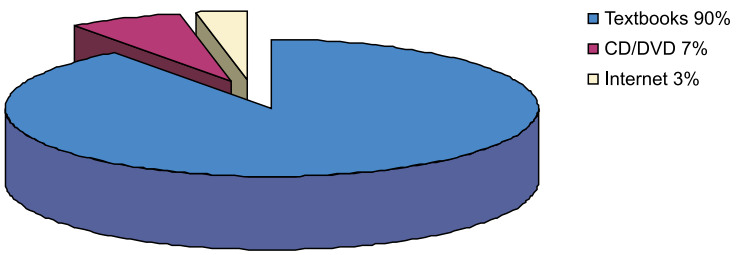

Figure 10. Division of Teaching Material Market in Hungary 2002

REAL WALLS DOWN – VIRTUAL WALLS UP?

Herbert Simon claims that the concept of knowledge, which until now was considered to mean possession, is gradually becoming to mean access. Providing access to state or EU-financed, high quality educational software may be the chance ICT culture needs for faster progress. It seems natural to consider the redundancy of parallel design, production and testing of new products and investigate the possibilities of sharing, on a non-profit basis the results of huge intellectual and financial investment.

Nowadays we tore down the wall among EU and accession countries and what do we see now? We just erect new walls with bricks of property rights! And these virtual walls are more resistant than the real ones.

Therefore we propose that all educational digital database and content developed by EU and state funding should be accessed by EU citizens for free. If all pay for it, we all should be able to reach it.

Software development efforts could be more targeted and efficient if a network of regional clearinghouses for educational software were set up to monitor and evaluate products, publicize best practice and catalyze further development in the field. We would like to provide a model for this effort through the establishment of a Central and Eastern European Educational Software Clearinghouse. It will collect, catalogue, clear for copyright, evaluate, and eventually translate into different languages, the best examples of digital teaching aids.

We believe that it is also in the interest of the non-profit content provider to reach the broadest audience possible and show, for example, treasures of cultural heritage or achievements of national science. Therefore, we invite you to consider joining this effort. We in Hungary are ready to share.

Let us not build new virtual Berlin-walls!

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