Computer literacy in the context of social exclusion and digital divide: Czech Republic in an international perspective [1] [2]

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Abstract

Computer literacy of 15-year-old pupils is analyzed within this paper and situation in the Czech Republic, Germany and Hungary is discussed using the OECD PISA (Programme for International Student Assessment) 2003 dataset. The research question of what socio-economic factors affect computer literacy is elaborated. On the basis of theoretical background (social exclusion and key competencies concepts), hypothesis covering mainly gender differences and parents' education and occupational status are formulated. There are two main ways of measuring computer literacy. The first is based on testing real computer skills and knowledge and the second, mostly used, works with respondent's self declaration. Declarative approach was used within the PISA survey within which computer literacy is represented by three separate variables (confidence in routine, internet and high-level tasks). I used them as dependant variables in my research. Besides significant differences between boys and girls, possession of a computer and an internet access was found to be most appropriate factor to explain distinctions in computer literacy.

1. Introduction

Individuals need a wide range of competencies in order to face the complex challenges of today's world and the number of people that may cope with their studies, jobs and other activities without at least some minimum level of computer skills and knowledge is decreasing nowadays. Not only upper-secondary and tertiary schools graduates are expected to dispose of skills and knowledge that are usually called 'computer literacy'.

1.1. Computer literacy

Although there is no strict definition of computer literacy, it is possible to identify some core aspects that various approaches have in common. Computer literacy covers skills and knowledge to use a computer and its additional devices (e.g. printer) as a working tool for creating simple multi-media documents, for retrieving information

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and within a network setting (sending and receiving e-mails, finding out information on the internet). Thus, it involves using both hardware and software tools. Another valuable component of computer literacy is to know, how computers work and operate. In a broader sense, computer literacy is often taken as synonymous to information literacy that relates to all the information and communication technology (ICT) tools, it means not only computers. (McLeod 1994, Vymětal et al. 2005: 22)

It has been discussed for many years that an access to computers is not equal (Angus et al. 2004) and it is usually characterized as a gap between the so called 'computer rich' and 'computer poor' people. Named as 'digital divide', it expresses the gap between those with regular and effective access to digital technologies and those without. It also refers to those who can benefit from it on the one hand, and those who can't on the other hand. In other words, access and effective use of computers and other ICT tools both make difference. The digital divide concept has been discussed for many years also in connection with possible risks of social exclusion (this concept is discussed more in the next part of the paper).

The conventional notion of 'access' in terms of whether technology is 'available' or not obscures more subtle disparities in the context of ICT access, according to Selwyn (2002). For example, accessing on-line information and resources from a home-based computer is not necessarily equitable to accessing the same materials via an open-access work station in a public library. Issues of time, cost, quality of the technology and the environment in which it is used, as well as more 'qualitative' concerns of privacy and 'ease of use' are all crucial mediating factors in people's access to ICT, Servon (2002) mentions.

He points out youth as a group that stands most to lose from being disconnected and most to gain from obtaining access to ICT. Those not connected will be potentially cut off from other opportunities ICT can offer (e.g. education, jobs) and those connected will get greater access to information, higher education or well-paid jobs, Servon (2002) argues.

Furthermore, Van Dijk (1999) elaborates 'access' and distinguishes four kinds of barriers to access and the type of access they restrict:

a) Lack of elementary digital experience caused by lack of interest, computer anxiety, and unattractiveness of the new technology ("mental access"),

b) No possession of computers and network connections ("material access"),

c) Lack of digital skills caused by insufficient user friendliness and inadequate education or social support ("skills access"),

d) Lack of significant usage opportunities ("usage access").

1.2. ICT skills and knowledge - present findings

On the basis of a survey carried out by EUROSTAT in 2006 it is possible to illustrate ICT skills and knowledge level in the Czech Republic in comparison with other countries. The terminology of the survey (Eurostat 2006) prefers to use 'digital literacy' and 'e-skills' terms, but it actually refers to the same what computer literacy covers.

According to the survey (Eurostat 2006) that focused on a sample of 16+ year olds, higher level of ICT skills and knowledge were observed for younger people and for those with higher level of achieved education. Although these facts are not surprising, worth mentioning is that the proportion of people who 'never used a computer' in the Czech Republic is above average.

Then, when we move from the general public to the 15-year-old pupils now, the availability of computers at schools is being monitored by both the OECD (2005a,

2006d) and the EU (EC 2006). Thus, there is for instance evidence covering how many pupils correspond to one computer on average or how many computers are available per 100 pupils (ÚIV 2006).
Although data describing availability at school level are slightly under average for the Czech Republic, more significant difference relates to availability of computers at home. In a comparative perspective, availability of a computer at home is strongly related to the level of socio-economic background of the family. And the extent of these differences is above-average in the Czech Republic (OECD 2005a).
Besides, the National Institute of Technical and Vocational Education (NUOV) deals with issues of employability and work eligibility of secondary school graduates in the Czech Republic and their findings (Festová 2004; Kalousková et al. 2004; Vojtěch et al. 2004; Trhlíková, Vojtěch 2004) help to indicate possible barriers that pupils could face when entering labour market. What is important from the perspective of this paper is that computer skills of graduates are more and more treated essential by the employers, no matter if they seek for a secondary or tertiary school graduate, according to NUOV's findings.
Furthermore, to deal with the computer literacy issue is relevant also from the perspective of the lifelong learning concept. The aim of the policy that concerns ICT skills and knowledge has to be focused on providing provisions not only for younger generation but for adults as well. This needs to be more emphasized in the Czech Republic, because we are lagging behind, according to experts' view (OECD 2006a, 2006b, 2006c).

1.3. Research question

For the purpose of my research presented within this paper, I formulated the following research question: What socio-economic factors affect computer literacy of 15-year-old pupils and what are the implications for educational policy?

2. Theoretical background

In this section, I deal with a brief overview of theoretical concepts used within my research. It covers both educational policy and sociology of education fields. After addressing computer literacy in the context of social exclusion I discuss the issue of transition from education to labour market with a particular emphasis on the concept of 'key competences' and work eligibility.

2.1. Social exclusion

To briefly focus on social exclusion, I will use the definition presented by Estivill (2003), who points out that social exclusion is not only connected with poverty. However, he warns against the so called catch-all expression that covers 'every think'. According to him, social exclusion may be understood as *an accumulation of ruptures arising from economy, politics, and society, which gradually distance and places persons, groups, communities and territories in a position of inferiority in relation to centres of power, resources and values*. Referring to Mingione, Estivill (2003: 28) emphasises that it was only in the early 1990s when social exclusion started to be treated not only materially. Contacts or social networks have become the relevant factors of analyzing social exclusion.
There are three main levels of social exclusion (Estivil 2003) – micro (individual), mezzo (group) and macro (institutional). Social exclusion coming from low level of achieved education or from political field (rights of Citizens) are only examples of a

wide range of factors that can may lead to social exclusion that is, generally said, related to *dissatisfaction or unease felt by individuals who are faced with situations in which they cannot achieve their objectives for themselves or their loved ones*, Estivil (2003: 30) argues.

Based on the above mentioned characteristics, I admire to assume that computer literacy may be seen relevant from the perspective of social exclusion, both in material (e.g. possession of a computer) and non-material sense (e.g. contacts with people thanks to e-mail).

Furthermore, worth mentioning in the context of social exclusion is the importance of computer literacy for integration of disabled people. Mareš et al. (2006) analyzed how the issue of access to education is covered in actions plans of social inclusion in various countries, including the Czech Republic. As the authors (Mareš et al. 2006) mention, action plans cover in particular access to education for disabled children. Not only within the Czech Republic's action plan (that discusses the issue of access to education in the most detailed way) but within all analyzed action plans there is a strong emphasis put on reflection of new possibilities related to ICT use, according to their findings (Mareš et al. 2006).

2.2. Key competences

The concept of key competencies started to be discussed in the 1970s. This topic was firstly described by Mertens in 1974 in the context of labour market and employability, Hučínová (2006) mentions. It was not no early than in the late 1990s when key competencies became to be involved in educational issues. The main reason for it was connected with the focus on quality and effective education, she explains.

Defining such competencies can improve assessments of how well prepared young people and adults are for life's challenges, as well as identify overarching goals for education systems and lifelong learning, according to the OECD report (2005b).

A competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competency that may draw on an individual's knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating. (OECD 2005b: 4)

In connection with the PISA (Programme for International Students Assessment) survey, the OECD carried out the DeSeCo Project through which it has collaborated with a wide range of scholars, experts and institutions to identify a small set of key competencies, rooted in a theoretical understanding of how such competencies are defined. The project concluded (OECD 2005b: 11) that each key competency must:

- *Contribute to valued outcomes for societies and individuals;*
- *Help individuals meet important demands in a wide variety of contexts; and*
- *Be important not just for specialists but for all individuals*.

Then, there are two examples of a list of key competencies in the appendix (Part 1) to illustrate the above mentioned statements. It is necessary to point out that both, one that covers definition created at the EU level and the second that focuses on view no being implemented in the Czech Republic, include ICT skills and knowledge (computer literacy) as one of the core aspects.

2.3. From school to work

Katrňák (2004) addresses effect of parents' education on children's educational perspectives when he defines two concepts covering influence of family background (stance to education) on children's own stance. The so called 'tight relation' illustrates the supportive approach of parents with higher level of achieved education. 'Lax relation', in contrast, refers to low educated parents that rather give up responsibility for their children's education to school.

The next 'step' - entering labour market after graduation - is an aspect that is pointed out by many authors (e.g. Shavit and Műller 2000, Katrňák 2004) as well. The importance of a relation between achieved education and work eligibility at labour market is a much discussed point. Furthermore, Kerckhoff (2000) has investigated, how the characteristics of educational systems affect the process by which young people make the transition form school to work.

Therefore the next part of background for my analysis comes from the current research focused on educational aspirations. The results presented by Mateju et al. (2007) confirmed that *the more stratified the system of secondary education, the stronger the effect of socioeconomic background on educational aspirations, even after controlling for students' ability*. They (Mateju et al. 2007) identified three groups of countries defined by different levels of educational system stratification. The 'more stratified' group includes for instance the Czech Republic and Slovakia, e.g. Hungary and Poland represent he middle and e.g. Sweden counts to the 'less stratified' group. Mateju et al. (2007) came to the conclusion that the net effect of social background on aspirations turned out to be significantly stronger in more stratified educational systems.

2.4. Socio-economic background and performance – current PISA findings

Results from OECD PISA 2003 survey indicate (OECD 2004) that while all participating countries show considerable within-school variance, in most countries variance in student performance in math between schools is also considerable. On average across OECD countries, differences in the performance of pupils between schools account for 34 per cent of the OECD average between student variance.

In the Czech Republic (and also in Austria, Belgium, Germany, Italy), variation in performance between schools is larger, over 1.5 times that of the OECD average level. There are countries (e.g. Finland, Ireland) where performance is largely unrelated to the schools in which students are enrolled. Furthermore, these countries perform well or at least above the OECD average level.

There is an assumption that between school differences are influenced by socio-economic factors (family background, etc.), according the report (OECD 2004). Parental occupational status is often closely interrelated with other attributes of socio-economic status and has a strong association with student performance. Although there are differences in the distribution of socio-economic characteristics between countries, in general, there is a certain relation between performance and socio-economic background.

Then, relationship between performance and socio-economic background tends to be stronger at school than at student levels. The Czech Republic (together with Germany or Hungary) is a country in which schools differ considerably in their socio-economic intake even though, within schools, students tend to have a comparatively homogeneous socio-economic background, it is argued in the report (OECD 2004).

Results from the PISA 2003 show that some aspects of pupils' ICT availability are strongly connected with their performance, it is argued in the final report (OECD 2005a). Furthermore, there is a clear relation between level of confidence to do routine tasks on a computer and pupils' performance in math literacy. The average proportion of variance in math performance explained by it is 10 per cent with the highest values (15 to 19) for Hungary, Portugal and Slovakia.

3. Analytical strategy

3.1. Hypothesis

With a link to the above mentioned research question and theoretical background I decided to cover within my analysis the Czech Republic, Germany and Hungary to discover if there are some differences between them from the perspective of computer literacy of 15-year-olds. For all the three countries was found (OECD 2004) that pupils in particular school types have comparatively homogeneous socio-economic background and thus I decided not to include school level to my analysis. Furthermore, because Hungary was, in comparison to the Czech Republic and Germany, classified by Mateju et al. (2007) to the group with a 'middle' level of educational system stratification, it is possible to focus on a difference from this point of view as well.

The specified research question is as follows:

What socio-economic factors affect computer literacy of 15-year-old pupils in the Czech Republic, Hungary and Germany and what are the implications for Czech educational policy?

On the basis of my research question I formulated the following hypotheses:

H1: The higher is parents' highest achieved education, the higher is computer literacy of their pupils.

H2: The higher is parents' occupational status, the higher is computer literacy of their pupils.

H3: Level of computer literacy of girls and boys is the same.

H4: Educational and job aspirations of pupils are strongly associated with level of computer literacy.

H5: There is no difference between the three considered countries in strength of socio-economic factors effects on computer literacy.

3.2. Data

To test my hypotheses I used the international data file from PISA 2003. The OECD PISA survey covers three literacy domains (reading, mathematical and scientific literacy) in a comparative perspective. It focuses on skills of 15-year-old pupils (the target population is defined as 15-year-olds enrolled in school, regardless of the grade or type of institution in which they are enrolled) and runs every three years.

They have already been carried out three cycles (2000, 2003 and 2006). More than forty countries took part in each cycle, including the Czech Republic in all the cycles. Considering research instruments, test booklets covering three literacy domains are used within the PISA survey and also student questionnaire (used to collect mainly information about socio-economic background) is included.

Separate part of student questionnaire is called ICT questionnaire and this particular part relates to my analysis of computer literacy. Although the ICT questionnaire was used in all three cycles, the number of questions and their content and wording has changed from one cycle to the next. Therefore only 2003 and 2006 data are comparable from the perspective of this paper. It has not been possible to include 2006 data yet, because the PISA 2006 dataset will be officially published in December 2007.

3.3. Methodology

From the methodological point of view, my analyses were done using the following analytical approaches: correlation, linear regression and international comparison.

It was already said in the first part of this paper that there is not just one clear definition of computer literacy. This fact probably supports various approaches of empirical measuring of computer literacy. There are two main ways of measuring the level of computer literacy, according to Sak (Sak and Sakova 2006). First possibility is based on testing really computer skills and knowledge when a respondent directly works on a computer. The second approach includes respondent's declaration of his/her computer skills and knowledge, either referring to a provided list of activities, or by open self-evaluation. Although it is clear that the second approach is less objective, most part of research evidence, not only in the Czech Republic (Sak and Sakova 2006) has been gained using it. Apart from other aspects, one clear reason for it is that it is cheaper to carry out such a type of survey, compared to really testing computer literacy.

Within the PISA survey, computer literacy is measured on the basis of pupils' self declaration. In 2003, they answered the question 'How well can you do each of these tasks on a computer?'. There was a list of twenty-four items (activities) and for each (see Appendix, Part 2) they were asked to choose one of the following possibilities:

I can do this very well by myself

I can do this with help from someone

I know what this means but I cannot do it

I don't know what this means

Then, after the data collection, all the measured items were divided into three groups – routine tasks, internet tasks, high-level tasks (for detailed list see Appendix, Part 3). According to the groups, three standardized variables were then counted for each respondent – confidence in routine tasks, confidence in internet tasks and confidence in high-level tasks. Theses variables are used within my analysis to represent pupils' computer literacy.

Someone could argue that there is no sense in analyzing computer literacy that was only measured the way as described above. The reason why I dared to analyze PISA data is connected with the STEM/MARK survey (STEM/MARK 2005) that was carried out on behalf of the Ministry of Informatics of the Czech Republic in 2005 in relation to the National Programme for Computer Literacy.

Aspects that were addressed by the survey (STEM/MARK 2005) correspond to tasks addressed within PISA 2003 survey. Although the main part of respondents (STEM/MARK 2005) was phone interviewed (15 000 of 18-60 year olds, 500 of 15-17 olds and 500 of 61+ olds) and it means that the interviewed people declared their computer skills and knowledge, there was a control group of 500 people who were also asked for direct testing. There were not found any significant differences between declared and tested computer skills and knowledge, according to published results (Peterka 2005, STEM/MARK 2005). Therefore, I have used their findings to legitimize my approach when working with PISA 2003 data.

4. Analysis and results

With reference to the hypothesis, the following variables were used to analyze to what extent various factors affect computer literacy of 15-year-old pupils. Data were weighted by final student weight within my analysis.

List of variables:

sex	(girls=0, boys=1)
routconf	confidence in routine tasks
intconf	confidence in internet tasks
highconf	confidence in high-level tasks
hisced	highest educational level of parents (ISCED)
hisei	highest parental occupational status (scale from 0 to 90)
sisced	expected educational level of student (ISCED)
ssecateg	self white collar/blue collar classification[3]
st17q04	Possessions of a computer at home (yes=1, no=2)
st17q06	Possessions of an internet access at home (yes=1, no=2)

The three above mentioned variables (confidence in routine tasks, confidence in internet tasks and confidence in high-level tasks) are strongly correlated mutually (see tables 2 to 7) and thus, they are used separately – each as a dependent variable that represent computer literacy - when measuring what factors affect computer literacy.

Firstly, it was necessary to prove, if it is possible to work with variable 'sex' as with an independent variable placed within the linear regression model, or not. Because there are some basic differences between boys and girls in their answers (see Appendix, Part 3) and also the statistics shown in table 1 illustrate difference, affects of computer literacy are analyzed separately for boys and girls.

The following findings can be formulated on the basis of correlation analysis (tables 2 to 7). Not surprisingly, there is a strong relation between highest educational level of parents (hisced) and highest parental occupational status (hisei) and it is slightly weaker in Germany compared to Czech Republic and Hungary. Similarly, there is a significant association of expected educational level of student (sisced) with self white collar/blue collar classification (ssecateg), the weakest in Germany again.
Quite obvious is probably strong correlation of *sisced* with *hisei* and *hisced.* More difference can be seen in a relation of *ssecateg* with *hisei* and *hisced.* In comparison to *sisced*, there is a bigger difference between boys and girls, expressed with stronger correlation for boys. On a country level, there is the strongest effect for Hungary and the weakest for Germany.
It is evident from correlations' values that possession of a computer and an internet connection at home (st17q04 and st17q06) is affected by *hisei* and *hisced.* Although the affect is not as strong in Germany as in Hungary or the Czech Republic, it is possible to point out that possession of an internet access (st17q06) is affected more than possession of a computer (st17q04).
Assuming that, *st17q06* and *st17q06* are used separately in further analysis. Stepwise method was used to indicate linear regression models for the three dependent

[3] (1-white collar high skilled, 2-white collar low skilled, 3-blue collar high skilled, 4-blue collar low skilled)

variables - *routconf, intconf* and *highconf* ('computer literacy'). Assuming that the aim is to compare Germany and Hungary to the Czech Republic, the first phase of regression analysis was only made on the Czech Republic's data.
On the basis of this analysis, most variables were eliminated from further step. Both possession of an internet access (st17q06) and possession of a computer (st17q06) were found as the strongest factors affecting computer literacy that is represented by *routconf, intconf* and *highconf.* Although more part of the variability of *routconf, intconf* and *highconf* could be accounted when adding highest educational level of parents (*hisced*) or expected educational level of student (*sisced*), they are not included within the next models because of their (*hisced* and *sisced*) quite strong correlations with *st17q06* and *st17q04* that can not be omitted.

Then, as a next step, linear regression models for both girls and boys in all the three countries were counted. Tables 8 and 9 illustrate what per cent of variability of *routconf, intconf* and *highconf* is explained by *st17q06* and the same for *st17q04*.
Although the level of explained variability is not high in general, there are some aspects worth pointing out. Boys' computer literacy seems to be more affected by either possession of an internet access or possession of a computer than girls' computer literacy. In other words, boys' computer literacy could to more extent be explained by socio-economic background of the family (represented by both possession variables). This can be claimed mostly according to R-square values for confidence in high-level tasks.
From the countries' perspective, there is some difference between Germany on one hand and the Czech Republic and Hungary on the other hand. The proportion of explained variance is much lower for Germany and I would interpret this fact in the sense that the average level of economic conditions in Germany is higher than in other two countries. And it enables to bigger part of German households that they can afford to possess a computer.
To conclude, I dare to claim that the general low level of explained variation indicates the following. The level of computer literacy in all the three countries does not really much differ in the context of socio-economic background of a family, according to my analyses.

5. Conclusion and discussion

When focusing on the results of my analysis from the hypotheses' perspective, I did not disconfirm H1, H2 and H4. I offered some evidence that there is a difference between countries (H5) and that computer literacy of boys versus girls is not the same (H3).
Referring to the above mentioned stronger affection of boys' computer literacy by socio-economic background of the family, I will briefly focus more on the Czech Republic. When asking 'who taught you most about how to use computers and internet?', girls mostly answered that 'my school', whereas boys answered mostly 'I taught myself' and 'my friends'. The fact is that the average level of boys' computer literacy is higher than of girls'.
I would like to point out one possible proposal for educational policy measure in this context. Although I know that activities like computer games playing need to be taken into account and more policy document study is needed as well, I think that it would be useful to focus on free time activities that will attract girls to computers.

Thinking about some future perspectives of the topic I discussed within this paper, I plan to extent my analysis after PISA 2006 data will be published in December 2007. It will give me a chance to analyze development and possible changes that occurred from 2003 to 2006.

6. References

Angus, L.; Snyder, I.; Sutherland-Smith, W. 2004. „ICT and Educational (Dis)advantage: Families, Computers and Contemporary Social and Educational Inequalities." *British Journal of Sociology of Education*. 2004, Vol. 25, No. 1, s. 3-18.

EC 2006. *Information and Communications Technologies (ICTs) in Schools*. Brussels: European Commission, Information Society and Media DG. Document available at www: http://europa.eu/information_society, 21.2.2007.

Estivill, J. 2003. *Concepts and strategie for combating social exclusion: an overview*. Geneva: ILO, 2003.

Eurostat. 2006. *How skilled are European in using computers and the Internet?* Statistics in focus. 17/2006.

Festová, J. 2004. *Nezaměstnanost absolventů škol se středním a vyšším odborným vzděláním 2004*. Praha: NÚOV, 2004.

Hučínová, L. 2006. Klíčové competence: Nový fenomén ve vzdělávání. na webu Praha: Vyzkumny ustav pedagogicky. Document available at www: http://www.vuppraha.cz/index.php?op=sections&sid=173, 2.2.2007.

Kalousková, P. et al. 2004. *Potřeby zaměstnavatelů a připravenost absolventů pro vstup na trh práce – 2004*. Praha: NÚOV, 2004.

Katrňák, T. 2004. *Odsouzeni k manuální práci: vzdělanostní aspirace v dělnické rodině.* Praha: SLON, 2004.

Kerckhoff, A. C. 2000. „Transition from School to Work in Comparative Perspective". Pp. 453-474 in Hallinan, M. T. (ed.) *Handbook of the Sociology of Education.* New York: Kluwer Academic/Plenum Publishers.

Mateju, P., Soukup, P., Basl, J. 2007. Educational Aspirations in a Comparative Perspective: The role of individual, contextual and structural factors in the formation of educational aspirations in OECD countries. *Sociologicke studie* 07: 1. Praha: Sociologicky ustav AV CR, v.v.i. (document in print)

Mareš, P. et al. 2006. *Sociální vyloučení a sociální začleňování v České republice jako veřejné politická agenda*. Praha: CESES.

McLeod, R. 1994. *Information Systems Concepts*. New York: McMillan, 1994.

OECD. 2004. Chapter 4: How Student Performance Varies between Schools and the role that Socio-economic Background Plays in This. Pp. 159-205 in *Learning for Tomorrow's World – First Results from PISA 2003*. OECD 2004.

OECD 2005a. *Are Students Ready for a Technology-Rich World? What PISA Studies Tell Us*. Paris: OECD, 2005.

OECD 2005b. *The Definition and selection of key competencies*. Paris: OECD. Document available at www: http://www.oecd.org/dataoecd/47/61/35070367.pdf

OECD. 2006a. *Czech Republic*. OECD Economic Surveys. Paris: OECD, 2006.

OECD. 2006b. *Economic Survey of the Czech Republic, 2006*. Policy Brief. Paris: OECD, June 2006.

OECD. 2006c. „Education and Training Policy ICT and Learning: Supporting Out-of-School Youth and Adults." *Education & Skills*. 2006, Vol. 2006, No. 7, s. 1 – 174.

OECD. 2006d. *Education at a Glance, 2006*. Paris: OECD, 2006.
Peterka, J. *Jak se měří informační gramotnost?* Document available at www: http://digiweb.ihned.cz, 11.4. 2005.
Sak, P.; Saková, K. *Počítačová gramotnost a způsoby jejího získávání*. Document available at www: http://www.lupa.cz/clanky, 28.11.2006.
Selwyn, N. 2002. Rethinking the digital divide in adult education. *Adults Learning*. 13 (10): 12-16.
Servon, L.J. *Bridging the Digital Divide*. Oxford: Blackwell, 2002.
Shavit, Y., Muller (PREHLASOVANE U), W. 2000. „Vocational Secondary Education, Tracking, and Social Stratification“. Pp. 437-452 in Hallinan, M. T. (ed.) *Handbook of the Sociology of Education.* New York: Kluwer Academic/Plenum Publishers.
STEM/MARK. 2005. *Výzkum informační gramotnosti.* Document available at www: http://www.dialogin.cz, 7.2. 2007.
ÚIV. 2006. *České školství v mezinárodním srovnání. Stručné seznámení s vybranými ukazateli publikace OECD Education at a Glance 2006*. Praha: Ústav pro informace ve vzdělávání, 2006.
Van Dijk, J., Hacker, K. 2003. The Digital Divide as a Complex and Dynamic Phenomenon. *The Information Society.* 19: 315–326.
Vojtěch, J. et al. 2004. *Uplatnění absolventů škol na trhu práce - 2004*. Praha: NÚOV, 2004.
Vymětal, J.; Diačiková, A.; Váchová, M. 2005. *Informační a znalostní management v praxi.* Praha: LexisNexis CZ s.r.o., 2005.
Trhlíková, J.; Vojtěch, J. *Názory pracovníků úřadů práce na uplatnění absolventů škol – 2004*. Praha: NÚOV. Document available at www: http://www.nuov.cz, 5.9.2006.

7. Appendix

Table 1: Comparison of means and medians for boys and girls

	Czech Republic		**Hungary**		**Germany**	
Statistic	Boys	Girls	Boys	Girls	Boys	Girls
Confidence in routine tasks*						
Mean	0,42	-0,01	0,12	-0,37	0,37	-0,06
Median	0,81	-0.04	0,80	-0,45	0,80	-0,04
Confidence in internet tasks						
Mean	0,30	-0,17	-0,24	-0,64	0,35	-0,07
Median	0.83	-0,32	-0,32	-0,63	0,87	0,09
Confidence in high-level tasks						
Mean	0,39	-0,30	-0,10	-0,59	0,43	-0,26
Median	0,40	-0,29	-0,14	-0,58	0,39	-0,29

* Values of all the three 'confidence' variables may be of value from -6 to 3.
Source: PISA 2003 data

Table 2: Correlation matrix (Czech Republic – girls)

	hisced	routconf	highconf	intconf	ssecateg	sisced	st17q04	st17q06
hisei	.668	.164	.058	.157	-.240	.392	-.277	-.333
hisced		.183	.081	.158	-.271	.414	-.288	-.309
routconf			.563	.496	-.161	.284	-.435	-.313
highconf				.609	-.047	.098	-.235	-.228
intconf					-.072	.181	-.198	-.412
ssecateg						-.489	.229	.147
sisced							-.321	-.258
st17q04								.510

All correlations are significant at the 0.01 level (2-tailed).

Table 3: Correlation matrix (Czech Republic – boys)

	hisced	routconf	highconf	intconf	ssecateg	sisced	st17q04	st17q06
hisei	.613	.236	.185	.226	-.332	.400	-.251	-.302
hisced		.212	.174	.195	-.298	.398	-.230	-.280
routconf			.520	.602	-.255	.257	-.489	-.302
highconf				.620	-.196	.206	-.318	-.303
intconf					-.240	.257	-.342	-.436
ssecateg						-.548	.244	.249
sisced							-.245	-.231
st17q04								.508

All correlations are significant at the 0.01 level (2-tailed).

Table 4: Correlation matrix (Germany – girls)

	hisced	routconf	highconf	intconf	ssecateg	sisced	st17q04	st17q06
hisei	.497	.120	.010	.138	-.171	.365	-.171	-.292
hisced		.117	.045	.135	-.182	.369	-.171	-.232
routconf			.559	.558	-.088	.184	-.249	-.185
highconf				.569	-.019	.040	-.153	-.117
intconf					-.067	.132	-.238	-.412
ssecateg						-.285	.094	.113
sisced							-.179	-.236
st17q04								.462

All correlations are significant at the 0.01 level (2-tailed).

Table 5: Correlation matrix (Germany – boys)

	hisced	routconf	highconf	intconf	ssecateg	sisced	st17q04	st17q06
hisei	.459	.149	.097	.164	-.311	.409	-.149	-.246
hisced		.135	.126	.141	-.203	.354	-.134	-.215
routconf			.485	.607	-.185	.208	-.321	-.221
highconf				.561	-.108	.102	-.164	-.202
intconf					-.180	.183	-.263	-.432
ssecateg						-.443	.145	.197
sisced							-.119	-.177
st17q04								.447

All correlations are significant at the 0.01 level (2-tailed).

Table 6: Correlation matrix (Hungary – girls)

	hisced	routconf	highconf	intconf	ssecateg	sisced	st17q04	st17q06
hisei	.638	.196	.086	.202	-.311	.430	-.356	-.364
hisced		.230	.127	.236	-.337	.450	-.382	-.403
routconf			.601	.618	-.249	.345	-.439	-.266
highconf				.653	-.128	.159	-.245	-.195
intconf					-.181	.260	-.282	-.419
ssecateg						-.545	.293	.235
sisced							-.372	-.269
st17q04								.399

All correlations are significant at the 0.01 level (2-tailed).

Table 7: Correlation matrix (Hungary – boys)

	hisced	routconf	highconf	intconf	ssecateg	sisced	st17q04	st17q06
hisei	.609	.281	.154	.268	-.340	.437	-.314	-.302
hisced		.296	.200	.309	-.346	.489	-.351	-.327
routconf			.579	.642	-.359	.400	-.532	-.278
highconf				.670	-.236	.245	-.392	-.267
intconf					-.346	.375	-.394	-.443
ssecateg						-.608	.325	.250
sisced							-.366	-.267
st17q04								.365

All correlations are significant at the 0.01 level (2-tailed).

Table 8: Adjusted R-squares for possession of an internet access (st17q06)

	Czech Republic		**Hungary**		**Germany**	
Dependent variable	Boys	Girls	Boys	Girls	Boys	Girls
Confidence in routine tasks (routconf)	0,091	0,098	0,077	0,071	0,049	0,034
Confidence in internet tasks (intconf)	0,19	0,17	0,196	0,175	0,186	0,17
Confidence in high-level tasks (highconf)	0,092	0,052	0,072	0,038	0,041	0,014

Table 9: Adjusted R-squares for possession of a computer (st17q04)

	Czech Republic		**Hungary**		**Germany**	
Dependent variable	Boys	Girls	Boys	Girls	Boys	Girls
Confidence in routine tasks (routconf)	0,239	0,189	0,283	0,192	0,103	0,062
Confidence in internet tasks (intconf)	0,117	0,039	0,155	0,08	0,069	0,057
Confidence in high-level tasks (highconf)	0,101	0,055	0,153	0,06	0,027	0,023

Part 1
List of the key competencies (EU approach):

Communication in mother tongue
Communication in foreing language
Mathematical, science and technology literacy
Information and communication technology literacy
Learning to learn
Interpersonal social and civic competences
Entrepreneurship
Cultural awareness

Source: Hučínová 2006

List of the key competencies (Czech Republic, prepared as a background for developing the so called Framework Educational Programmes):

Comepetence to communicate
Personal competences
Social competences
Civic competences
Problem solving
Effective work with information resources and ICT tools
Aplication of basic mathematical procedures to practic tasks solving
Work eligibility competences

Source: VUP 2006

Part 2
Information and communiction technology questionnaire, PISA 2003

Q 6 How well can you do each of these tasks on a computer?
(Please <tick> one box on each row.)

		I can do this very well by myself.	I can do this with help from someone.	I know what this means but I cannot do it.	I don't know what this means.
a)	Start a computer game.	1	2	3	4
b)	Use software to find and get rid of computer viruses.	1	2	3	4
c)	Open a file.	1	2	3	4
d)	Create/edit a document.	1	2	3	4
e)	Scroll a document up and down a screen.	1	2	3	4
f)	Use a database to produce a list of addresses.	1	2	3	4
g)	Copy a file from a floppy disk.	1	2	3	4
h)	Save a computer document or file.	1	2	3	4
i)	Print a computer document or file.	1	2	3	4
j)	Delete a computer document or file.	1	2	3	4

k)	Move files from one place to another on a computer.	1	2	3	4
l)	Get on to the Internet.	1	2	3	4
m)	Copy or download files from the Internet.	1	2	3	4
n)	Attach a file to an e-mail message.	1	2	3	4
o)	Create a computer program (e.g. in <Logo, Pascal, Basic>).	1	2	3	4
p)	Use a spreadsheet to plot a graph.	1	2	3	4
q)	Create a presentation (e.g. using <PowerPoint>).	1	2	3	4
r)	Play computer games.	1	2	3	4
s)	Download music from the Internet.	1	2	3	4
t)	Create a multi-media presentation (with sound, pictures, video).	1	2	3	4
u)	Draw pictures using a mouse.	1	2	3	4
v)	Write and send e-mails.	1	2	3	4
w)	Construct a web page.	1	2	3	4

Source: PISA 2003 ICT questionnaire

Part 3

Table: Proportion of 'can do well' answer to the above mentioned question (for boys and girls, values in %, items grouped by type of task)

	Czech Republic		Hungary		Germany	
Task	Boys	Girls	Boys	Girls	Boys	Girls
Routine tasks						
Open a file	96,5	95.8	92,3	87,6	96,2	94,8
Play computer games	96,6	94,4	93,1	87,0	95,7	92,4
Start a computer game	96,7	90,5	91,1	80,7	97,3	90,4
Save a computer document or file	93,1	89,9	89,4	83,6	92,1	81,2
Delete a computer document or file	94,6	91,3	86,7	75,1	93,9	91,3
Draw pictures using a mouse	93,9	94,5	85,5	86,9	85,6	88,6
Print a computer document or file	91,1	84,3	76,2	63,2	92,9	89,6
Scroll a document up and down a screen	93,7	92,8	87,9	81,1	95,4	94,1
Create / Edit a document	85,0	72,9	86,2	78,9	89,5	82,2
Move files from one place to another on a computer	90,5	73,7	78,7	52,0	89,5	69,2
Copy a file from a floppy disk	90,2	66,9	83,2	60,3	90,3	66,1
Internet tasks						
Get onto the Internet	91,4	88,6	81,3	81,0	94,4	92,6
Write and send e-mails	85,3	85,0	66,7	67,8	86,8	84,9
Copy or download files from the Internet	83,3	63,6	63,1	37,9	86,7	69,3
Download music from the Internet	78,2	46,1	63,2	36,1	81,2	54,9
Attach a file to an e-mail message	70,0	50,7	43,6	25,8	73,4	51,3
High-level tasks						
Use a database to produce a list of addresses	70,0	49,5	47,3	27,1	68,2	46,8
Create a presentation (e.g. using a MS PowerPoint)	43,9	21,6	31,4	22,2	43,5	26,1
Use a spreadsheet to plot a graph	61,3	41,7	38,2	23,3	58,9	39,4
Create a multi-media presentation (with sound, pictures, video)	46,0	18,4	30,7	13,2	50,2	22,1
Construct a Web page	40,2	22,7	18,5	9,3	39,3	21,4
Use software to find and get rid of computer viruses	69,3	23,8	55,3	17,9	69,7	26,3
Create a computer program (e.g. in Logo, Pascal Basic)	27,1	10,7	20,1	10,6	36,0	15,4

Source: PISA 2003 data