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# The ICT literacy in the OECD countries

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## Abstract

The usage of ICT is becoming increasingly important in the world of work, so computer skills development plays a key role in education as well. Every young person will need to use ICT in their lives for a full scale participation in modern society. Based on the objective assessments education can be developed more efficiently, this way the assessment of knowledge will have an even bigger role in education. In the last years several international researches were organised about the assessment of informatics skills.

The most significant data were provided by the result of the ICT questionnaire made by the OECD (*Organization for Economic Co-operation and Development*) in 2003. The questionnaire revealed the 15-year-old students' attitudes towards computers, access to computers and internet, self-confidence in routine, internet and high-level ICT tasks and learning methods. In Hungary such assessments have been made, which indicate the informatics skills and the effectiveness of learning methods. This study presents the international and domestic results of informatics assessment.

The results of the PISA assessment provide good grounds for comparisons with results of other IT assessments. Besides the tests based on students' self reports surveys are also needed which measure students' knowledge, skills and abilities.

In Hungary the Center for Research on Learning and Instruction University of Szeged conducted a survey for the 14 and 18 year-old students in 2007 which measured students' knowledge acquired at school and in everyday life. The aim of the IT evaluation is to prove the efficiency of informatics teaching and the objective measurement of students' knowledge.

## Keywords

ICT; ICT literacy; PISA; assessment

## Introduction

Surveys, researches by means of ICT have been playing an even bigger role in labour market and education as well. The OECD (*Organisation for Economic Co-operation and Development*) is an organization of 30 member countries. Their common aim is to answer economic, social and environmental challenges of globalization. Participation is important in the international assessment because they develop their assessment according to the methodology elaborated for the education of the most developed countries (Csapó, 2005). The results provide opportunity for the identification of problems and planning the objective development strategies. The PISA (*Programme for International Student Assessment*) evaluates the 15-year-old students' performance according to the *index of Economic Social and Cultural Status (ESCS index)*.

The PISA 2003 index of *economic, social and cultural status* is based on three variables:

- highest occupational status of parents (HISEI),
- educational level of parents (PARED),
- and home possessions (HOMEPOS).

The PISA 2003 survey measured students' literacy in mathematics, reading, science, problem solving and the effect of background variables on performance. 30 OECD countries and 11 partner countries participated in the survey. 127 165 students, among them 4765 Hungarians answered the questionnaire. Students in the 31 countries (containing 24 OECD countries) answered an ICT questionnaire, which concerned their access to and familiarity with ICT.

Students provided information on the following:

- ICT was available to them at home, at school or in other places,
- or how often they used ICT,
- how self-confident they felt performing certain tasks on a computer,
- their general attitudes to using computers,
- how they learned to use computers and the Internet and who they turn to for help.

According to the questionnaire indexes were made describing ICT skills. The indexes were divided into quarters based on the ESCS index. Using the indexes the achieved results of Hungarian school system can be revealed and certain elements of the development strategy can be indicated (Dancsó, 2005).

## Frequency use of ICT

Students were asked how frequently they performed various Internet and entertainment tasks using ICT. The index of ICT Internet/entertainment use (INTUSE) and the index of ICT program/software use (PRGUSE) were derived from students' responses. Altogether 12 items measure the frequency of different type ICT use.

Positive values on this index indicate high frequencies and negative values indicate lower frequencies of ICT use.

The students had to choose from 5 options below:

- almost every day,
- a few times each week,
- between once a week and once a month,
- less than once a month,
- never.

The frequency index describes the total results, the indexes were standardized. The mean of the OECD countries is 0, the standard deviation is 1.

We can measure with indexes

- to what extent the national indexes differ compared with the international average,
- to what extent the quarter indexes differ compared with the same quarter indexes in the OECD countries,
- what skills our educational system is able to develop independently of the social, cultural and economic background.

### Frequency use of ICT for Internet and entertainment (INTUSE)

On average across the OECD countries, 56% of students often use computer for e-mail or chat, 55% of them use the internet to look up information, 53% of them play games, but only 31% of them use the internet to collaborate with a group (1. Table).

How often do you use ...	OECD average (%)	Males (%)	Females (%)
A computer for electronic communication (e.g. e-mail or "chat rooms")?	56	56	55
The Internet to look up information about people, things or ideas?	55	59	50
Games on a computer?	53	70	35
The Internet to download music?	49	56	40
The Internet to download software (including games)?	38	51	25
The Internet to collaborate with a group or team?	31	36	27

1. Table. Students' use of ICT for Internet and entertainment.  
(Source: OECD, Figure 3.3, Table 3.3)

The results indicate that the students

- should do exercises in groupwork on the Internet more often,
- should download useful softwares and music from the Internet more often,
- should search for information on the Internet more often.

In case of downloading softwares and playing games there is a significant difference between genders. Twice as many boys play on computer as girls and twice as many boys download softwares from the Internet as girls.

There isn't any difference between genders considering electronic communication.

The INTUSE index in the OECD countries is between -0,91 and 0,63.

The lower indexes indicate that students don't benefit from the information gathering and communication supporting opportunities of Internet efficiently.

	Bottom quarter	Second quarter	Third quarter	Top quarter
OECD	-1,05	-0,32	0,16	1,22

2. Table. Index of ICT use for the Internet and entertainment.  
(Source: OECD, Table 3.2)

### Frequency of use of ICT for program and software (PRGUSE)

Students use word processing by the highest percentage. 30% of students frequently use graphics programs and 30% use the computer to learn school material. 23% of them use computer for programming, 21% use spreadsheets and only 13% use educational software frequently (3. Table).

How often do you use ...	OECD average (%)	Males (%)	Females (%)
Word processing (e.g. Word)?	48	48	49
Drawing, painting or graphics programs on a computer?	30	34	26
The computer to help you learn school material?	30	31	29
The computer for programming?	23	30	16
Spreadsheets (e.g. Excel)	21	24	18
Educational software such as mathematics programs?	13	15	11

3. Table. Students' use of ICT for programs and software.  
(Source: OECD, Figure 3.4, Table 3.5)

The frequencies indicate that students

- rarely use programs for learning
- and rarely use computer for programming (for example creating Logo or Basic programs).

Boys use computer for programming, working with spreadsheets and drawings more often. There isn't any difference between genders for example in using word processing and computer use for learning.

In Hungary the use of word processing, spreadsheets and graphics programs are compulsory so the

- 53% of Hungarian students often use word processing,
- 31% of them often use spreadsheets,
- 30% of them often use graphics programs.

Although the Hungarian students rarely use programs for learning but in the near future a lot of them will use the Sulinet Digitális Tudásbázis (SDT), which is an LCMS e-learning system. They use computers for learning more often because teachers also give them homework more often, which requires computer programs.

The PRGUSE index in the OECD countries is between -0,35 and 0,33 which indicates that the students of the countries participating in the survey apply similar programs in education.

	Bottom quarter	Second quarter	Third quarter	Top quarter
OECD	-1,15	-0,22	0,28	1,14

4. Table. Index of ICT use for programs and software.  
(Source: OECD, Table 3.4)

## Students' confidence in using ICT

Data were collected about the confidence level of usage with 23 questions. These tasks fell into three categories: routine tasks (such as opening, saving, deleting, moving, copying, creating, editing files, or playing computer games), internet tasks (such as downloading files or music from the internet, writing and sending e-mails, attaching a file to an e-mail message) and high-level tasks (such as creating presentations, using spreadsheets to plot a graph, using database to produce list of addresses, constructing web page, finding computer virus or creating computer programs).

The students had to choose from 4 options below:

- I can do this very well by myself.
- I can do this with help from someone else.
- I know what this means but I cannot do it.
- I don't know what this means.

Based on the results 3 indexes were created:

- confidence in routine ICT tasks (ROUTCONF);
- confidence in Internet ICT tasks (INTCONF);
- confidence in high-level ICT tasks (HIGHCONF).

The indexes were standardized.

The mean of the OECD countries is 0, the standard deviation is 1.

### Confidence in routine ICT tasks (ROUTCONF)

The students are confident in doing simple routine tasks, for example opening files, starting games, creating drawings, editing and saving documents, scrolling a document up and down a screen. However they admitted to expecting more help with printing, moving, copying and deleting files (5. Table).

Routine tasks	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 (%)
Open a file	90	7	2	1
Play computer games	90	7	2	1
Start a computer game	86	10	3	1
Save a computer document or file	88	8	3	2
Delete a computer document or file	88	8	3	2
Draw pictures using a mouse	85	10	3	1
Print a computer document or file	86	9	3	2
Scroll a document up and down a screen	87	8	3	3
Create/edit a document	80	13	4	2
Move files from one place to another on a computer	76	17	6	2
Copy a file from a floppy disk	75	16	7	3

5. Table. Percentage of students who are confident performing routine ICT tasks.  
(Source: OECD, Table 3.9, Box 3.3)

The ROUTCONF index in the OECD countries is between -0,80 and 0,39.

	Bottom quarter	Second quarter	Third quarter	Top quarter
OECD	-1,34	-0,11	0,61	0,81

6. Table. Index of confidence in routine ICT tasks.  
(Source: OECD, Table 3.8)

### Confidence in Internet ICT tasks (INTCONF)

The INTCONF index in the OECD countries is between -0,81 and 0,77, that also indicates big difference in internet use between students having favourable or unfavourable economic, social and cultural background.

Internet tasks	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 (%)
Get onto the internet	89	7	3	1
Copy or download files from the Internet	70	19	8	3
Attach a file to an e-mail message	58	24	13	5
Download music from the Internet	66	20	11	3
Write and send e-mails	79	12	6	2

7. Table. Percentage of students who are confident performing Internet tasks.  
(Source: OECD, Table 3.11, Box 3.3)

	Bottom quarter	Second quarter	Third quarter	Top quarter
OECD	-1,23	-0,17	0,51	0,87

8. Table. Index of confidence in ICT Internet tasks.  
(Source: OECD, Table 3.10)

### Confidence in high-level ICT tasks (HIGHCONF)

The HIGHCONF index in the OECD countries is between -0,71 and 0,43.

High-level tasks	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 (%)
Use a database to produce a list of addresses	52	30	11	7
Create a presentation	47	27	15	10
Use a spreadsheet to plot a graph	43	31	17	9
Use software to find and get rid of computer viruses	38	29	26	7
Create a multimedia	35	35	23	7

presentation

Construct a web page	28	39	28	6
Create a computer program	20	34	32	14

9. Table. Percentage of students who are confident performing high-level tasks on computers.  
(Source: OECD, Table 3.12, Box 3.3)

	Bottom quarter	Second quarter	Third quarter	Top quarter
OECD	-1,14	-0,31	0,22	1,25

10. Table. Index of confidence in high level ICT tasks.  
(Source: OECD, Table 3.12)

## Attitudes towards ICT (ATTCOMP)

The ICT questionnaire surveyed the students' attitude to computers. The degree of attitude was defined qualifying statements about ICT activities.

These statements included

- whether students think computer use is important,
- whether they enjoy using them,
- whether they are motivated by an interest in computers and
- whether they lose track of time when they use a computer.

The students had to choose from 4 options below:

- strongly agree
- agree
- disagree
- strongly disagree.

The ATTCOMP index in the OECD countries is between -0,41 and 0,31. The negative score on this index indicates less positive attitude than the average of students in OECD countries.

Of course students from less well-off backgrounds have lower index and well-off students have higher index.

	Bottom quarter	Second quarter	Third quarter	Top quarter
OECD	-1,24	-0,35	0,37	1,22

11. Table. Index of attitudes towards computers.  
(Source: OECD, Table 3.6)

## The assessment of Hungarian students' knowledge

The results of the PISA assessment provide good grounds for comparisons with results of other IT assessments. Besides the tests based on students' self reports surveys are also needed which measure students' knowledge, skills and abilities.

In Hungary the Center for Research on Learning and Instruction University of Szeged conducted a survey for the 14 and 18 year-old students in 2007 which measured students' knowledge acquired at school and in everyday life. The aim of the IT evaluation is to prove the efficiency of informatics teaching and the objective measurement of students' knowledge.

The survey provides opportunity for evaluating knowledge, skills and abilities in operating systems, word processing, using spreadsheets, making presentations, familiarity with database topics as well as identifying the level of self-confidence in doing IT operations. The questionnaire contains exercises which students meet at school or in everyday life so during evaluation we will be able to compare the level of knowledge at school and in everyday life as well.

According to our hypothesis with this assessment we can reveal

- the difference between genders in certain fields
- the level of development of certain IT skills and abilities
- the level of development of IT means used in other subjects
- the difference between age groups
- the degree of development between the ages of 14 and 18.

Using the data, global and detailed analysis can be conducted and we can create an exact picture of students' knowledge. With these results improvements based on objective data can be planned in education.

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