eSkills IT Fitness Test 2012 in Slovakia

Zuzana Kubincová *, Martin Homola*, Pavol Kubinec**, Mário Varga***, Andrea Hrušecká*, Andrej Blaho*, František Jakab****, and Beáta Brestenská*****

*Comenius University, Faculty of Mathematics, Physics and Informatics, Bratislava, Slovakia
**The First Independent Secondary Grammar School, Bratislava, Slovakia
***MICROCOMP - Computersystém s r.o., Bratislava, Slovakia
**** Cisco Systems Slovakia, Bratislava, Slovakia / Technical University in Košice, Faculty of Electrical Engineering and Informatics, Košice, Slovakia
*****Comenius University, Faculty of Natural Sciences, Slovakia

{kubincova}{homola}{hrusecka}{blaho}@fmph.uniba.sk
pkubinec@1sg.sk
mario.varga@infovek.sk
fjakab@cisco.com
brestenska@fns.uniba.sk

***Abstract* — The eSkills IT Fitness test was conducted again in Slovakia after two years. We picked out the data from 34,775 respondents, analyzed them and compared the results with our last testing findings. We focused on young generation aged 15-24 and tracked the IT skills development in students mainly at primary and secondary schools. We also compared the results of the students of different types of secondary schools. Some of the positive findings showed an improvement in this area, e.g. on secondary grammar schools or secondary vocational schools. There were also some less encouraging findings, which lead to reflection about the efficiency of ongoing educational reform, proper curricula and IT skills of teachers on certain types of schools.**

I. INTRODUCTION

The e-Skills week is an extensive campaign of European Commission supporting the development of ICT skills in Europe. This initiative implemented for the first time two years ago took part in more than 30 countries this year. The IT FITNESS TEST is one of the activities carried out in the frame of European e-Skills week. Its aim is to test the IT skills of young people.

The strategy of the e-Skills week is to motivate young people, mainly the students of high schools and universities to study or work in the area of digital technologies and encourage the interest of public in escalation of educational level in the area of digital technology usage in the everyday life and professional praxis as well. Its aim is to respond to the growing demand for highly qualified specialists and users in the digital technology area, fulfill the rapidly changing requirements of the industry and guarantee the computer literacy of students in the time of their study as well as all the citizens in the lifelong learning context.

In the frame of European e-Skills week in Slovakia in 2010, we decided to implement the IT Fitness Test [1] – the countrywide exploration of IT skills putting the special accent on the young generation (age 15-30). Based on the large engagement of young people in 2010 as well as on the highly positive assessment of Slovak outcomes by the European report [3] we decided to organize the IT Fitness Test in Slovakia in the year 2012 again. The possibility to trace the development and compare the results adjusted was an interesting challenge. Since also other countries indicated the interest in the IT Fitness Test implementation (e.g. Czech Republic, Poland, Russia), our test was translated into English and Czech.

II. ESKILLS IT FITNESS TEST

The test was based on the relevant Slovak high school standards in informatics [4], some other applicable standards [5] as well as on our experience from the previous testing [1]. The testing was executed online via the Slovak e-Skills Web page[1]. It was open for the public for about one month and concluded during the e-Skills week. Although the target group was the young generation, anyone could be tested.

The participants had to fill in some personal data and answer several informative questions about their use of IT before the testing itself. The test itself consisted of 24 questions from various IT areas targeting basic but also advanced knowledge of the participant, her competencies to create and present information, her practical skills in searching and processing information, etc. All questions were formulated as multiple choice closed-ended questions with single correct answer.

After the testing, the results were presented to the respondent. The success rate was expressed as percentage and the respondent was categorized into one of the five levels. Each of the levels was also verbally described.

Just as in the previous testing, the questions covered seven IT areas; each of them included easier and also more difficult questions. A brief description and a sample question from each area follow. Correct answers are marked up with an asterisk (*).

A. basics

In this area we tested the basic knowledge about computer software used for basic file authoring,

[1] www.eskills.sk

processing, transmission and search. A sample question from this area: *Using a word processor you can:*

1. format a hard drive containing text documents
2. number individual steps of a recipe for a cake *
3. edit text in photographs that contain written text
4. find the longest article about the history of Slovakia in the Internet

B. data formats and compression

This area comprised questions about data formats appropriate for a given purpose, compression programs and their usage and the like. A sample question from this area: *Some pictures have a filename extension PNG. These pictures can be viewed on most computer systems. The PNG extension stands for:*

1. graphic format allowing (similarly to GIF) transparency *
2. graphic format without transparency (similarly to JPEG)
3. graphic format allowing (similarly to GIF) animations
4. graphic format allowing (similarly to JPEG) lossy compression

C. hardware

This area was focused on respondent's knowledge about computer hardware, PC components, I/O devices, etc. A sample question: *A friend wants to buy a laptop, so he looked up some offers on the Internet. He wants to be able to burn DVDs and also wants at least 4GB of memory. Which one of the following should he buy?*

Four possible answers comprised descriptions of four different laptop computers of which only one met these requirements.

D. operating system and software

Here we surveyed the user's familiarity with the operating system, and some of the well known software types. A sample question form this area: *Every operating system has to perform a number of functions. Which of the following is not a basic function of the operating system?*

1. it provides operations with devices and files
2. it provides simultaneous running of several processes
3. it provides access permissions for different users
4. it provides installation of plug-ins into a browser *

E. office software

The questions within this area were aimed at word processing and the work with spreadsheets. A sample question: *The SUM(cell area) function calculates the sum of all numbers in the given cell area.*

	jan.	feb.	mar.	I. kv.	apr.	máj	jún	II. kv.	júl	aug.	sep.	III. kv.	okt.	nov.	dec.	IV. kv.	spolu 2010
Citroen	189	216	232	637	233	338	380	951	338	318	209	865	383	335	351		
Ford	109	167	265	541	197	188	269	654	221	269	257	747	237	257	274		
Kia	190	205	384	779	328	341	433	1102	295	329	328	952	419	383	632		
Peugeot	190	195	287	672	322	338	339	999	401	295	246	942	424	442	483		
Renault	154	236	340	730	341	290	465	1096	465	511	247	1223	314	407	512		
Škoda	454	494	990	1938	772	1041	1225	3038	1062	869	1215	3146	1365	1353	1550		
Toyota	175	197	248	620	146	191	272	609	277	267	254	798	278	221	397		
VW	202	290	447	939	370	388	442	1200	337	283	353	973	460	459	420		

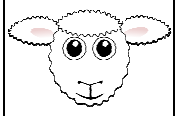
Which formula must be entered into the R7 cell if it has to calculate the sum of all Renaults sold during the quarter IV?

1. =SUM(O7:Q7) *
2. =SUM(C7:Q7)
3. =SUM(O3:Q3)
4. =SUM(R3:R6)

F. Internet

This part of the test served to determine the level of respondent's knowledge and skills regarding the Internet as a data source and also as a mean of communication. Most of the questions in this area were explicitly practical. The respondents had to search the Internet and find relevant information. A sample question: *The author of this image*

published in Open Clip Art Library also other pictures. Search the Web for the information which one of the following is not a work of this author.

1.	2.	3. *	4.
			

G. social, legal and safety aspects of IT

The questions here addressed problems like information security, fraud e-mail, copyright issues, etc. A sample question: *One of the following statements about phishing is false. Which one is it?*

1. The address of the phishing website displayed in the address bar can correspond with the address of the website which is imitated.
2. E-mail messages redirecting the user to phishing websites often contain links which seemingly lead to the sites regularly visited by the user.
3. A phishing website can contain also an SSL icon (a lock).
4. When displaying a phishing website, the https:// protocol is always used in the address bar *

III. SAMPLE DEMOGRAPHICS

This year, the total number of 47,860 respondents participated in the test, which was approximately 7,500 respondents less than in the previous testing. We further filtered out respondents with personal information not completely filled in, containing obvious nonsense, or insufficient number of answers in the main testing part. The sample was reduced to 34,775 respondents – roughly 2,000 less than two years ago. The ratio of female and male respondents was 37% to 63% (compared to 41% to 59% in 2010), as shown in Fig. 1.

The participants' age ranged from 8 to 76 years. Our primary target group for this research were young people aged 15-24 years, especially students. Since the testing in

2010 was deeply supported by Ministry of Education and widely promoted in media, it was massively handled in schools, especially secondary schools.

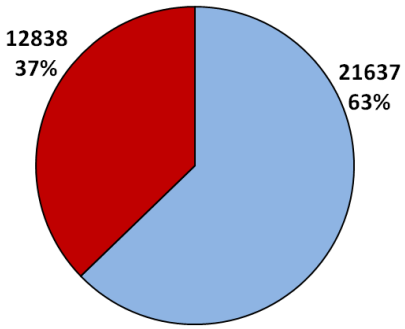


Figure 1. Break down of female and male participants (male; female)

The students of secondary schools represented nearly 2/3 of all respondents and together with the university students more than 3/4 of all respondents. This year the situation was slightly different. The secondary schools were still the most active, but their students represented less than 1/2 of all participants and together with university students faintly more than 1/2 of all participants (18,823). The detailed distribution of different age groups is depicted in Fig. 2.

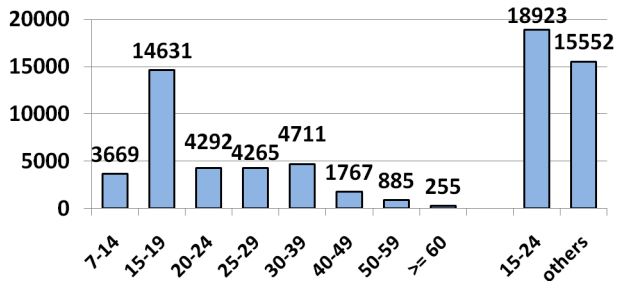


Figure 2. Distribution of age groups

Similarly to the previous testing, we tried to collect also the data about teachers, who comprised 1,150 respondents – 3.3% of the whole sample, that is a comparable number to the previous one.

Finally, the number of other respondents doubled. The overall distribution of students, teachers and other respondents is shown in Fig. 3.

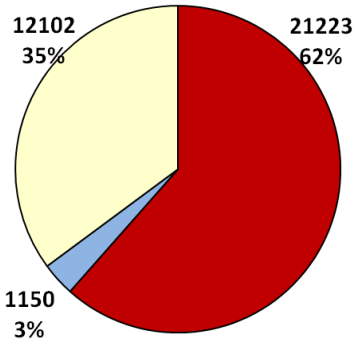


Figure 3. Number of teachers, students and others (teachers; students; others)

As explained in our previous report [1] there are different types of secondary schools in Slovakia. In this research, we especially concentrate on 4-year secondary grammar schools (4-year SGS), 8-year secondary grammar schools (8-year SGS), secondary vocational schools (SVS) and secondary training schools (STS). The most of secondary school students tested was from the SVS (about 63%). The number of 4-year SGS was large as well (about 30%). The smallest part of secondary schools data constituted the data from STS students (only 0.4%). The volume of data collected for different secondary schools is detailed in Fig. 4.

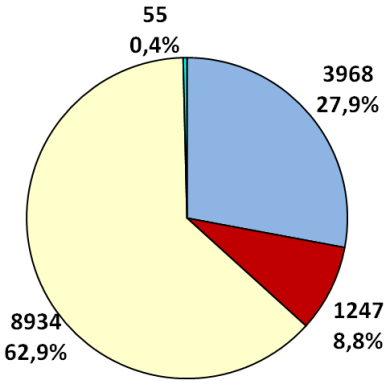


Figure 4. Volume of data for different secondary schools (4-year SGS; 8-year SGS; SVS; STS)

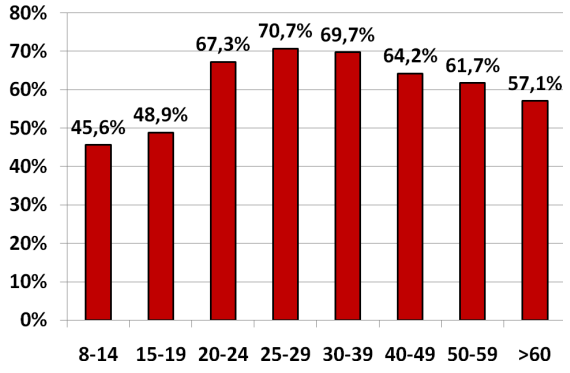
IV. Comparison of Results

The overall average result calculated for the sample of 34,475 participants was 57.46% with the standard deviation of 19,87% which is some 3% better than two years ago (54.50% with the standard deviation of 19.30%). The age group 15-24 - our target group - attained the average result of 54.39% with the standard deviation of 19.33%, which was also some 3% higher than in previous testing (51.60% with the standard deviation of 18.52%) . The remaining 15,552 participants achieved the average result of 61.20% with the standard deviation of 20.29% (compared to 64.30% with the standard deviation of 16.46%).

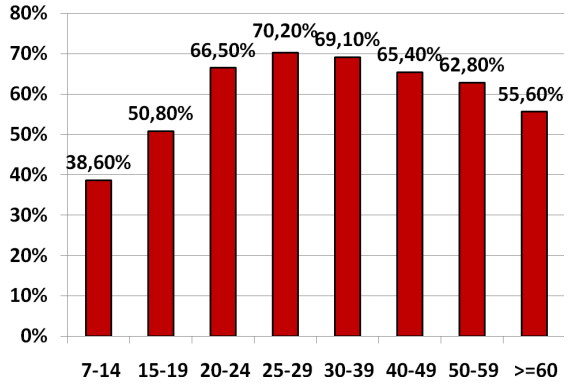
A. Age groups and gender

As shown in Figs. 5a,b, the results for different age groups were rather similar in both testings. The highest success rate (about 70% and 69% in both years) was recorded for the age groups 25–29 and 30–39 years of age. The lowest success rate (in the youngest age group) was significantly lower this year against two years ago (38.6% compared with 45.6%).

The outcomes from both testings confirmed the common stereotype, that the male population achieves better results than the female population. This year, the average result for female gender was 51.1% and for the male gender it was 61.3%. The results for both groups were better and the difference between male and female results was slightly lower than in 2010 (47.50% and 59.30).

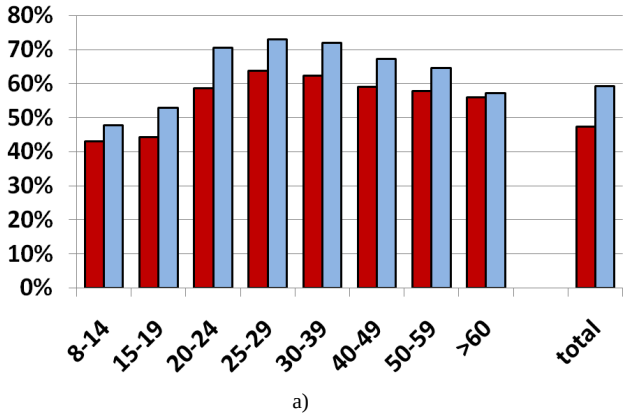


a)

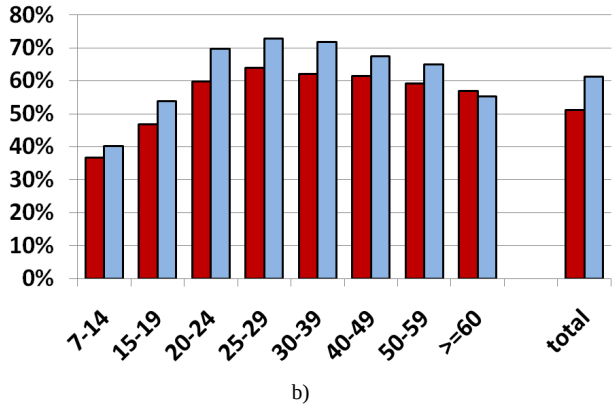


b)

Figure 5. Average success rate for different age groups in a) 2010, b) 2012



a)



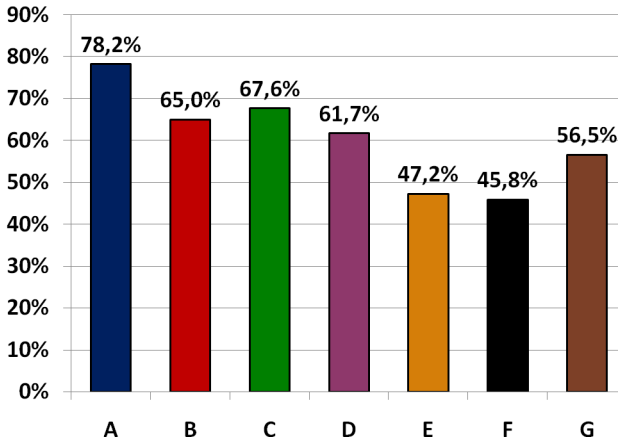
b)

Figure 6. Average success rate for different age groups and gender in a) 2010, b) 2012 (male; female)

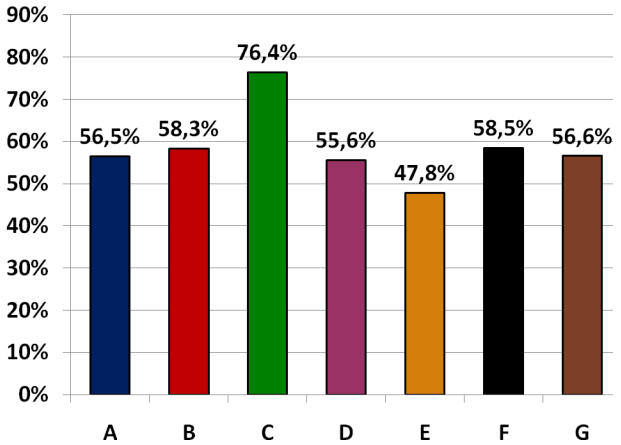
The new outcomes confirmed our findings from 2010, that with rising age the difference between male and female results lowered, it even switched in the age group over sixty this year. The results for different gender and different age groups for both years are depicted in Fig. 6a and Fig. 6b.

B. Topics of the test

The succes rates of the test topics turned out a bit different this year in comparison with the previous results. Two years ago there were more significant differences among particular topics results. In 2010, the most successful topic proved to be Basics (78.2%) whereas the least successful was the Internet (45.8%). The success rates for other topics varied between 47.2% and 67.6%. T This year , as we can see on Fig. 7b, the most successful topic was Hardware (76.4%) and the Office topic turned to be the least successful (47.8%). The results for all other topics were surprisingly balanced (from 55.6% to 58.5%).



a)



b)

Figure 7. Average success rates for test topics in a) 2010, b) 2012

We acclaim the surprising success in the Hardware topic to the fact that the questions in this topic were really practical, e.g., questions about I/O devices or about computer parameters. The remarkable success rate increase in the Internet topic is also attributable to the practical nature of the questions, and, as we hope, it points out to an actual increase in the Internet usage by the population. The low success rate in Office software is not suprising, as this field belongs to the most problematic

topics according to our experience, especially the more advanced questions related to spreadsheets.

Out of the individual questions, the most successful (91.61%) turned out to be the question about the vulnerability of personal data published on the Web, from the topic of Social, legal and safety aspekts of IT. The least successful (19.01%) was a question dealing with the text formating in a word processor, which belonged to the Office topic.

Fig. 8 shows that regardless the topic, the success rate follows more or less the same trend with respect to the different age groups. One of the subtle differences can be noticed in the oldest age group (over 60 years old), where Basics is the second least sucessful topic.

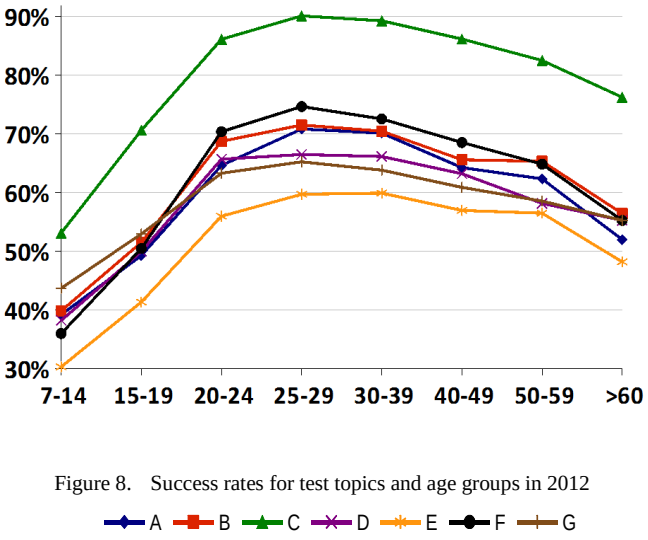


Figure 8. Success rates for test topics and age groups in 2012

C. *Primary target group*

Likewise as in 2010, the aim of this testing was to track down the development of basic IT skills of our primary target group, which comprised young people between 15 and 24 years of age, as well as to compare the results with the previous findings. We conducted the research on the data collected in schools of different type and different level. Let us first compare the results of students who attend 9-year elementary schools (ES) followed by a 4-year SGS, on one hand, and those who switched to 8-year SGS after the 5th grade of ES (Fig. 9).

The results from 2010 implied that 8-year SGS seem to be more effective in development of students' basic IT skills in the first half when compared to the respective period of ES. But, they seemed to be less effective in their second half when compared to more classic 4-years SGS. This year's resuls did not confirm this observation. Except for two years (the third and fifth grades) the students of 8-year SGS showed higher success rate than the students of compared schools.

This finding corresponds to the general opinion, that the 8-year SGS are more effective in education. However, the success rates of all compared ES grades as well as the first four grades of 8-year SGS were lower than in the previous testing, that is certainly a suprising and not satisfying fact especcially considering the fact, that the overall average score in test increased.

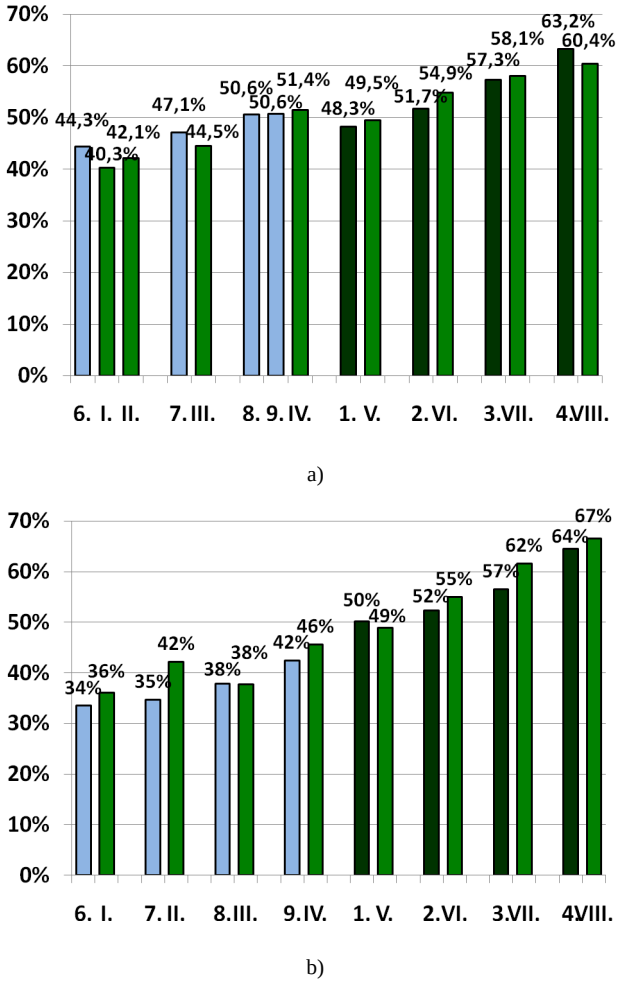


Figure 9. Success rate: matching grades of ES and SGS in a) 2010 and b) 2012 (ES; 4-year SGS; 8-year SGS)

The comparison of the different types of secondary schools is depicted in Fig. 10.

The current testing confirmed the results observed also the last time – students from SGS (8-year as well as 4-year) performed significantly better than their peers from SVS and STS. Considering the fact, that the most talented pupils choose grammar schools instead of SVS or STS for their secondary education, these results were expected. But since IT skills are taken to be very important for the professional life of the whole population, we can not consider these results to be satisfying.

However, students of 8-year SGS, 4-year SGS as well as SVS showed regular progress in IT skills development over the four years of study and their success rates were generally slightly higher than those two years ago. In our opinion this trend could be attributed to the educational reform which brought also more Informatics classes into secondary education among others.

On the other hand, the success rates of the STS students were lower (except for the first grade) than two years ago, which we find alarming. It must be noted that the number of tested STS students constituted only a very small part of our corpus (55 students – 0.4% of the whole sample) and so their relevance is not high enough.

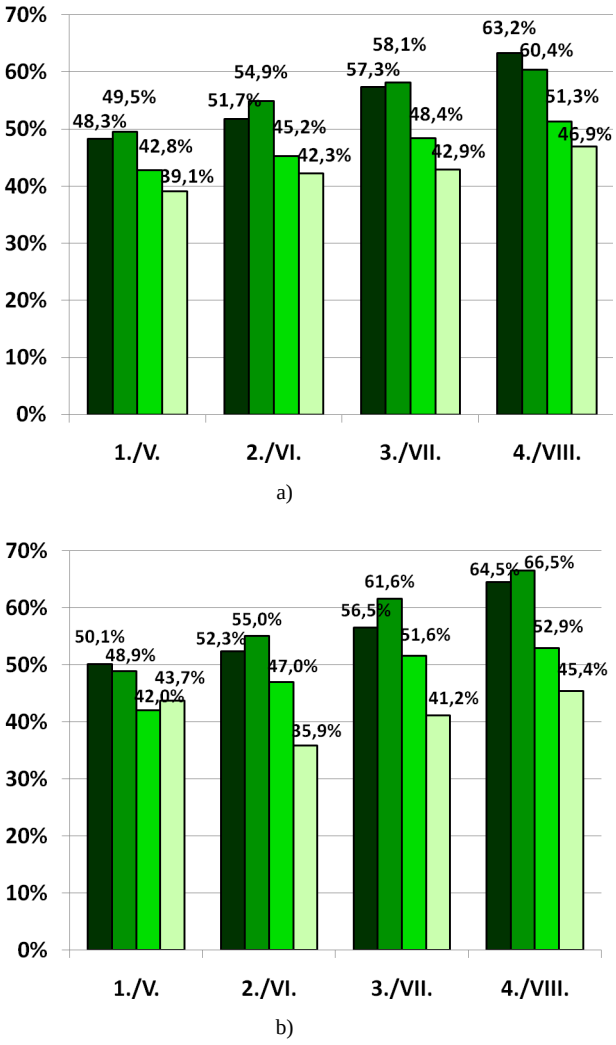


Figure 10. Success rate: secondary schools by year in a) 2010 and b) 2012 (■ 4-year SGS; ■ 8-year SGS; ■ SVS; ■ STS)

V. CONCLUSION

The second year of IT Fitness Test associated with the European campaign for IT skills development support – eSkills week – passed from the middle of February to the middle of March 2012 in Slovakia. Out of nearly 50,000 participants we picked out 34,775 respondents and processed their data with the aim to find out their level of IT skills and compare the outcomes with the results of previous testing.

As the testing was public and on-line, anybody could participate, however, our primary target group consisted of young people between 15 and 24 years, especially high school and university students.

The overall average result for all participants was 57.46% and for the target group it was 54.39%. Both of them are approximately 3% better than two years ago.

We tracked the IT skills development during the school grades of our target group.

Our research confirmed some of the outcomes of previous testing, e.g., the male participants performed slightly better than female participants; the age groups from 20 to 39 years are the most skilled in IT; the secondary grammar school (SGS) students have developed their IT skills better than those of secondary vocational (SVS) or training (STS) schools, etc. However, there are also results of previous testing that were not confirmed this year. For example, the surprising result from last time was not confirmed: the students of 8-year SGS generaly achieved higher success rates than their peers from the respective periods of ES or 4-year SGS.

We also found that the comparable grades of 4-year SGS and 8-year SGS showed regular increase of IT skills level over the four years study. Also their success rates were generally higher than those two years ago. Contrary to this, the success rates of higher ES grades as well as the comparable grades of 8-year SGS were lower than in the previous testing. The results of IT Fitness test 2010 pointed out to the very low performance of SVS and STS with respect to the development of IT skills in their students. According to our new outcomes, the situation on SVS has improved, since the SVS students showed the regular progress in IT skills development over their four years study. Unfortunately, the students of STS achieved this year even worse results than in the previous testing. In our opinion, these last findings are unacceptable. Since the IT skills are the important part of key competencies [2], it is necessary to develop them continually, starting in elementary schools and holding out during the formal education in the schools of all types.

As we hope, some of positive results can be attributed to the proceeding education reform, which bolstered the Informatics education in all grades of primary and secondary schools. On the other hand, the worse results pointed out the insufficient implementation of reformative changes at least on certain schools, related probably also to the inadequate curricula or to the lack of properly skilled and educated teachers. (As we know, the teachers in Slovakia are largely underpaid.) In our opinion these findings should give the impulse for more precise research and prompt problem solving.

REFERENCES

[1] Kubincová, Zuzana - Homola, Martin - Kubinec, Pavol - Hrušecká, Andrea - Jakab, František - Brestenská, Beáta: IT Skills in Slovak schools: Results of the eSkills IT Fitness test 2010. In: ICETA 2010 International Conference. - Košice : elfa, 2010. - S. 339-344. – ISBN 978-80-8086-166-7

[2] European Commission: Second report on the activities of the Working Group on Basic Skills, Foreign Language Teaching and Entrepreneurship, June 2003, dostupné na: http://www.eaea.org/index.php?k=2620 (september 2011)

[3] European Commission: European e-Skills week 2010: Key facts & figures. http://files.eun.org/eskills/ facts_figures_eSkillsWeek.pdf

[4] Blahová, V.: Vzdelávací štandard z informatiky pre gymnázium, štvorročné štúdium. ŠPU 2001, in Slovak, accesible: http://www.statpedu.sk/sk/filemanager#67

[5] ECDL Foundation: ECDL syllabus, version 5.0. ECDL Foundation, 2007. http://www.ecdl.com/programmes/ index.jsp?p=108&n=204