DIGITAL COMPETENCES FOR THE POLICE – A NEW ECDL

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Abstract
In the last year topics, such as Big data, data analytics and GDPR became more and more popular. However, companies – especially SMEs - and also the public sector have difficulties in dealing with these topics, which on the one hand might change the daily operative business or even their whole business process.

Nevertheless digital competences are still not well spread among the citizen. The Austrian Computer Society (OCG) therefore tries to enhance digital skills by several activities. One of the most important initiatives is the European Computer Driving Licence (ECDL) or currently being renamed to European Certificate for Digital Literacy, which celebrated last years its 20th anniversary.

Since 2018 every upcoming police-man /woman will receive the ECDL certificate during his/her three years appreciniship focussing on IT security, computational thinking and basic digital literacy knowledge

1. Introduction

As the European Union already stated 2016 [1] Europe is facing a huge gap in digital skills among their citizens. An average of 44% of the European citizens lack in digital competences as shown in Figure 1. This number is not changing much over the last decade although basic digital competences are becoming more and more mandatory in the work force. Several studies [2, 3] are predicting that within the next five years more than 90% of all jobs need at least basic digital skills. Hence, initiatives as the Digital Skills and Job Coalition have been founded by the European Union. This initiative – based on a partnership among different stakeholders – has one shared purpose to attract young people for ICT and to reduce the digital skills gap.

As depicted in Figure 1 there is still a great variety among the EU28 countries with respect to digital skills. To some extent there is a clear west/north to east/south decline. While countries as Denmark, Luxembourg or the Netherlands have a very good coverage of digital skills (above 77%) citizens of countries as Bulgaria or Romania lack more than 75% of basic skills.

In the EU28, in 2014 more than 8.9 million people have been working as ICT practitioner and ICT mechanics [2]. It is obvious that digital skills are an important asset for the whole workforce not only particular for the ICT sector, which is covering approximately 48%.

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In [2] it is further stated that 37% of all the labour force have no or only a low levels of digital skills. Figure 2 shows the estimated growing numbers of vacancies having e-skills in their portfolio. The study further emphasizes that approximately 750,000 more jobs could be generated if the needed skills were available. Especially the three big countries UK, Italy and Germany contribute for almost 60% of all vacancies in Europe.

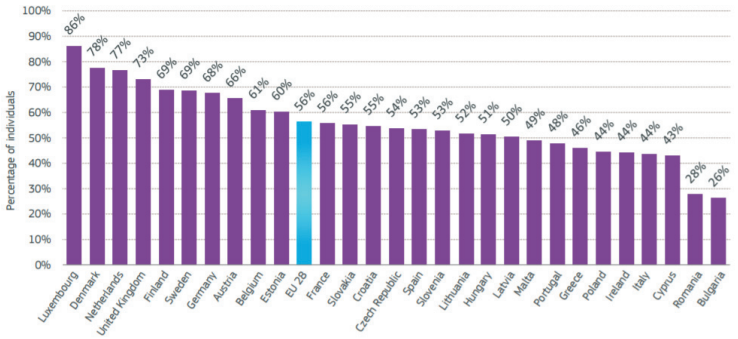

Figure 1. Basic digital skills within the European Union, European Commission paper for Digital Single Market [4]

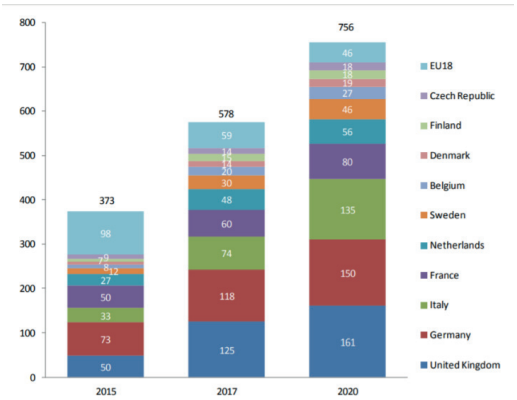

Figure 2. e-skills vacancies estimation (distribution of vacancies per country (´000s) [2]

The study concluded that in order to overcome this shortage of ICT professionals but also to have an effective e-leadership, people need strong ICT and digital skills. The whole European ICT eco-system is urgently called upon to tackle this problem.

An OECD paper [6] stated that 95% of all workers in OECD countries in large businesses are using internet as part of their jobs. Due to such predictions it becomes even more important that governments react in time to start an action plan to enhance the digital skills among all citizens. Already in 2001 the European Union stressed specifically the need to develop digital skills in their Europe Action Plan.

There is the potential that increasingly a high number of tasks might be automated over the next few years [7]. However, only less than 10% of all jobs on average are at risk of being replaced by machines.

Another survey which shows the grade of digitalization is the so called DESI (Digital Economy and Society Index) which comprises the following topics:

- Connectivity
- Human capital
- Use of internet
- Integration of digitalization in companies
- Digitalization in public sector

The last survey [8] came to conclusion that still 43% of all Europeans do not have basic digital skills. On the other hand a slight increase in graduates among STEM (Science, Technology, Engineering and Mathematics) is visible (from 18.4% in 2013 up to 19.1% in 2015). Already Berger and Frey [9] stated 2016 that nowadays all jobs require ICT know how except two professions – dishwashing and food cooking. It is obvious that almost all workers (more than 90%) have access to and use the internet as part of their jobs.

The country specific results showed a slight improvement within the human capital in Austria. In the field of IT skilled personnel Austria increased its ranking from 10th (2016) to 8th (2017) while Austria lost one place (down form 3rd to 4th) in the numbers of graduates among STEM. Especially in the field of Informatics the graduates remained quiet stable over the last decade. There was no significant increase visible among Austrian universities.

Another survey asked (top) management in the IT sector of Austria on the required skills for the todays jobs. On the top of these requirements was across the board by far “IT know-how” followed by “expert knowledge”. Within the top 5 needs there was also “programming know-how” [5].

Therefore people have to be well educated in digital skills and digital literacy. Facing all these circumstances, ICT competences – especially on a basic level – are becoming increasingly important for having better chances on the labour market. A lifelong learning attitude is a more and more important feature in order to stay competitive. The European Union has initiated an action plan for digital education aiming to increase digital basic skills along literacy, numeracy and problem solving. This action plan also implements computational thinking techniques which are an essential part of todays digital competences.

2. Digital Comptences for everyone

A survey of adult skills - PIAAC, Programme for the International Assessment of Adult Competences - 2015 showed that the majority of people between 16 and 65 years have little or no knowledge in problem solving (see Figure 3). But such competences are becoming more and more

essential especially in technology rich environments. Due to the digital transformation a high percentage of jobs are nowadays dependent on a certain knowledge level of digital competences.

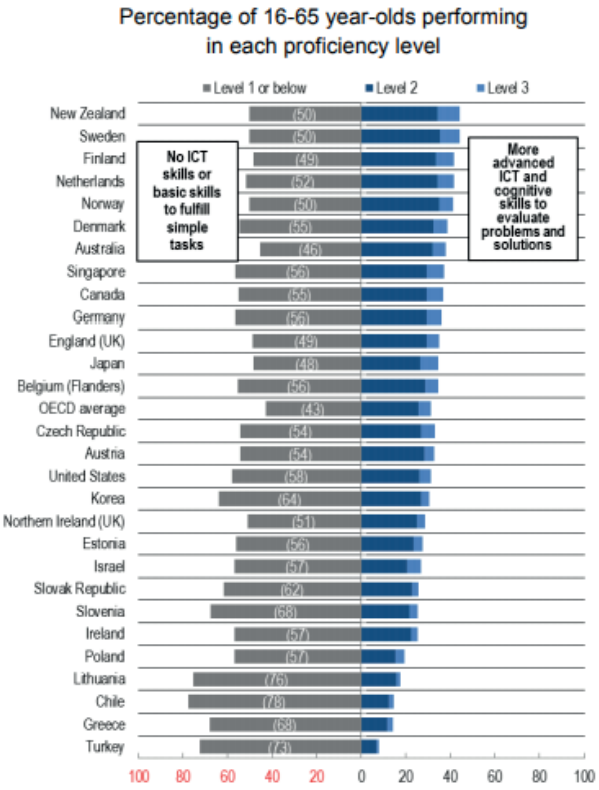

Figure 3. PIAAC and OECD survey regarding problem solving skills [6]. Note: Individuals in Level 2 or Level 3 have more advanced ICT and cognitive skills to evaluate problems and solutions than those in Level 1 or below.

The PIAAC study differs among three different levels of cognitive skills. Level 1 means no or only little ICT skills. People on this level can fulfill only simple digital tasks. Level 2 and 3 have already a more advanced ICT and cognitive skills to evaluate and solve problems.

It is alarming that people with at least level 2 or 3 according PIAAC study are a minority in all OECD countries, even in the best-ranked ones, such as New Zealand, Sweden or Finland as depicted in Figure 3. According to this survey more than 60% of all adult citizens show little or no basic ICT skills at the OECD average – even worse in Austria. Hence, governments as well as the educational sector are forced to implement an action plan to increase digital skills among its citizens. Although the study also shows a big gap between younger (25-34 years) and older (55-64 years) citizens it is obvious that even the younger generation have too few digital competences. An Austrian representative study [10] clearly showed a tremendous gap in digital skills between perception of one's own skills and real skill level. Through all generations a gap was visible while the biggest deviation was among the younger generation below 30 years. The so called digital natives thought at least to have a good coverage of digital literacy knowledge while the older ones already knew what they do not know with respect to digital literacy. The term "Digital Natives"

came up by Marc Prensky in 2001 [11]. The author described "Digital Natives" as young people who grew up surrounded by, and using computers, cell phones and other tools of the digital age. His explanation derives from the assumption that young people are all "native speakers" of the digital language. Although the younger people did slightly better than the older generation the gap between their actual competences and their perception was even larger compared with the ones above 50 years.

Such a tendency is not surprising. Digital skills are normally associated with modern, active and successful people. It is natural for most people to aspire to be a part of such a group. Due to the fact that people – and here especially young ones – are continuously busy with online tools and equipments they believe to be an experienced ICT user. However, that is a fallacy that several surveys have shown.

Such international digital literacy studies were conducted in countries such as Switzerland, Singapore, Denmark, Finland, India and Germany [12]. All these surveys can be summarized with a common result: there is a clear gap between self-perceived and actual levels of digital skills. The data indicate that people can not adequately assess their digital skills. In Austria 94% of all participants believed to have at least averaged or better computer skills. But the practical test showed a completely different result: only 39% scored above average. Even in high developed countries as Switzerland or Singapore the differences between actual skills and self-assessed skills deviate dramatically as depicted in Figure 4. While the perception was always far beyond 80% only half (in Singapore) or just a third (as in Switzerland) showed sufficient results.

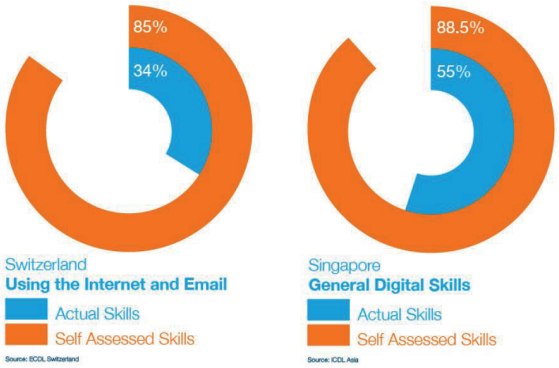

Figure 4. Digital Fallacy – Perception versus reality – A paper from the ECDL foundation [12].

Problem solving techniques become an essential feature for the current job descriptions. The founder of the so called Computational Thinking concept, J. Wing, already emphasized the importance of skills like problem solving and algorithm thinking [13]. Such competences are becoming a crucial skill for the today's challenges. As J. Wing pointed out already back in 2006 "… To reading, writing, and arithmetic, we should add computational thinking to every child's analytical ability…".

Unfortunately, the number of students finishing computer science at the university is slightly declining since the last decade as mentioned in [2]. The peak of computer science students was reached in 2006 in Europe. In only a few countries, such as Germany and France, the number of

informatics students has increased over the last years while in other countries, such as the UK, a tremendous decline happened. In Austria the number of master students in informatics remained stable over the last decade.
Hence - as stated in the OECD report - the major key priorities in order to meet the challenges of a digital world are amongst others:

- Basic education in ICT skills and problem solving skills
- Faster adoption of current needs for education and training systems and
- Life long learning attitude among citizens

Therefore, OCG is trying to push all these factors within the Austrian educational sector. In 2015 OCG started an initiative "Education 4.0" aiming to enhance digital literacy and computational thinking among all citizens [14]. This initiative supported by several stakeholders is focusing on all the key priorities mentioned by the OECD report.

3. A new ECDL – an approach for all citizens

The European Computer Driving Licence (ECDL or ICDL) was founded 1997 by a couple of European computer societies with the goal to bring digital literacy competences to all of Europe. In the meantime – more than 20 years later – this initiative became the most successful and popular ICT certification over the world. No other product in the ICT domain remained so successful as the ECDL/ICDL certificate does. Currently ECDL/ICDL is spread over more than 140 countries and yearly more than 15 million people participate in such online tests.

In Austria the ECDL is a true success story. With more than 700.000 participants in over 800 schools per annum the ECDL program has set a standard. The national operator in Austria is the Austrian Computer Society which is responsible for the quality of the certification and is supervising more than 350 test centers. In 2018, Austria ranked second in the number of people doing a certificate test – worldwide and in absolute numbers! (seen in Figure 5). Only in Italy (a country with seven times the population of Austria) more people were doing an ECDL/ICDL test. Austria even overtook countries like Germany, France or Romania in absolute numbers already several years ago.

Recently the ECDL Foundation started to redesign the ECDL/ICDL. A renaming of the acronym should indicate a change in the ECDL/ICDL program. From the European Computer Driving Licence it will change to European / International Certificate for Digital Literacy. Furthermore, the ECDL certificate series is split into school sector and workforce. There are different target groups which need different digital skills for their work.

The European Union settled a framework of digital competences which describes what it means to be digitally competent for citizens [15]. This framework is based on five pillars as shown in Figure 6.

Certification Tests			
Territory	Region	Qtr 4 2018	Total Sales 2018
Italy	Europe	18 295	226 831
Austria	Europe	13 543	128 233
Egypt	Arab States	10 703	115 557
United Kingdom	Europe	9 740	72 449
Ireland	Europe	5 359	67 665
Romania	Europe	7 394	53 532
Germany	Europe	3 973	49 140
France	Europe	4 000	48 000
Switzerland	Europe	3 395	42 103

Figure 5. Statistic over the year 2018 of certification tests per country, source, ECDL Foundation Dublin

Competence area	Competences
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
2. Communication and collaboration	2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity
3. Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licenses 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

Figure 6. The DigComp 2.1 framework of the European Union [15].

Within this framework several proficiency levels are defined as foundation, intermediate, advanced and highly specialized. Last year, the Austrian government started an initiative aiming to bring all citizens towards a certain level using the DigComp framework of the EU. An UNESCO study [16] analyzed several ICT certifications with respect to the coverage of the DigComp framework of the EU to the particular syllabus of the certification (see Figure 7).

The ECDL/ICDL programme turned out to be by far the most effective certification which covers the most part of the Digcomp framework as it is depicted in Figure 7. The ICDL competences reach 177 points while the next best certificate program only achieves 107 points. Only in a few topics the ECDL/ICDL has not reached any points, such as “Engaging in citizenship through digital

technologies", "Solving technical problems" and "Identifying need and technological responses". With the new modules Information literacy and Computing all these missing topics are covered too. The polish ECDL national operator showed in an EU project that the minor shortcomings of the ECDL/ICDL towards this framework can be withdrawn by implementing a few additional components and questions.

Digital literacy frameworks	0	1	1.1	1.2	1.3	2	2.1	2.2	2.3	2.4	2.5	2.6	3	3.1	3.2	3.3	3.4	4	4.1	4.2	4.3	4.4	5	5.1	5.2	5.3	5.4	6	Total
Kenya Basic Education Curriculum Framework	5			2		4			3					5		2	3			2			2			2	2	6	**38**
Philippines ALS-K to 12 LS 6	7		19	1	6		3	4		1	4	2		19	4	3		4	1	6	5					3	6		**98**
India Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)	1		4		2	1	1	1	1					1															**12**
Costa Rica Student Performance Standards in Digital Technology-enhanced Learning	15		4	4	4		4	6	1	10	5			11		1	10	8	3	2	1			1	1	3	13		**107**
Chile SIMCE TIC Matrix of ICT Skills for Learning			2	2	2		1								3	1				1	1						1		**14**
British Columbia Digital Literacy Framework	8	1	13	4	1	5	3	2	4	2	7	5		6	3	5	4	1	3	4	8	1	4	5	2	3	2		**106**
IC3 Global Standard 5	16		16	1	14		5	3			2	1		14	2	1	1	1	5	4	3			1		1	3		**94**
ICDL Competences	21		22	5	19	1	5	2		4	3	1		41	10	2	3	2	8	6	3	1				2	12	4	**177**
Microsoft Digital Literacy Standard Curriculum Version 4	15		13	1	5		1				1			10	3	1			5	2	1						7	2	**67**
Total no. of instances mapped	**88**	**1**	**93**	**20**	**53**	**11**	**23**	**18**	**9**	**17**	**22**	**9**	**0**	**107**	**25**	**16**	**21**	**16**	**25**	**27**	**22**	**2**	**6**	**7**	**3**	**14**	**46**	**12**	

Figure 7. Mapping of selected digital literacy frameworks onto the DigComp 2.1 framework of the EU. (Note: underscored competence areas (0 and 6) are proposed additions to the existing DigComp 2.0 competence areas.) [16].

Furthermore, the ECDL/ICDL program was rebuilt in 2014 towards a life-long learning program aiming to keep his/her ECDL ID and giving the possibility to re-skill and up-skill one's proficiencies. While the ECDL/ICDL was focusing mainly on digital literacy skills, new modules are dealing more and more with problem solving topics as for example the newly-launched computing module. This module on the one hand emphasises computational thinking concepts and on the other hand has first steps in coding. However, this module is not meant to educate programmers but to spread problem solving techniques among all people.

The syllabus of the computing module covers the following topics:

- Computing terms in general
- Computational thinking methods as problem solving, algorithms
- Starting to code (variables, data types, …)
- Building and using code (logic, iteration, procedures, …) and finally
- Test, debug and release

This new ECDL /ICDL module is a perfect solution to take people from level 3 to at least level 2 according the PIAAC levels explored in [7].

4. Austrian good practices

Therefore OCG is pleased that some regional Austrian governments have taken the ECDL as a mandatory tool for the educational careers of their civil servants. The dual academy of the Chamber of Commerce in Upper Austria for example has implemented the ECDL advanced modules in their career plan. And just very recently the Austrian Chamber of Commerce announced this approach as one of its five light house projects in their master plan for reducing the shortage of young. ICT experts.

The Ministery of Defence has relied on the ECDL program for a long time. In total more than 10.000 recruits have done the ECDL during their military service.

The Austrian police school included the ECDL program in its curricula. From 2018 onwards all future police men/women can do the ECDL certificate during their training. The Ministry of the Interior which is responsible for the education of future police officers, identified the ECDL as an important vehicle to improve the digital skills among the police force.

With this milestone the Ministry of the Interior established a good standard of digital skills among their police schools. In the following years the police will double their students from currently 2000 to almost 4000 students per year. Topics, such as IT security, data protection and especially learning computational thinking methods, are essential skills in today's world.

In the meantime OCG is further investigating new ECDL modules including Robotics and Artificial Intelligence, which will be implemented in the ECDL program in the next few years.

5. Summary

The most successful ICT certificate worldwide – the ECDL/ICDL program – is almost completely covering the DigComp framework of the European Union. With new ECDL modules like Computing and Data protection the ECDL program also remains up to date with the current developments.

OCG is proud that several ministeries made a commitment to the ECDL program and from 2018 onwards all police students will pass the ECDL certificate during their education.

The OCG is further trying to be on the leading edge of education in digital competences. The ECDL Foundation and its members are looking to establish a new ECDL/ICDL within schools and the workforce with the aim to face emerging IT developments, such as Artificial Intelligence, Machine learning and Robotics.

6. Literature

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