

# PERCEPTION AND REALITY

Measuring Digital Skills in Europe

Annex



*ECDL Foundation is a stakeholder in the eSkills for Jobs campaign, an initiative of the European Commission*

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## Indexes

This document overviews digital literacy studies carried out in 5 countries: Austria, Denmark, Finland, Germany, Switzerland. In order to see these countries in a broader context, we use three international indexes that rank countries by their development in digital areas: Network Readiness Index (NRI), Digital Economy and Society Index (DESI) and ICT Development Index. Separately, we also review sub-indexes which measure the digital skills dimension (marked in italics in the table below).

Index	No of countries	Austria	Denmark	Finland	Germany	Switzerland
1. Network Readiness Index (NRI), 2015	143	20	15	2	13	6
1.1. Quality of the educational system	143	31	18	2	12	1
2. Digital Economy and Society Index (DESI), 2015	28	12	1	4	9	N/A
2.1. Human Capital Dimension	28	8	5	1	9	9
3. ICT Development Index, 2015	167	25	2	12	14	7
3.1. Skills sub-index	167	22	12	3	33	48

Table 1. International indexes aggregating ICT indicators

1. The Network Readiness Index (NRI) is published by the World Economic Forum in collaboration with INSTEAD<sup>1</sup>. It measures the propensity for countries to exploit the opportunities offered by information and communications technology (ICT). The Index consists of 10 key pillars: Political and regulatory environment; Business and innovation environment; Infrastructure; Affordability; Skills; Individual usage; Business usage; Government usage; Economic impacts and Social impacts. The Index is was developed in 2004 and is now published annually.
2. The Digital Economy and Society Index (DESI) is the new composite index developed by the European Commission announced in the beginning of 2015<sup>2</sup>. It summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. The index includes five main dimensions: Connectivity; Human Capital; Use of Internet; Integration of Digital Technology and Digital Public Services. This indicator only measures the 28 EU Member States. The Human Capital dimension measures the skills needed to take advantage of the possibilities offered by a digital society.
3. The ICT Development Index (IDI) is an index published by the United Nations International Telecommunication Union based on internationally agreed information and communication technologies (ICT) indicators<sup>3</sup>. It is based on 11 ICT indicators, grouped in three clusters: access, use and skills (adult literacy rate, gross enrolment ratio secondary level and gross enrolment ratio tertiary level).

1 <http://reports.weforum.org/global-information-technology-report-2015/>

2 <https://ec.europa.eu/digital-agenda/en/desi>

3 <http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2015/methodology.aspx>, <http://www.itu.int/net4/ITU-D/idi/2015/>

## **Austria**

### **Background**

Austria ranks 20 out of 143 countries measured by the Network Readiness Index and 25 out of 167 countries in ICT Development Index. The European Commission's DESI index positions the country 12 among 28 Member States.

The Austrian Computer Society OCG introduced ECDL in Austria in 1997. 320,000 people in Austria have already received an ECDL certificate. This ICT education programme has already reached more than 6% of the Austrian population.

In January-February 2014, OCG carried out a survey of Austrians in order to verify their digital skills levels and to determine if self-assessment is an adequate tool to measure digital skills.

### **Methodology**

A representative group of participants from 15 to 60 years old was selected from the meinungsraum.at survey panel to by sex, age, education background, federal province and activity. 1,260 people participated in computer-assisted web interviews, 494 of them also took a test containing practical assignments.

Firstly, survey participants were asked some general questions about what devices they own; how much time during the day they spend using these devices and which activities they carry out. The test also contained questions about self-confidence in using computer and the internet, for example "How do you assess your Internet skills?". Possible answers provided a scale 'very good' / 'quite good' / 'average' / 'quite bad' / 'bad'.

The second part of the study consisted of practical questions provided in a simulated work environment by the Sophia system. The questions were based on three ECDL modules: Computer Essentials, Online Essentials and IT Security. The test results were grouped in the following categories: 'Very good' (90-100%), 'Good' (80-89%), 'Average' (64-79%), 'Bad' (51-63%), 'Very bad' (0-50%).

### **Key Findings**

The Austrian study revealed two key findings. Firstly, Austrians own multiple digital devices and they use them often. For example, 66% of the respondents indicated that they have notebooks and / or smartphones and access to the internet at home. Moreover, 51% of the Austrian workforce spend at least half of their working time on a computer. Nevertheless, test results show that 61% of the respondents scored 'bad' or 'very bad' in the practical test on their general computer skills and just 7% received a very good score.

Secondly, Austrians tend to over-estimate their digital skills. For example, almost half of the respondents indicated that they have very good skills in computer essentials, whereas only 7% of them scored 'very well' in the practical test (see Figure 1). These findings show that self-assessment is a poor predictor of the actual skills levels and that despite being confident about their skills, people often fail to carry out practical assignments correctly.

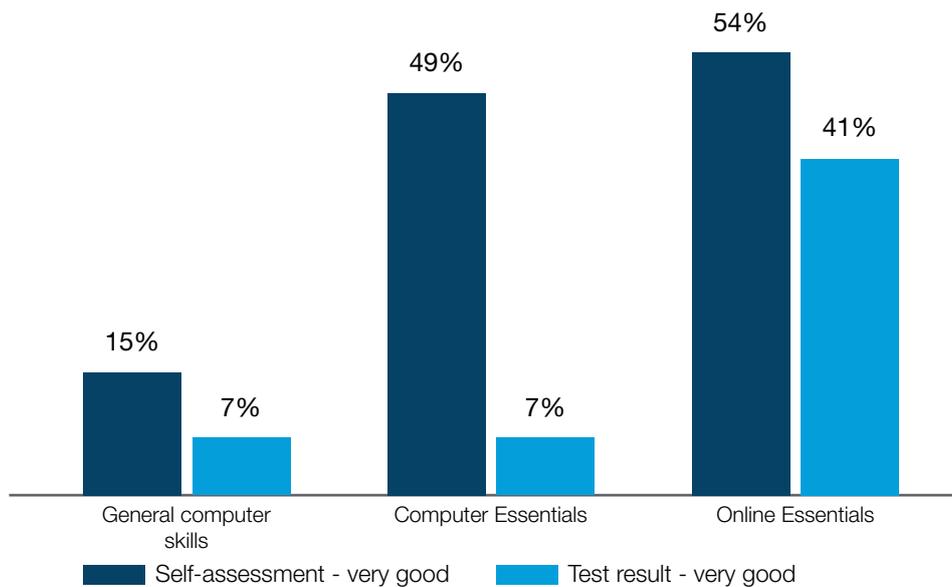


Figure 1 Comparison between self-assessment and test result in Austria

## Denmark

### Background

Denmark appears at the top of international digital development indexes. It holds 1st place among 28 Member States in the DESI index published by the European Commission and 2nd place out of 167 countries in the ICT Development Index. 93% of Danish people use the internet at least once a week<sup>4</sup>. ECDL programme has been very successfully implemented in the country. 4.7% of the Danish population is ECDL certified.

During the academic year 2013-2014, ECDL Foundation and the ECDL National Operator in Denmark, Dansk IT, carried out an assessment of first year university students' digital literacy levels. The aim of the study was to determine if young people who have recently left secondary education possess the digital skills necessary for a workplace.

### Methodology

183 first year students from Danish universities participated in the study. Respondent groups were selected randomly by survey coordinators of the participating universities. Students could voluntarily accept or decline the invitation to participate in the study. Most of the respondents (85%) were 18-24 years old, 10% were 25-30 years old and the remaining 5% were older than 30 years.

The questionnaire consisted of the two key parts: questions about students' perceived level of digital skills and questions to assess students' actual digital skills levels. Respondents also received demographic questions about their gender, age, frequency of computer use, etc.

Both self-assessment and practical questions were structured across six key digital skills areas: Concepts of ICT, Using Computers and Managing Files, Word Processing, Spreadsheets, Presentations, and Web Browsing and Communications. Students were asked to estimate if they are 'very confident' / 'somewhat confident' or 'not

<sup>4</sup> Digital Agenda Scoreboard, "Individuals who are regular internet users (at least once a week)", 2015, <http://digital-agenda-data.eu/>

confident' in certain areas (for example, in understanding basic network concepts, in compressing files or securely using a browser).

The evaluation of actual digital skills consisted of multiple choice questions and assignments in a simulated work environment (the so-called 'hot spot' technology). For example, some multiple choice questions were: 'What is measured in kilobits per second?', 'What does the https indicate in a URL address?'. The assignments in a simulated environment included these questions: 'The Mail merge function is open. Where should you click to open a mailing list stored in a folder on your computer?', 'Where should you click to save the attached file?', etc.

Students were given 40 minutes to answer the questions. The assessment took place in a designated area within the university where the students logged into the assessment system using their own electronic device, but remained within a supervised environment.

### Key Findings

As one could expect from a digitally advanced country, Danish students scored quite high in most of the digital skills areas (see Figure 2). They correctly answered 93% of questions in Concepts of ICT, 82% - in Using Computer and Managing Files and they scored almost 80% in Word Processing and Web Browsing and Communications areas. However, their skills in working with Spreadsheets and Presentations remain relatively low (57% and 58% respectively).

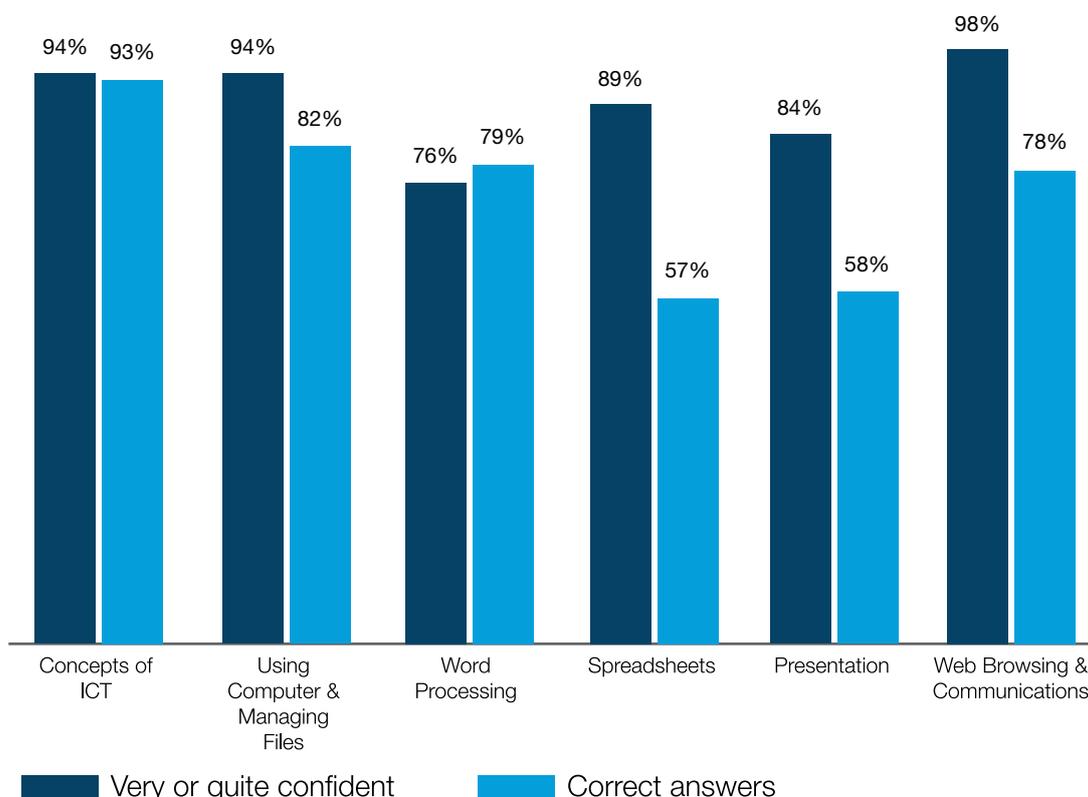


Figure 2 Comparison between self-assessment and test result in Denmark.

Figure 2 also shows that students in Denmark tend to over-estimate their skills in most of the digital areas. For example, 89% of respondents claimed to be very or quite confident in working with Spreadsheets but only 57% of them answered the practical questions correctly. Similar results exist in the area of working with presentations (84%

confidence and 58% correct answers). In comparison, Danish students tend to slightly underestimate their skills in working with Word Processing software (76% confidence and 79% correct answers).

Results of the Danish study revealed that self-assessment is an imperfect measure of actual level of digital skills. Demonstrated skills and knowledge must be examined to make reasonable conclusions about actual digital competence.

## Finland

### Background

Finland is one of the most digitally advanced countries in the world. It ranks 2nd among 143 countries in Network Readiness Index, 4 in DESI and 12 in ICT Development Index. It holds the 1st place in Europe in Human Capital dimension of DESI. Moreover, the Finnish Communication and Media Competence curriculum for upper secondary school which includes digital skills development is considered exemplary by many experts.

ECDL Foundation and ECDL Finland carried a small sample survey of first year university students to verify if digital skills of young Finnish people are as high as expected.

### Methodology

The survey was conducted in parallel to the Danish study (late 2013 and early 2014) and used the same surveying tool as the Danish one (translated into Finnish) described in the previous section. The survey was conducted in 2 universities and 62 randomly selected students participated in it.

### Key findings

Finnish students are quite confident about their digital skills levels. Their confidence varies from 98% in Web Browsing and Communications to 74% in using Spreadsheets (see Figure 3). However, the gap between self-assessment and actual skills is prominent in most of the skills areas. Even though nearly 100% of respondents are very or quite confident in Web Browsing and Communications, only 56% of them answered the practical questions correctly (the difference between self-assessment and real competence is 42 percentage points). Moreover, the actual skills of survey participants in some of the key digital areas are strikingly low (Spreadsheets - 37%; Presentation – 60% correct answers).

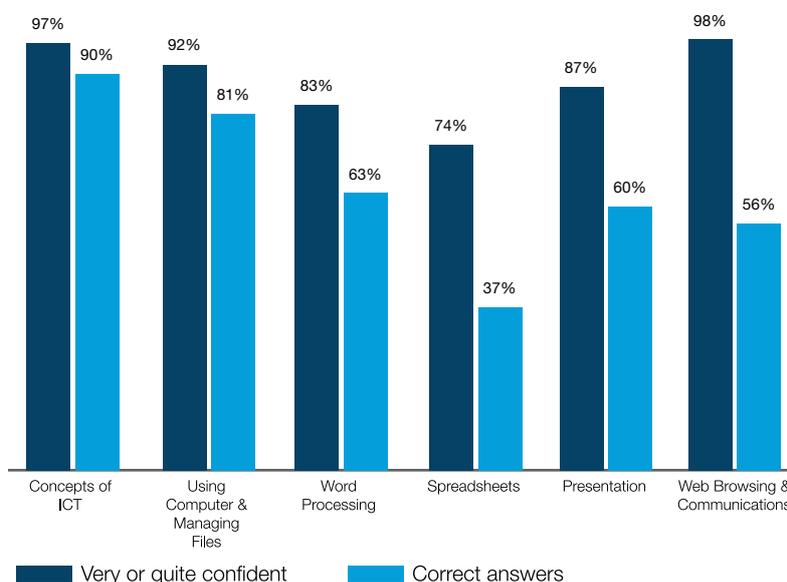


Figure 3 Comparison between self-assessment and test result in Finland.

The Finnish study confirms Danish findings that there is no correlation between self-assessment and objective test results. These findings suggest that there is a need for an objective tool to estimate and validate the acquired digital skills.

## Germany

### Background

Germany is among top-15 countries in different international indexes (NRI – 13, DESI – 9, ICT Development Index – 14). 87.8% of German households have a broadband connection and 84.5% of its population use the internet every week<sup>5</sup>. The ECDL programme is well broadly implemented in Germany: it is available through the network of 1,500 testing centers throughout the country.

The German partner of ECDL, Dienstleistungsgesellschaft für Informatik (DLGI), carried out a digital literacy study during the first two quarters of 2014. The study was based on the methodology used in the Nordic countries.

### Methodology

DLGI used the same methodology as Denmark and Finland (for detailed description of the study design, see chapter 3. Denmark). In addition, Germany expanded the survey group to include not only first year university students as in the Nordic countries, but also final year students of higher-tier secondary education institutions. The reason to do that was to cover a broader range of students from the same age group and to increase the number of responses. 673 students participated in the survey, most of whom were 18-24 years old (63%) or younger than 18 years old (25%).

Germany also added an additional demographic question about respondents' fields of study. This question allowed comparative analysis of confidence and skill levels between students of various majors. Students were asked to choose from a list of 13 different categories which were later grouped to STEM (21% of respondents), Finance / Accounting (20%), Management / Logistics (20%), Commerce (12%), Legal / Admin (7%) and Other (20%).

### Key Findings

#### *Skills Gap*

The study found that German students are quite confident about their digital skills levels. Their confidence varies from 79% in Spreadsheets to 93% in Web Browsing and Communications (see Figure 4). As in the previous studies, results of the practical tests are considerably lower: only 38% of correct answers in Spreadsheets and 71% in Web Browsing and Communications (see Figure 4).

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5 Digital Agenda Scoreboard, "Individuals who are regular internet users (at least once a week)", 2015, <http://digital-agenda-data.eu/>

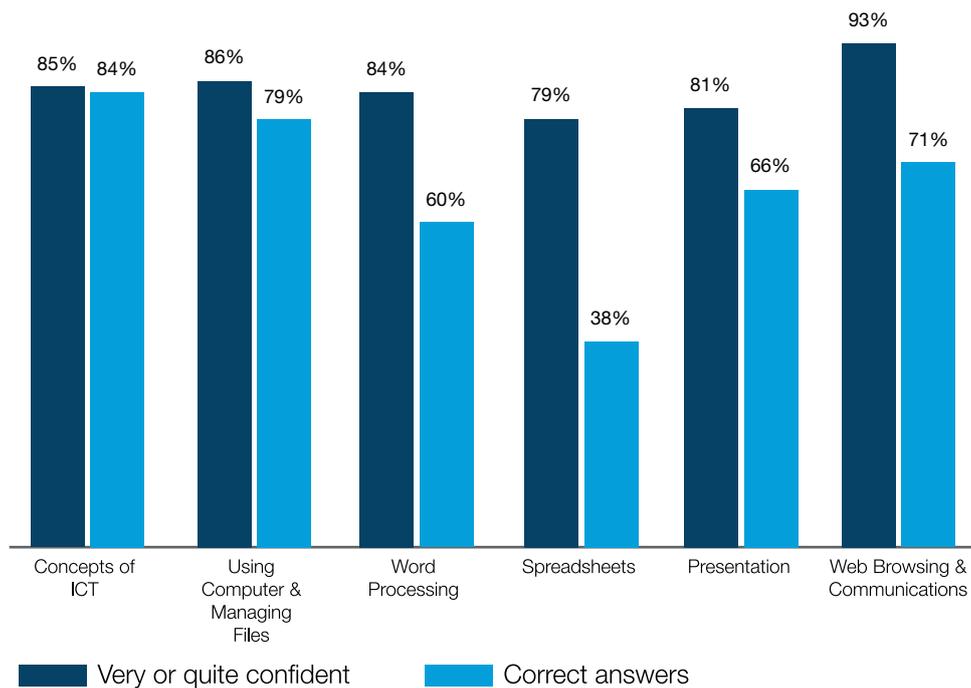


Figure 4 Comparison between self-assessment and test result in Germany.

These findings illustrate that:

- Self-assessment is not the best measure to evaluate digital skills
- People tend to overestimate their skills. Practical tests show that their actual skills levels are much lower
- Contrary to a widespread illusion (also called digital native fallacy<sup>6</sup>), not all young people are proficient in digital skills.

#### *Factors that Determine Higher Digital Skills Levels*

The analysis revealed that the field of studies has an influence to digital skills levels. Although students of different subjects had similar levels of confidence in their skills, the Legal/Admin and Finance/Accounting students scored the best in the practical test (75% and 74% pass rate per item), whereas Commerce students performed the worst (61% pass rate per item).

Respondents who had previously acquired digital skills certification performed on the average 12% better than students without similar certification. Certified students had significantly better results in tasks related to productivity applications (Word Processing, Spreadsheets and Presentation) whereas in the areas of Web Browsing and Communications and Concepts of ICT they scored similarly to non-certified students. In addition, digital skills certification does not seem to have an impact on students' confidence levels.

6 For more information about Digital native fallacy, see ECDL Foundation's position paper "The Fallacy of the 'Digital Native': Why Young People Need to Develop their Digital Skills", <http://www.ecdl.org/media/TheFallacyofthe'DigitalNative'PositionPaper1.pdf>

## Switzerland

### Background

Switzerland holds high positions in different international indexes. The Network Readiness Index ranks Switzerland as one of the best connected and most innovation-driven economies (6th out of 143 countries) and having the best quality of the educational system in the world (1st out of 143 countries). ICT Development Index gives the 7th place for the country.

The ECDL programme is integrated in a large number of Swiss secondary schools, vocational colleges, private institutions of (further) education to companies and public authorities. Every year about 18,000 people in Switzerland and Lichtenstein take ECDL exams.

In spring 2015, the research institute 'meinungsraum' conducted a survey of the Swiss on behalf of ECDL Switzerland AG. The aim of the study was to compare the self-assessment and actual digital skills of the respondents.

### Methodology

2,050 people between the ages of 15 and 64 in the German- and French- speaking parts of Switzerland participated in the study. Participants were selected to be representative according to their sex, age, canton<sup>7</sup> and education. Firstly, respondents were asked how they use their PC and how they rate their digital skills. Additionally, 492 people participated in a practical assessment which contained three questions from each ECDL Base diagnostic tests.

In the first part of the survey participants were asked to rate their skills in file management, internet usage, word processing and spreadsheets on a scale from 0 to 10. The questions included, for example, "How do you assess your basic skills in word processing? Can you, for example, format text, edit it, insert page numbers, search for a word and replace it?" The questionnaire also had a separate set of questions about the usage of computer equipment and awareness of digital certification as well as socio-demographic characteristics. The responses were grouped in a scale 'good/very good' (rate 7-10) / 'sufficient' (6) / 'insufficient' (4-5) / 'poor/very poor' (0-3).

The second part of the study consisted of practical tasks that were given in a simulated work environment (Sophia system). This test consisted of three questions from each of the ECDL Base diagnostic tests: Computer Essentials, Online Essentials, Word Processing and Spreadsheets. The tasks included, for example, creating new folders, downloading files from an internet website, formatting Word documents and creating simple charts in a spreadsheet document. Test results were grouped in the same scale scale 'good/very good' (result 75-100%) / 'sufficient' (60-74%) / 'insufficient' (36-59%) / 'poor/very poor' (0-35%).

### Key Findings

#### *Skills Gap*

The study revealed two key findings. Firstly, despite being well-equipped with PCs and using them frequently, the Swiss population has a poor level of basic computer skills - the average practical test result of the participants was 46%. Secondly, the Swiss inadequately assess their digital skills levels. 67% of the participants described their skills as "very good / good" but only 31% of them actually achieved a corresponding test result (see first column of the Figure 5). In comparison, 6% of respondents evaluated their skills as "very poor / poor", but in practice 40% of them scored "poorly / very poorly".

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<sup>7</sup> Member states of the Swiss confederation

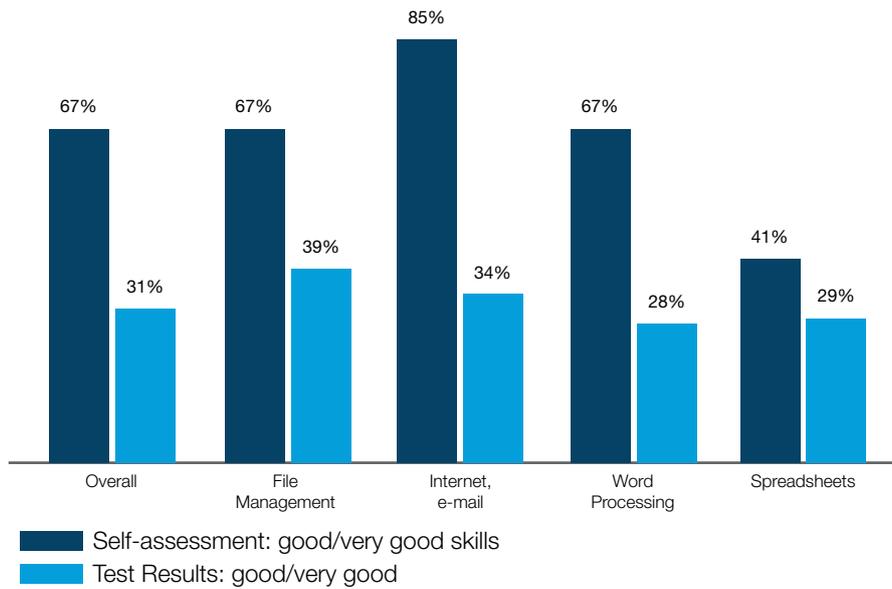


Figure 5 Comparison between self-assessment and test result in Switzerland.

The Swiss performed the best in using file management (39% scored good or very good) and in the area of using the internet and e-mails (34%). Good or very good test result in Spreadsheets and Word processing was 29% and 28% respectively.

#### Skills Depend on Socio-Demographic Characteristics

The survey revealed that digital skill levels are influenced by age, time spent working at the computer, and previously received digital skills certificates. For example, the best results in the practical test were achieved by 15 to 25 year olds and people from central Switzerland (see Figure 6). Moreover, people who use PCs intensively at work (who spend more than three quarters of their working time at the computer) and those who developed their digital skills as part of structured education or training perform better in practical digital skills tests. Finally, ECDL certificate holders scored 24% better in practical tests than participants without certification (see Figure 6). These findings suggest that regular work with computer programmes, structured studying and certification result in better digital skills.

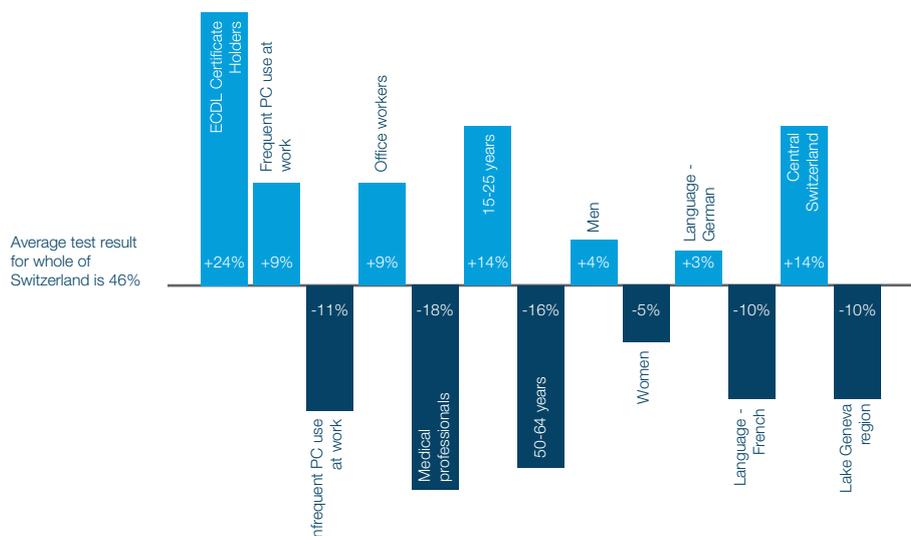


Figure 6 Test result: the deviations from The Swiss average – practical test results.

## Summary

	Austria	Denmark	Finland	Germany	Switzerland
<b>Time period</b>	January - February 2014	Academic year 2013-2014	Academic year 2013-2014	Q1-Q2 2014	Spring 2015
<b>Target group</b>	15 - 60 years old, selected by sex, age, educational background, federal province, activity	First year university students	First year university students	First year university students and last year higher tier secondary education students	15 - 64 years old German and French speakers selected by sex, age, canton and education
<b>Total number of respondents</b>	1,260 survey participants, of whom 497 took a practical test	183	62	673	2,050 survey participants, of whom 492 took a practical test
<b>Age distribution</b>	15-29 – 29% 30-49 – 47% 50-64 – 24%	<b>18-24 – 85%</b> 25-30 – 10% >30 – 5%	<18 – 24% <b>18-24 – 58%</b> 25-30 – 11% >30 – 7%	<18 – 25% <b>18-24 – 64%</b> 25-30 – 8% >30 – 3%	15-19 – 5% 20-25 – 11% 26-29 – 8% 30-39 – 21% 40-49 – 23% 50-59 – 21% 60-64 – 8%
<b>Digital skills gaps are present</b>	+	+	+	+	+
<b>Respondents overestimate their digital skills</b>	+	+	+	+	+
<b>Rejects the 'digital native' fallacy</b>	<b>N/a</b>	+	+	+	<b>N/a</b>

Table 2. Overview of studies carried out in Austria, Denmark, Finland, Germany and Switzerland

The table below summarises studies carried out in Austria, Denmark, Finland, Germany and Switzerland. Two key findings can be drawn out of these studies:

- Self-assessment is a relatively poor predictor of actual performance. People tend to either underestimate, or, most often, overestimate their digital skills. Formal tools that measure actual ability, such as certification, are essential if levels of competence amongst individuals or groups need to be evaluated.
- In all of the countries, clear skills gaps exist in the execution of common tasks associated with productivity applications such as working with documents, spreadsheets and presentations – these are potentially crucial skills for employability. In order to close this skills gap, people should have access to digital training and digital skills development programmes should become a part of all education forms: formal, non-formal and informal.

Findings from most of the countries also contradict the widespread illusion that all young people are proficient in digital technologies (digital native fallacy). Even in digitally advanced countries like Germany or Finland young people do not perform high enough. Thus, digital training and certification are as relevant for young people as they are for the population in general.

Finally, data from Germany and Switzerland shows that people who have previously acquired digital skills certification perform significantly better in the practical test. These findings suggest that engagement in formal certification programmes, as opposed to informal training, supports better performance in real-world tasks.



