

ICT Skills in Denmark's population

Summary of the report submitted to the Danish
National IT and Telecom Agency

Policy and Business Analysis
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1. Summary and recommendations

The National IT and Telecom Agency in Denmark commissioned Danish Technological Institute to analyse information and communication technology (ICT) skills in population of Denmark. The analysis was carried out in order to inform future policy measures on ICT skills in the population.

1.1. Analysis main messages

The analysis contains: a description of the population's ICT skills and an evaluation of these skills in light of future needs; an examination of the overall economic benefits of improved ICT skills in the population, and; an analysis of the barriers to better ICT skills in different population groupings. The analysis points to a range of target areas for the enhancement of the population's ICT skills, based on an overall balanced estimation of which target groups have the greatest needs and of where the most substantial benefits could be obtained for individual target groups and for society as a whole.

ICT Skills in Denmark's population: Large groups with low skills levels

The examination of the population's ICT skills builds on a survey of a representative selection of 1547 persons. These survey subjects evaluated their own routine and experience with 34 ICT skills. On the basis of the examination results, the population can be divided into four skills groups. Persons at level 0 have never used a computer. Persons at level 1 ("weak skills") score from 0-40 on a scale from 0-100. Persons at level 2 ("moderate skills") score from 41-70. Persons at level 3 ("good skills") score from 71-100.

Table 1: The Danish population distributed by ICT skills level

	Level 0	Level 1	Level 2	Level 3	Total
Share (%)	20%	18%	32%	30%	100%
Number	316	275	500	456	1547

The examination shows that large groups in the Danish population have weak ICT skills levels. 20% of the population is in group 0, having never used a computer, and an additional 18% is characterized as having weak ICT skills. Respondents in level 1 typically indicate that they have "no experience or routine" with the 34 ICT skills analysed.

- *Overall, almost 40% of the population has either no ICT skills at all or only weak ICT skills.*

As a group, people in Denmark are very good at obtaining information with the aid of ICT, are not quite so good at evaluating, handling, and integrating this information, and have difficulties creating new information with the aid of ICT.

Laboratory studies show that information searches by persons at levels 1 and 2 are characterized by inefficiency and accidental coincidence. Persons at level 3 are more confident and effective in their information searches.

Overrepresentation of the elderly and of persons with low education attainment levels in the groups with no or weak ICT skills

The elderly and persons with low education levels are overrepresented in the group that never uses ICT. Within the group with no ICT skills, almost half are no longer members of the labour market - that is, retired or receiving various forms of early retirement benefits, or in some other way not part of the labour force. Level 1 is also clearly overpopulated with people with low education attainment levels, and is somewhat overpopulated with the elderly. There is, however, a very large share of the 30-59 year-old group with weak ICT skills (level 1).

Characteristic for persons in level 1 (weak skills) is a lack of interest in new technologies, the use ICT for entertainment purposes, and few occasions and limited need for the use of ICT. Persons in level 0 have of course in no way described any use of ICT.

Persons at level 2 and 3 have higher levels of education attainment and use ICT at work

Persons with moderate or good ICT skills have on an average a higher education level and use ICT more often, not least in work-related situations. The largest segment of persons with good ICT skills is composed of "highly-educated, online, white-collar employees." These are typically men in their late 30s who use ICT extensively at work and who quickly learn to employ new technology.

Substantial economic benefits in better ICT use - potential annual gain of DKK 79 billion

Danish Technological Institute's analysis indicates that there are substantial economic benefits available to Danish society should individuals make better use of ICT. The economic benefits of better ICT use can be realized through time-savings, efficiency enhancement, and quality enhancement in production.

Based on an investigation of 445 enterprises in 14 branches, a calculation can be made of the potential annual gain for Danish society through the best possible use of ICT in the service sector and in the production of physical goods. This potential annual gain can be estimated at DKK 79 billion, corresponding to 5% of the Danish BNP.

- and even if there are expenses involved in raising the population's ICT skills levels, there will be a very good return on investment

Massive efforts will be necessary if people are to be able to make "best possible" use of ICT - but even if these efforts are cost-intensive, cost-benefit calculations show an extremely good return for society on investments in ICT skills enhancement in the population.

The costs of upskilling all members of the labour force to ICT skill level 3 can be estimated at about DKK 38 billion. This is, however, a one-time short- and medium-term investment, and the total positive return can be estimated at DKK 59 billion in the period 2007-2012, corresponding to almost 4% of Denmark's BNP, even when taking into account the declining future value of returns when compared to current value, and even when assuming that this upskilling only has a success rate of 70% of its total maximum possibility. The net return on investment in enhanced ICT skills is thus 150%. If the time frame is enlarged beyond 2012, then the net return is even greater.

There are many lifestyle and daily life benefits available to individuals with good ICT skills

Danish Technological Institute's investigation and interviews with a number of persons in Denmark show that there are many lifestyle and everyday life benefits available for those with

good ICT skills; computers can be used as an aid to day-to-day tasks and challenges, and ICT gives access to opportunities unavailable without ICT skills and web access.

ICT skills benefit the individual in many ways. They save time (e.g. through online banking instead of waiting in line); reduce the efforts involved in planning, staying informed, and keeping in touch (e.g. through online access to travel information or to education information available through study program internet forums); provide access to better information through the online availability of multiple and mutually independent information sources; enhance private life through easier communication with family and friends in word, picture, and sound; save money through price comparison websites; and give access to opportunities that are solely available through the internet, such as special low-cost airline tickets and employment service CV databases whose use is mandatory for all registered job-seekers.

Increased demands for ICT skills in the future

We can expect increased demands for ICT skills in the years to come. An expert workshop with representatives from research institutions, public authorities, and private enterprises, indicated that the ICT skills level needed in 2012 will correspond to an average ICT skill level in members of the work force of 72 (on a scale of 0 - 100). Currently, 69% of persons in the work force score under 72 and 90% of persons outside the workforce score an ICT skill level under 46. Considering the total population, 72 % of all Danish citizens over the age of 15 currently score less than the average IT skill level that experts expect them to achieve in 2012.

"The March of Time" and the increased dissemination of ICT cannot solve the problem

Will "the march of time" solve the problem of low ICT skills levels? And will the population's ICT skills become better as information and communication technologies become more widespread? These are relevant questions, especially because younger members of the population have clearly better ICT skills than others. But the answer to both questions is "no." ICT skills projections that take demography and the spread of ICT into account indicate that there will continue to be large groups of people with weak ICT skills. In addition, the effects of demography and the spread of technology are factored into calculations about the economic benefits of better ICT skills.

Motivation, interest, and needs are significant barriers to better ICT skills

There are a number of significant barriers that must be overcome in order to improve the ICT skills of persons with no or weak skills. Lack of interest and lack of perceived need for ICT skills are two of the most significant barriers that future efforts must overcome. People with the lowest ICT skills levels are those who feel the least need to improve their work-related ICT skills - and this is also true of those who are employed. The lack of ICT training provision and economic difficulties are, in contrast, not experienced as significant barriers. Those with weak ICT skills point to friends and family and public ICT training provision as elements in strengthening these skills.

Lack of time is the most significant barrier for people with good ICT skills. Members of this group feel a considerable need to strengthen their ICT skills, and indicate that this can best be done by themselves or through on-the-job training provision.

We must meet people where they are - and make them aware of their ICT needs

Public focus groups indicate that very generalized and traditional awareness campaigns and standard information are not very effective tools for increasing the population's ICT skills. It

is especially important that efforts targeting persons with no or low ICT skills take place as much as possible in these persons' own contexts - often a workplace - where they can be better motivated to improve and to increase use of their ICT skills. It is also crucial to increase these individuals' motivation and interest regarding ICT, and their desire to work with the tools of information and communication technology.

- just as efforts must be differentiated in relation to various target groups

The analysis identifies eleven subgroups within the four ICT skills level groups. Challenges and barriers to enhanced ICT skills vary among these subgroups, and it would be relevant to differentiate ICT skills enhancement efforts accordingly.

Transversal efforts: create awareness, use the public sector, mobilize enterprises

A number of efforts are relevant for all target groups, no matter what ICT skills level they start at. It would be relevant to increase general information efforts regarding the potential benefits of ICT for individuals, enterprises, and society at large. In light of the substantial potential economic benefits indicated by the analysis, it should be possible to raise awareness levels and strengthen the will for change across Danish society.

Efforts strengthening enterprises' own ICT upskilling would be relevant as an extension of general awareness-raising about the benefits of enhanced ICT skills. The establishment of an ICT-skills "training consultant" scheme could focus enterprises' attention on needs and opportunities, and could help enterprises establish training activities on a permanent, running basis, whether in the form of course provision, on-the-job training, or peer-learning activities. Another possibility would be the dissemination of good-practice examples of ICT upskilling.

Finally, the active use of the public sector could further the population's ICT skills in a comprehensive manner. Municipalities should be encouraged to take proactive action, for example by upskilling their own employees and training front-end personnel so that they can offer guidance to the public. The public sector should in general be encouraged to maximize public use of digital services by making these services more user-friendly. This can then permit shorter physical opening hours in some circumstances, thus freeing more resources for other important tasks.

Groups with weak ICT skills: motivate, counsel, and support enterprise and union efforts

For those with no ICT skills at all, it would be relevant and necessary to clearly point out the benefits and opportunities that they are missing by not utilizing information and communication technologies, and to emphasize the disadvantages - and perhaps threats - that they will face in the years to come if they do not become better at using ICT.

Efforts relevant to this group's *motivation* include among others information campaigns that clearly emphasize the concrete benefits and advantages of using ICT. Such efforts can include the participation of celebrities as role models and the use of television, so that entertainment programs can help create awareness of the need for and the opportunities related to good ICT skills. Relevant efforts targeting this group's *skills* can include impartial assistance and advice in how to buy computers and software, and support for enterprises' and unions' efforts to enhance this group's ICT skills level. It would also be relevant to develop and offer this group special ICT learning provision in connection with already existing reading-writing-arithmetic courses. This is especially relevant as an extension of the

government goal of assuring that 40,000 people annually complete reading-writing-arithmetic courses offered as part of the labour market continuing training programme. Finally, it would be relevant to strengthen education and training provision targeting the elderly, and to develop education provision specifically for this group.

Groups with moderate ICT skills: provide information about ICT security and about future demands

Relevant efforts to *motivate* the group with moderate ICT skills would include information about future labour market demands for ICT skills. In addition, motivation for enhanced ICT skills and use of ICT can be increased through better and more information about ICT security and "safe ICT habits." The analysis indicates that many people feel insecure about safety, for example when using the Internet for payments and banking. Information about the national digital signature can also increase this group's use of ICT for new purposes.

Groups with strong ICT skills

The greatest barrier for (even) better ICT skills for members of this group is lack of time; there is nothing wrong with their motivation. A relevant initiative can consist of efforts that target enterprises and workplaces and motivate them - not least by indicating the substantial potential economic benefits - to devote sufficient time and resources to continuing efforts to upskill employee ICT skills levels. Another relevant initiative can be an information campaign that increases the individual's ability to self-improvement of ICT skills, for example by increased information about help functions in computer programs or in connection with access to public sector digital government services.

1.2. Recommendations for civic ICT-skills policy

On the background of the analysis' overall results and main messages, Danish Technological Institute recommends the following in order to reach the overall Danish goal of strengthening the population's skills in the use of information and communication technology:

Recommendation 1: A national action plan for ICT skills

The government should initiate the development of a national action plan for better ICT skills in the population of Denmark, framed by an ambitious level of stated objectives and supported by the involvement of all areas of Danish society.

The action plan shall specify overall goals for the population's ICT skills levels, the public resources to be used to reach these goals, the principle actors to be mobilized to participate in carrying out the action plan, and the areas for which each type of actor shall be the main driver.

The analysis indicates that a major boost of the population's ICT skills necessitates comprehensive societal efforts, and these cannot be successfully carried out by efforts restricted to individual ministries, the national government, or the public sector alone.

Recommendation 2: Comprehensive involvement in the creation of the action plan

This report contains a number of building blocks for an action plan. The overall action plan should, however, be formulated in an interplay between all of the relevant actors. It would be appropriate for the National IT and Telecom Agency and the Ministry of Science, Technology and Innovation to formulate a first draft, and - after a comprehensive public hearing phase - to convene all of the relevant partners to a conference and follow-up process on the design of the final action plan.

Recommendation 3: 2/3 of the adult population in Denmark shall be ICT-superusers in 2012

The overall goals of the national action plan should be for a minimum of 2/3 of the adult population to be ICT superusers in 2012, superusers being individuals at ICT skills level 3 as defined in Danish Technological Institute's ICT skills-level survey described above.

Recommendation 4: Enhance the ICT skills of all adults

Given the importance of ICT as generic technology, the action plan should embrace initiatives that target the entire adult population, no matter what the individual's age or skills level.

Recommendation 5: Focus on most effect for the money - and then focus on the 35-60 year-olds

The final national action plan should emphasize the use of public finances so as to maximize society's return on investment.

Specifically, this would indicate the suitability of targeting the majority of public investment on enhancing ICT skills in the group of 35-60 year-olds. Those who are younger already have on the average a high ICT skills level, and the return on investment in enhanced ICT skills for those over 60 will mostly be related to better communication with the public sector, and only to a limited degree be relevant to better use of ICT in production. If efforts are to be focused further, it is economically most efficient to focus on 35-60 year-old members of the labour force.

Recommendation 6: Allocate considerable amounts of public resources to strengthen ICT skills

There are substantial potential economic benefits for society in enhanced ICT skills.

At the same time, the analysis indicates that the present level of investment is insufficient to enhance the population's ICT skills. Enterprises, unions, and the voluntary sector must be highly involved, and these actors' involvement is crucial. Such involvement requires the Danish state to be at the forefront, not least by allocating considerable amounts of public resources with the goal of enhancing the population's ability to use ICT in the best possible way. This should involve assessing which types of ICT training activities are likely to produce the best results in relation to the different target groups. Financial priority of enhanced ICT skills would be a direct continuation of the Globalisation Council's Recommendations and of the government's globalization strategy.

Recommendation 7: Motivate – not least by pointing out benefits and threats

The analysis describes 18 different proposals for initiatives that can be included in civic policy for ICT skills. Nine of these initiatives focus primarily on motivating people to enhance their ICT skills, and the other nine focus on the enhancement of ICT skills.

To motivate people to attempt to enhance their ICT skills, the action plan should focus on efforts that inform about benefits and gains from the use of ICT. This can be done through printed and digital media, and through the use of role models. An important direct effect can be obtained through collaborative information campaigns by unions and other relevant actors about ICT demands in the coming labour market and in relation to specific jobs and branches. Finally, priority should be given to information campaigns about benefits and gains (based on the economic benefit analysis above), targeting enterprise management, unions, branch organizations, and other relevant actors in order to stimulate their participation in these efforts.

Recommendation 8: Prioritize learning efforts targeting those with weak ICT skills, and mobilize enterprises

In order to enhance the population's ICT skills, priority should be given to initiatives that are directed towards participants in the labour force who have weak or moderate ICT skills, and to the development of education provision that couples training in ICT skills with reading-writing-arithmetic skills, so that those with the lowest basic skills levels also receive training in the fourth fundamental skill, ICT.

The action plan should also prioritize initiatives for additional situation- and task-specific ICT training and peer learning (an ICT-skills training consultant scheme for enterprises), and prioritize training of public sector employees who are faced with the responsibilities of serving the public at town halls and civic service functions. The goal is for these employees to be able to instruct the public in the use of Internet-based services.

The rest of the initiatives described in the analysis should also be carried out, because the gains associated with these can be substantial. However, some of these initiatives overlap other policy action areas and must therefore be coordinated with these (for example information and education and training in ICT security and the digital signature, and enhancement of public sector digital services), and some of these initiatives address a group of elderly that are very difficult to motivate, or address persons who already have strong ICT skills and are able to maintain and improve these skills by themselves.