LOW AND TOP PERFORMERS OF INFORMATION PROCESSING SKILLS IN ESTONIA

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Earlier international surveys of adult competencies\(^1\) have shown that countries with a larger proportion of people with high level of literacy and smaller proportion of people with a lower level of skills have a higher GDP per capita. Hanushek and Woessman\(^2\) have also found that both the share of people with low skills and the share of people with good skills affects the economic growth of any country. In addition, it has been demonstrated that countries with a larger proportion of people with a higher level of literacy have a larger share of people with higher income. Previous works also suggest that the level of information processing skills is not only associated with the economic indicators of a country — for instance, it has been found that the life expectancy of the population is higher in the countries with a larger proportion of people with a higher level of literacy.

Although the studies referred to above focus, among other things, on the so-called tails of the distributions of skills, many earlier analysis have concentrated on mean values characterising the distributions of skills. However, in the light of the results referred to, this report focuses on the former ones: adults with good and poor skills in literacy, numeracy and problem-solving in technology-rich environments established as a result of the PIAAC survey, who are hereinafter referred to as the top and low performers of information processing skills, respectively.

The aim of the analysis is to observe the following:

- how many adults have poor and good information processing skills in Estonia;
- who are they or which socio-economic factors are associated with the poor and good information processing skills of adults;
- how do adults with poor and good information processing skills cope and prosper in the socio-economic sense or why is it necessary to have top performers and which problems are connected with low skills.

Low performers of information processing skills are defined as follows:

- **people with low literacy level** — literacy at or below Level 1;
- **people with low numeracy level** — numeracy at or below Level 1;
- **people with low level of problem-solving skills in technology-rich environments** — problem-solving skills in technology-rich environments below Level 1, plus people who had no previous experience in using computers, who did not wish or dare to solve tasks in the computer\(^3\) or who “failed” a simple test of their ability to use the functionality to undertake the assessment in computer-based form (the ICT core test).

Reading component skills are separately observed in the analysis to characterise the low level of literacy in more detail. According to the PIAAC methodology, reading component skills are those associated with understanding vocabulary, meaning at the level of the sentence and passages of text. Reading component skills are a prerequisite to understand the text being read and the lack of those skills can impact on the coping and well-being of adults.


\(^3\) The participants in the survey who opted out of taking the computer-based assessment for whatever reason are also considered people with a low level of problem-solving skills in technology-rich environments in this report. It is thereby presumed that most probably they opted out because they did not have sufficient computer skills or felt unconfident in using a (unfamiliar) computer.
Top performers of information processing skills are defined as follows:

- people with high literacy level – literacy at Level 4 or 5;
- people with high numeracy level – numeracy at Level 4 or 5;
- people with high level of problem-solving skills in technology-rich environments – problem-solving skills in technology-rich environments at Level 2 or 3.

Analysis revealed that:

Estonia has just slightly fewer top and low performers of information processing skills than the countries participating in the survey on average. The greatest shortcomings are seen in the problem-solving skills in technology-rich environments. According to the PIAAC survey, in 2012 the proportion of top performers of information processing skills formed 5-6% and of low performers 8-10% of the Estonian population aged 16-65, which was a little less than the average of countries that have taken part in the survey. However, there are some differences in individual information processing skills. On the one hand, the share of top performers of literacy and numeracy in Estonia is comparable to the international average and the share of low performers is even smaller than the international average. On the other hand, Estonia has fewer top performers and clearly more low performers of problem-solving skills in technology-rich environments than the average of other countries. Thus, in order to reach at least the average level of information processing skills of countries that have participated in the PIAAC survey, the problem-solving skills in technology-rich environments of Estonian adults need to improve.

The level of education is not the only factor that affects the share of top or low performers. The level of information processing skills is different by socio-economic and demographic factors. The proportion of top performers is larger and the proportion of low performers is smaller among adults who are highly educated and younger, whose home language is Estonian, who participate in cultural events more often and who are employed in highly skilled occupations. In addition, groups with a larger share of top performers stand out among respondents using information processing skills on a daily basis and having parents who have a higher level education. In comparison to women, men form a larger proportion among top performers of numeracy skills. It should also be highlighted that there is a significant proportion of low performers and a small proportion of top performers of problem-solving skills in technology-rich environments among people with poorer health, incapacity for work or disability as compared to other adults, although good skills in the domain could help the former to cope better in the society.

The analysis has also examined whether combinations of any socio-demographic qualities are more associated with being a top performer or low performer. It has appeared that the low level of education and age over 25 years (i.e. a group where the low level of education will probably be the final level of education) are factors that in conjunction are associated with the larger than average share of low performers. It is interesting that the

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4 It is justified to argue here that under the PIAAC methodology the tasks solved at Level 2 need not be very complicated and this level might not characterise a very high level of problem-solving skills in technology-rich environments. The level of skills of people scoring at Level 2 is still higher compared to a large proportion of the population and the decision to consider those scoring at Level 2 top performers has mostly derived from methodical considerations of the data analysis.
low level of education and age under 25 years also constitutes such a combination if the person’s home language is Russian. The third combination of factors that distinguishes the proportion of low performers that is considerably larger than average is secondary education along with a poor or satisfactory assessment of health and the Russian home environment. When dealing with the problem of poor information processing skills, these groups should be the primary focus and it should be kept in mind that although education is important, it is not the only factor that is highly associated with the proportion of low performers.

Home environment seems to play a key role for top performers – there is a significantly larger share of top performers among people who have higher or secondary education, whose mother has higher education and whose home language is Estonian.

The labour market primarily rewards education, not the status of being a top or low performer of information processing skills. In addition to knowledge of which factors help to explain the status of being a top or low performer, it might be even more important whether being a top or low performer is correlated with coping with life. The status of being a top or low performer could influence the person’s success on the labour market, and why not their state of health. This analysis does not support these hypotheses – although there are more employed persons and persons with greater income and better health among top performers as compared to medium performers (and also to low performs, as expected), after the consideration of other factors it appears that the key role is played mostly by other indicators, especially the level of education.

Therefore, it is questionable whether it is practical to focus on identifying top and low performers of information processing skills and on the development of specific measures for them – this analysis seems to rather support the idea that the aim could be the improvement of labour market outcomes of people with low level of education. At the same time, it should not be forgotten that the analysis has only dealt with links between the status of being a top or low performer and selected coping indicators. Therefore, it cannot be precluded that the usefulness of being a top performer for an individual or usefulness of a larger share of top performers and the negative impact of a larger share of low performers on the country as a whole results from other outcome indicators.

The employment possibilities of low performers are primarily related to health. Considering only the low performers of information processing skills, the employment possibilities are mostly associated with health – the share of employed persons is considerably smaller among low performers with a disability and poor health than among low performers on average. As the possibilities of disabled individuals to find work are generally modest, these results do not require any specific measures for low performers. It is probably expedient to contribute to the general improvement in employment possibilities of disabled persons.

As expected, the low performers include a larger share of employed persons among people aged 25-49, but the share of employed persons is also above the average among the low performers not belonging to that age group who have at least secondary education and children.

5 Assuming that they live in the northern part of Estonia.
In terms of participation in the labour market, the group of top performers of information processing skills tends to be uniform and there are no considerable differences.

**Income is mostly associated with age, gender and health among low performers.** Although the proportion of highly-paid persons among top performers is larger than among low performers, very low level of information processing skills does not exclude higher wages. 3-7% of low performers belong to the highly-paid group and the gender scale tends to incline more towards men. The groups of adults with a disability or permanent incapacity for work have more low-paid persons among low performers. There are no clear factors among top performers of information processing skills that could help to explain the highly-paid and low-paid persons.

**The analysis leads to the following conclusions:**

In connection with the results of the PISA survey, the lack of top performers has frequently been discussed in Estonia and the results of the PIAAC survey also seem to confirm the foregoing to some extent – Estonia has fewer top performers of information processing skills than countries that have participated in the survey on average. At the same time, the backwardness is modest in comparison with other countries and it does not point to any tragic consequences. The greatest backwardness has been observed in the problem-solving in technology-rich environments and this is the area that needs most attention among information professing skills.

The advantages (and disadvantages) of being a top (or low) performer has been discussed to a lesser extent than the lack of top performers. Do top performers cope obviously better in the society in comparison with people with a medium level of skills? Do low performers cope clearly worse? This analysis shows that although the inclusion in top and low performers of information processing skills is correlated with different labour market outcomes, such as wages and the probability of being employed, the participation in the labour market, level of income and health are much more explained by other indicators, especially education, than the level of information processing skills. This means that besides information processing skills the labour market needs other (perhaps even more important) skills and the improvement of only information processing skills will probably not lead to any substantial changes with regard to coping in the labour market. Arising from that, it is unclear whether the measures targeted at the improvement of information processing skills of adults can bring about more successful coping in the labour market – rather it might be rational to pay attention to the improvement of practical skills. However, the foregoing does not mean that in some instances the prerequisite for acquiring these skills could not be the higher level of information processing skills.

In addition, it cannot be excluded that the usefulness of being a top performer or disadvantage of being a low performer for an individual or the impact of a larger share of top performers and a smaller share of low performers on the country as a whole results from other outcome indicators that were not analysed in this report. In other words, the achievement of a larger proportion of top performers and a smaller proportion of low performers of information processing skills can still be important for the country. In order
to reach at least the average level of information processing skills of countries that have participated in the PIAAC survey, the problem-solving skills in technology-rich environments of Estonian adults need to improve. However, the modest results of problem-solving skills are not unambiguously clear today and an additional analysis is required to make more specific proposals for intervention measures (another report is prepared for this theme).

Nevertheless, this report also provided a hint with regard to a target group that needs the improvement in the level of problem-solving skills. The results of the analysis has showed that, in addition to other socio-economic and demographic factors, health is correlated with the ability to acquire the skills to use technology: over half of the persons with poor health, loss of capacity for work or disability whose daily life could be simplified by IT-solutions belong to low performers of problem-solving skills in technology-rich environments. As people with poorer health, disability or incapacity for work may have limited access to hardware and software customised to their needs, a question of how to provide various groups with equal opportunities to develop and use their skills must be dealt with.

The employment possibilities of low performers of information professing skills are also primarily associated with health and income mostly with age, gender and health. As the employment possibilities and income are generally different depending on health, gender and age, the results do not require specific measures for low performers of information processing skills. Measures that create equal opportunities and contribute to the improvement in employment and income of different socio-economic and demographic groups should rather be developed.

The level of education is the indicator that affects the inclusion in the top performers of information processing skills to the greatest extent, as expected, but the home background also plays a pretty important role – the probability that people who have a mother with a higher level of education and come from an Estonian home belong to the top performers is considerably greater than in the case of people whose parents do not have higher education and who do not speak Estonian at home. Although the association between belonging to the group of top performers and education of parents is expected, such conspicuous differences cause doubt that they do not just reflect differences in mental abilities, but background factors that could be improved also play their role. The analysis has not explored which measures would lead to the desired changes most efficiently, but these should supposedly be looked for among the activities targeted at the increase of awareness of parents and strengthening of cooperation between home and school.