

# EDUCATION AND SKILLS

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The Education and Skills report mostly focuses on the analysis of two issues on the basis of data from PIAAC, the Estonian Education Information System (EHIS) and the State Register of Occupational Qualifications. First, who in Estonia study longer and why and what the role of different factors is in the length of education path is analysed, and the importance of results of national examinations administered in the end of upper secondary programmes (hereafter national tests) and differences between education paths taken by various groups are evaluated. Second, the role of formal education and other factors to assess the level of information-processing skills and its changes is analysed. The skills of graduates at different levels and fields of education as well as the skills differences between men and women are reviewed. Attention is separately paid to the skills of teachers and graduates in the field of education. A more precise review of occupational qualifications in the labour market as compared against skills and education has been also carried out.

### The results of the analysis have shown that:

- 1. The average education length has grown by one year over the last 30-40 years: today's youth go to school for 13 years, on average. The difference in the education length between men and women and between people with Estonian and other home languages has also become greater. The difference is one year or longer in both cases. The length of an education path depends not only on one's gender and home language, but also on the home background, the education of the parents and, after the completion of secondary education, on the national test results. Taking into account other factors, the latter depends both on the location of the school and the language of instruction.**

People in Estonia place a great value on education: the role of education in future success is considered as important approximately by 80% of the population<sup>1</sup>. The education length in Estonia has increased approximately by one year over the last 30 years. People who currently belong to the 55-65 age group went to school, on average, for 12 years, but people who currently belong to the 25-35 age group went to school, on average, for 13 years. Speaking about the education length and results it is difficult to deny the impact of home background; to lessen differences caused by the family social status is one of the goals often stated for education. An education path is also influenced by personal characteristics (intellectual abilities, gender, readiness to make efforts, etc.) and the related personal value put on the investment into education. Education prospects are also influenced by financial means, awareness, etc. Good school systems are able to offer a uniformly good education regardless of a specific school (location, size, etc.) and the background of a student's parents.

This analysis has shown that the sources of inequality in the length of education path in Estonia have been home background (measured through the parents' education and the number of books at the childhood home), home language and gender. The impact of home background has also been identified in all the earlier works. The analysis of the entire PIAAC sample has shown that a father and a mother with a higher education both add over one extra year of schooling to the child's education length, i.e. children whose both parents have a higher education study almost two

<sup>1</sup> Täht, K., Helemäe, J., Võõrmann, R. (2014). *Public opinion on the importance of education and its dependence on financial means*, Unt, Marge; Täht, Kadri (Eds.). Tööturu väljakutsed kõrgharidusele (17 - 78). Põltsamaa: Vali Press OÜ

and a half years longer than children whose both parents have only lower secondary education. The home learning environment (measured through the number of books at respondents' homes when they were 16-year-olds) is especially important and it might cause a two-year difference in the education length. There is no obvious trend showing the changing significance of home background, but for younger age groups the role of a father with a higher education has decreased and the role of the mother's education has increased. Nevertheless, the role of parents' education in Estonia is rather small compared to other countries.

**A link between the education length, home language and gender needs additional attention, because inequality measured through these indicators has grown. People who speak Estonian as their home language study approximately one year (0.9) longer than people with other home languages, and women, on average, study 0.7 years longer than men.** Education paths of men and women are different in all the age groups, but in older age groups the difference is 0.5-0.7 years and in the youngest age group (25-34) where education has been usually finished the difference is one year. At the same time, the difference in education length between respondents with Estonian and other home languages has increased. Leaving aside the youngest age group where education has not been completed yet, the difference in the other age groups is from 0.5 years in the oldest age group (55-65) up to 1.2 years in the 25-44 age group. **The rising gender- and language-based inequality definitely requires more attention in the education policy, especially considering the fact that respondents with the Russian home language actually place an even greater value on education than Estonians<sup>2</sup>.** It should be further studied whether young people with the Russian home language who achieve the best test results prefer to continue studies abroad more often than Estonians, thus creating an education divide. An indication of the greater inclination to continue education abroad among the Russophone youth is a Praxis report<sup>3</sup> that studied the specific intentions of secondary school graduates after graduation. Only 7% of the Estonian youth intended to study abroad, whereas the respective indicator among the Russophone youth was 31%. The follow-up survey of the same study was conducted in the autumn following the graduation from secondary school and it showed that a little more than half of the respondents realised their intention to go abroad.

The report also attempted to shed some light on the causes of differences in the education path after graduation from secondary school. The analysis of youth has shown that all the aforesaid factors (gender, home language, parents' education level and home background) also influence national test results, and the education length after the graduation from upper secondary school also depends on these factors. The better the national test results, the longer the period of studies after the completion of secondary education. Ten additional points in the test results lead to an education path that is approximately half a year longer. It further confirms the findings of Dubow et al.<sup>4</sup> that the education level of parents is also related to the education level acquired in the adult age 40 years later, but this influence is diminished: the parents

2 Masso, A., Kirss, L., Kriger, T. (2012). Haridus ja noored. Kogumikus (AS Emor, SA Poliitikauuringute Keskus Praxis, Tartu Ülikool, koostajad) Integratsiooni monitooring 2011, 51-79. [http://www.kul.ee/sites/default/files/integratsiooni\\_monitooring\\_2011.pdf](http://www.kul.ee/sites/default/files/integratsiooni_monitooring_2011.pdf)

3 Mägi, E. ja Nestor, M. (2012). Koolilõpetajad ja nende karjäärivalikud. SA Archimedes

4 Dubow, E. F., Boxer, P., & Huesmann, L. R. (2009). Long-term Effects of Parents' Education on Children's Educational and Occupational Success: Mediation by Family Interactions, Child Aggression, and Teenage Aspirations. *Merrill-Palmer Quarterly: Journal of Developmental Psychology*, 55(3), 224-249. doi:10.1353/mpq.0.0030

influence the educational ambitions of their child until he/she becomes 19 years old and his/her education level achieved by this time. When considering national test results, one can first of all see the diminishing role of home background (the number of books at one's childhood home) in influencing the length of education path as well as of mother's education and gender. It confirms earlier findings that educational inequality caused by home environment should be addressed early. A needs-based student allowance or other measures at the level of higher education might not be enough to correct inequality that emerged earlier.

In the context of school-related differences, this analysis offers rather positive messages. **The education path of school graduates from rural areas, small towns and other cities is as long or even longer than the education path of those who go to a basic school, e.g., in Tallinn or Tartu. At the same time, the language of instruction in basic school does not correlate with the education length, if the background factors are taken into account.** Nevertheless, a school's location and language of instruction do correlate with national test results: **Compared to Tallinn, upper secondary school graduates in Tartu receive higher national test results and the graduates in rural areas and small towns lower test results.** Similarly, basic school graduates in rural areas, small towns or other cities receive, on average, lower results compared to the graduates in Tartu and Tallinn, even if home background is taken into account. In this context it is important to remember that over 40% of basic school graduates from rural areas and small towns in this sample continued their education in a bigger centre: Tallinn, Tartu or other larger city. The results of those who continue their education in other location become similar to the results of students who originally studied in this location: it is very clear in the case of Tartu and other larger cities where the results of students who moved from rural areas and small towns do not differ from the results of students who went to a basic school in the same city.

2. **Education is very important for the prediction of skills, but in Estonia this factor is sometimes even over-valued. Taking into account various factors, numeracy proficiency of men exceeds that of women at an amount equal to three years of schooling, i.e. the number of years that it takes to obtain a bachelor's degree. At the same time, work sophistication plays a key role in the prediction of skills level (the frequent use of ICT skills). Also, nothing can replace home background – a lot of books at the childhood home leads to higher skills regardless of education. The lower the education, the greater the effect of continued studies – a higher education adds less to skills than the continuation of studies after graduation from basic school. Nevertheless, the comparison of school graduates with similar national test results shows that those who later acquire a higher education have information-processing skills that are higher by approximately 10 points compared to those who limit themselves to secondary education. However, attention should be paid to numeracy and problem-solving skills in a technology-rich environment among people with a bachelor's degree who studied under the 3+2 system. The skills of graduates in science and the humanities and arts are at a (very) good level in the international comparison, but the skills of graduates in the field of education, engineering, manufacturing and construction are (very) low.**

Evaluating the role of formal education in skills development, the earlier findings that the length of an education path predicts the level of skills to an important extent got

confirmed. Taken separately, education predicts 4-17% of the variation in the skills level, depending on a specific skill. On the other hand, education is clearly not the only way to improve one's skills. When other factors are taken into account, the role of education in predicting the level of skills drops by approximately 2 times, i.e. two persons with the same education do not necessarily have the same skills. In addition to formal education, skills are related to age, gender, home language, home background and mother's (higher) education and the frequency of use of one's skills, especially the use of ICT skills at work and at home. The best skills are demonstrated by young men with the Estonian home language whose mother has a higher education and who had a lot of books at home during childhood. However, the role of these factors is very different depending on specific skills. Although the age difference (the youngest vs. the oldest group) means a 30-point gap in problem-solving skills that could only be bridged by at least 10 years of schooling for older persons, the link between numeracy and age is insignificant, if other factors are taken into account.

**The gender-based difference is the biggest in the case of numeracy – 11 points, which is comparable to 3 school years. Home language correlates most with literacy; taking into account other factors, respondents with the Estonian and Russian home language have the same problem-solving skills.** Taking into account other factors, father's education is insignificant for the prediction of the skills level, and the correlation of mother's education with skills is rather weak compared to all the other factors (a 3-4 point difference between lower secondary and higher education). As was already shown above, it means that mother's education correlates with national test results and the length of the education path, and when these factors have been taken into account, mother's education loses its key role.

The home background (the number of books) during childhood and the use of ICT skills at work uniformly and strongly predict the level of information-processing skills independently of all the other factors. If the latter has been factored in, the length of the post-secondary education path loses its significance for the prediction of problem-solving skills. It shows that sophisticated work may compensate education-based differences in the level of problem-solving skills, i.e. an incomplete education is not necessarily critical for these skills provided that the use of ICT skills is required at work. The same cannot be said about numeracy and literacy, because formal education makes an independent contribution into the development of these skills. On the other hand, it must be noted that a higher education level is usually required to get more sophisticated work. At the same time, the education length indicator does not take into account a possibility that a person had started to acquire a higher education level but discontinued the studies at some point.

The skills of more advanced students are better at all the education levels regardless of the time when the highest education level has been acquired, e.g. 1 or 10 years ago. However, the lower the education level, the greater the effect of further studies – higher education adds less to skills than the continuation of studies after graduation from basic school. To put it simply, if a person would continue his/her studies without interruptions, he/she would compensate the age-related drop in the skills level by 2-10 times. In a younger age the age-related decrease in the skills level is slower (approximately 0.5 point per year). Therefore, the benefit of education is greater, whereas in the oldest age group skills are decreasing by approximately 2 points per



year. Earlier studies have shown that participation in formal education at an older age (over 40 years) brings greater work-related benefits for women.

A closer look at the comparison of different education levels uncovers an earlier confirmed fact that in the youngest age group (under 30) Estonia has average or above-average skills at every education level compared to the countries participating in PIAAC. **Lower secondary, general secondary and academic higher education graduates have above-average skills and the graduates of professional and applied higher educational institutions have average skills. It illustrates current education competitiveness.** Unfortunately, things are not so good in older age groups. In these groups adults with general secondary and applied higher education (including secondary specialised education acquired after secondary education) are considerably below average in the international comparison of the countries participating in PIAAC. It may be related to the fact that for older age groups secondary education was compulsory. It meant that even people with poor skills were “dragged through”. However, many people with secondary specialised education currently work at positions that do not require such education, i.e. they perform work that does not match their education.

An interesting opportunity offered by this report was the possibility to compare the contribution of post-secondary education into the development of skills, taking into account national test results retrieved from EHIS. The contribution of one school year after the completion of secondary education is clearly (approximately 2 times) smaller than across the entire educational range. **All the higher education levels have a statistically significant impact on the improvement of the literacy level, with the approximate difference from general secondary education being 10 points.** Thus, higher education is not only chosen by more capable students, but it can be argued that higher education makes an independent contribution into the development of information-processing skills. The contribution of professional and applied higher education to skills development after graduation from upper secondary school is zero for all the skills, and the difference between applied higher education and 3-year bachelor’s degree is actually very small. Regardless of very broad confidence intervals and the consequent overlapping of results, it appears that old curricula based upon the 4+2 system (first of all, master’s programmes) were more successful in developing numeracy and problem-solving skills than new higher education curricula. **The development of problem-solving skills is clearly a challenge for the organisers of 3-year bachelor’s studies.** For example, graduates of bachelor’s and master’s programmes based on the 4+2 system have a numeracy advantage over respondents with secondary education equal to +11 and +18 points, respectively, whereas the similar advantage of graduates in the 3+2 system is only +5 and +6 points. For problem-solving skills the difference is +11 and +15 and -1 and +8, respectively. The first decade after the introduction of the 3+2 system in 2003 was also characterised by the largest admission numbers that could also influence the results. It should be also taken into account that the period of studies in the case of a 3-year bachelor’s programme is a year shorter than in the case of a 4-year programme. The period and scope of studies are further reduced by the fact that opportunities to prolong studies have become more limited during the last decade: additional and prolonged studies are no longer welcomed or tolerated as much as 10-20 years ago.

The review of the contribution of various fields of study in higher education into the development of skills after national tests shows that the science curricula indeed enhance one's numeracy skills. On the other hand, the situation in the field of health and welfare is rather disturbing as it does not add extra points to any skills. It may be caused by the intense competition, for example, in the education of physicians and by the fact that advanced studies focus more on occupation-related skills rather than on general skills. A more significant improvement of skills after graduation from upper secondary school was identified among people whose national test results were in the lowest quartile. On the one hand, it is a positive sign that the lack of skills can be compensated for later or it may indicate that people with lower test results included those who just failed at the test and whose skills could have actually allowed a better result. On the other hand, it indicates the need of tertiary education providers to work more efficiently with more capable persons and develop their potential.

The skills of graduates in various broad groups of study in higher education have also been reviewed with the conclusion that Estonia clearly has the biggest problems with the skills of graduates in the field of education, engineering, manufacturing and construction. **The stronger results are shown by graduates in science as well as by graduates in the humanities and arts, and social sciences, business and law.** The skills gap between graduates in science and graduates in the field of education is approximately 50 points, which is as large as the difference between an average person with lower secondary education and an average person with higher education. It should be noted that the skills gap between the graduates is influenced by the selection effect, at least partially: the national test results upon the completion of upper secondary education shown by graduates in science have been, on average, 15 points higher than those of graduates in the field of education. Comparing Estonian graduates in different groups of studies with graduates in the same groups of studies in the other countries, Estonia is behind the strongest countries (the Netherlands, Finland) in practically every area; in the humanities and arts, and science we are competing with Sweden. People who graduated in professional secondary education after the completion of secondary education have a more uniform distribution of skills in different groups of studies; only graduates in the humanities and arts stand out in all the skills and graduates in science stand out in problem-solving skills. Graduates in the humanities and arts mostly come from music schools.

3. **The levels of the occupational qualifications system are adequately related to each other: the information-processing skills of people with a higher qualification level are better than the skills of those with a lower qualification level. In the majority of cases a person's qualification is lower than his/her education level. It is probably connected to the fact that, taking into account other factors, the presence of a qualification is associated with a lower rather than higher salary. People with qualifications are more active in the labour market than adults without a qualification. Among people with qualifications the share of employment as well as unemployment is higher; among the respondents with higher education the share of employed persons is higher.**

In general, it can be argued that qualification levels are logically arranged in terms of skills, although the proficiency of information-processing skills of people with the I and II qualification levels does not differ between the groups, and the same is true

when comparing the skills of people with the IV and V qualification levels. The literacy proficiency of people with the I-II qualification levels matches the skills of people with general secondary education, the skills of people with the IV-V qualification levels match the skills of an average person with higher education and the III level is between the two. Thus, it can be said that people with the I and III qualification levels have better information-processing skills compared to the corresponding education level. In the majority of cases a person's qualification is lower than his/her education level. Thus, the qualifications system corrects imprecisions of the education system, but it does so more effectively with over-education rather than with under-education. It is proved by the salary analysis of people with different qualification levels: the salaries of people with the III-V qualification levels exceed the salaries of people with the I qualification level by 18.8%. If the qualification level is taken into account, the correlation between the education level and salary becomes statistically insignificant.

People with qualifications have a greater probability of active participation in the labour market compared to people without qualifications; they have a greater share of both employed and unemployed persons. Approximately half of employed people with qualifications work in the area of economic activity corresponding to their highest qualification. The most important question of the analysis was whether a qualification gave an advantage in the labour market alongside skills and education. In the context of unemployment no difference between people with and without qualifications has been identified, but people with qualifications who have higher education have a greater probability of active participation in the labour market. Considering gender, home language and the skills-intensity of the occupation, the expected correlation of the highest education level and numeracy with salaries has been identified. A qualification as such does not correlate with a higher salary; even the contrary is true, which indicates that a lower qualification level is more often acquired compared to one's education level. **If other factors are taken into account, people with professional qualifications do not earn more than people without a qualification. Thus, the system of qualification has yet to prove its importance in the labour market.** One possibility to explain these results is the hypothesis that the acquisition of a qualification at lower education levels provides more active people an opportunity to avoid or exit unemployment and at higher education levels an opportunity to look for new challenges, even if they require a lower competence compared to the acquired education.

4. Correlation of gender with education and skills has been separately analysed. Gender differences in the youngest age group are either advantageous for women (in literacy), absent (in problem-solving skills) or smaller (in numeracy) compared to older age groups. In the 35-44 age group, however, men have better skills in all the categories compared to women and this difference remains in older age groups as well. **The most important finding was that women's skills were more influenced by children than men's skills and this influence was negative, whereas in the case of men the number of children may even point to better skills. As a rule, men have better skills, but if the number of children is factored in, the best skills are demonstrated by young women who do not have children.**



5. The analysis of skills of teachers and graduates in the field of education has shown that Estonian teachers have the average or slightly below-average level of information-processing skills compared to their colleagues in the other countries but they clearly do worse in problem-solving in a technology-rich environment, which is also a general problem in Estonia. The outcomes of teaching that are partially revealed in all the adult skills (PIAAC's average results) and more clearly revealed in student skills (PISA results) are, at the same time, (slightly) above average, except problem-solving skills. In the national level analysis, information-processing skills of teachers and students correlate (one explains the variation in the other by 30-40%), but the causality of this link is difficult to assess. Compared to an average employed person, the skills advantage of teachers in Estonia is smaller than in other countries and the ratio of a teacher's salary against the national average is the lowest in Estonia compared to the other countries. The situation with teacher's skills is somewhat ambiguous, but we clearly have a problem among graduates in the field of education where Estonia's results are among the lowest in all the measured skills both in the international comparison and in the comparison with other broad groups of study in higher education.

### Policy recommendations based on this work are as follows

1. **One issue in education that needs to be monitored and possibly intervened into is inequality in the length of an education path arising, first of all, from gender and home language, but also from parents' education.** The sources of inequality are family and home background in Estonia (parents' education and the number of books at one's childhood home), home language and gender. All these factors, in general, add or subtract one year: a male child in a family where both parents have lower secondary education, with a non-Estonian home language and a limited number of books, studies approximately 5 years less than a female child in a family with the Estonian home language, where both parents have higher education and the home learning environment is favourable (a lot of books). The impact of gender and language upon the length of an education path has grown over the last 30 years. One way to intervene is to treat these groups as kind of risk groups that need a separate attention in career counselling and monitoring of possible discontinuation of studies. Intervention is complicated by the fact that the same factors (home language, gender, parents' education and home background) also correlate with lower national test results that, in its turn, have a negative shortening impact on an education path.
2. **This analysis supports the policy promoting strong basic schools in the vicinity of home and strong upper secondary schools located in bigger centres.** Although the location and language of instruction of a school do not correlate with the length of an education path, they do correlate with national test results. When considering differences in parents' education and home background, the national test results upon the graduation from upper secondary school are lower for graduates of basic schools in rural areas or small towns compared to the graduates of Tartu or Tallinn schools. However, lower grades receive only those students who also graduate from an upper secondary school in a rural area or small town. The results of those who move to Tartu, Tallinn or other larger city do not differ from the results of those who also graduated from a basic school in a city. Nevertheless, the results in upper secondary schools in rural areas and small towns are somewhat lower.

- 3. In higher education curricula, attention should be paid to the development of numeracy and problem-solving skills in a technology-rich environment.** The analysis compared the contribution of post-secondary education into the development of skills and the results of curricula applied in different time periods. However, the small sample used in this analysis does not provide final answers and, therefore, the results should be taken with care. Although various analyses show that there are no differences in literacy between graduates under the 3+2 and 4+2 systems, graduates of 3-year bachelor's programmes have lower numeracy skills and problem-solving skills in a technology-rich environment compared to those who received higher education earlier. According to one hypothesis, the difference already arises earlier: graduates from upper secondary schools already have lower mathematical skills. Nevertheless, this difference also stands out in the analyses where national test results have been taken into account. The contribution of studies under the 3+2 system (as well as the contribution of applied higher education and professional post-secondary education) into the development of numeracy skills and problem-solving skills in a technology-rich environment is very small. The insignificance of this contribution cannot be blamed exclusively on the poor skills of upper secondary school graduates.
- 4. A policy supporting more equal child care and education opportunities for parents with small children could raise the skills of women with children (in the 25+ age) to a more competitive level.** As a rule, in Estonia as well as in the other countries participating in PIAAC the skills divide between men and women usually arises after the graduation – in the 25-44 age group. Before that women demonstrate the same or higher level of skills than men. A possible cause of this situation that has been partially confirmed is that motherhood more often steers women away from work and the active use of skills, negatively influencing their skills. Women without children have the same or even better skills than men without children. However, men occupy a more advantageous position in the comparison of men and women with children. The gender-based salary divide that was the main topic of the PIAAC's thematic report no. 4<sup>5</sup> is also related to this issue as well as the perceived strong need of additional education among women with small children that has been identified in the PIAAC's thematic report no. 2<sup>6</sup>. A possible solution would be a policy of parental benefits supporting a shorter and partial parental leave with a more even distribution of leave between fathers and mothers than in the current system. Another possibility lies with an education policy (financed by the government or employers) providing an employee who takes a parental leave with an opportunity to participate in in-service training and maintain their skills.
- 5. The biggest problem identified in this report is poor skills of graduates in teacher training and education science that have been already identified in the analysis published earlier.** The numeracy and problem-solving skills in a technology-rich environment of the Estonian graduates in the field of education are currently very low compared both to the graduates in the same field of study in the other countries and to the graduates in other fields of studies in Estonia. On the one hand, it is caused by the selection effect, because graduates in the field of education have the weakest

5 Halapuu, V. (2015). *Infotöötlusoskuste roll soolise ja keelelise palgalõhe selgitamisel Eestis: PIAAC uuringu temaatiline aruanne nr 4*. Tartu: Haridus- ja Teadusministeerium.

6 Saar, E., Unt, M., Lindemann, K., Reiska, E., Tamm, A. (2014). *Oskused ja elukestev õpe: kellelt ja mida on Eestil oskuste parandamiseks õppida? PIAAC uuringu temaatiline aruanne nr 2*. Tartu: Haridus- ja Teadusministeerium.

national test results. On the other hand, studies cannot close the initial gap. Thus, there is an urgent need for all the policies that influence the attractiveness of the teaching profession, improve the level of teacher education and support the further development of graduates.

6. It should be taken into account in the development of the system of qualifications that people with qualifications currently tend to be over-educated for their qualifications: in the majority of cases a person's qualification is lower than his/her education level. The same is indicated by the salary analysis: taking into account other factors, a qualification tends to be associated with a lower rather than higher salary. Thus, the qualifications system corrects imprecisions of the education system, but it does so more effectively with over-education rather than with under-education. **The system of qualifications should become a ladder where work experience combined with education would help acquire a higher qualification level and, consequently, receive a higher salary.** The system of qualifications matches the labour market when the link between education and salary becomes insignificant after the qualification level has been taken into account: a salary tends to depend on the qualification level rather than on the education level. Unfortunately, the former rule is currently followed less closely than the latter.