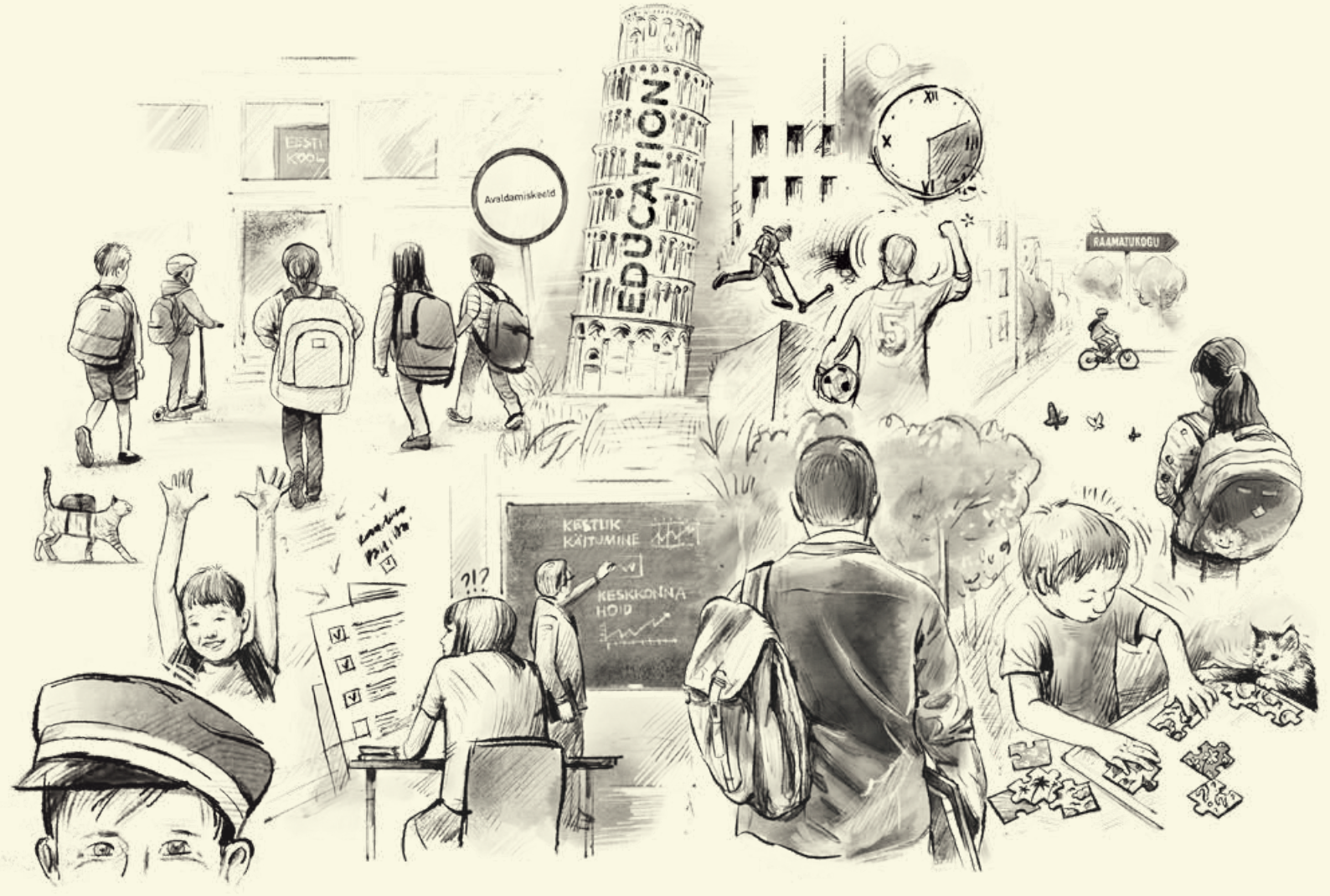
Estonian Human Development Report 2026

EDUCATION REFLECTED IN SOCIETY



The Estonian Human Development Report is a biennially published collection of articles reflecting and interpreting the current socio-economic situation in Estonia and possible future developments.

Produced as a collaboration involving leading researchers and experts, this in-depth report contributes to evidence-based perspectives and policymaking and helps make research accessible to the general public. The Estonian Human Development Report is based on the international Human Development Index and Human Development Report published by the United Nations.

The Estonian Human Development Report has been published since 1995, with the Estonian Cooperation Assembly as its publisher since 2006.

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Estonian Human Development Report 2026

EDUCATION REFLECTED IN SOCIETY





DEAR READER,

There are several stories we tell about education in Estonia. The most reassuring is the story of rankings and assessments. For reasons that even we cannot fully explain, our education system consistently places young Estonians among the world's top performers in international comparisons. It is a story of a society that values education, autonomous teachers, smart solutions and the courage to experiment.

The other familiar story is more troubling. According to this view, despite its strong performance in rankings and assessments, our education system is hollow and nearing the limits of its sustainability. Its recurring themes are teacher shortages, unsustainable workloads, declining enjoyment of school among pupils and growing concerns about mental health.

These two narratives have shaped debates on education in Estonia for years – so long that we have come to view education through an increasingly narrow lens, as if under a microscope. We focus on individual problems and risk losing sight of education's broader impact.

Over several decades, the Estonian Human Development Report has sought to illuminate precisely these broader dimensions. This edition asks what impact education has on our society and which underlying factors – often powerful yet largely unnoticed – shape young people's educational pathways and their opportunities in society.

The report is guided by data and expert analysis. The numbers may be dispassionate, but the story they tell is anything but.

One central conclusion stands out: the effects of schooling stay with people throughout their lives. Education is something like a second genome – a force that shapes future trajectories much as our genes do. However, just as a biological genome does not predetermine a person's destiny, educational choices and opportunities rarely determine outcomes outright. Education shapes probabilities: where people are likely to end up, what opportunities become available to them and how vulnerable they may be.

This insight is most meaningful at the level of society rather than the individual. It reveals the causal chains through which education affects every sphere of life, showing how each sector bears the costs or reaps the benefits of the population's educational capital.

Extracurricular education is as much a matter of internal security as of education policy; teacher shortages affect regional development and economic competitiveness alike; mental well-being at school is reflected years later in health outcomes and working life.

For this reason, we cannot afford to ignore the insidious deepening of educational inequality. It undermines a fundamental principle of human development: that every child should have the opportunity to receive a good education, regardless of their family background.

This report does not focus on specific policy recommendations. Instead, it creates space to reflect on how to make decisions that are necessary but difficult, and how to resist the temptation to add yet another measure where what is really needed is a choice and the willingness to let something go. One recurring theme is data literacy: the ability to make use of the knowledge we already possess rather than continually produce new studies whose findings remain unimplemented. These are valuable principles not only in education but also more broadly.

The report connects with earlier Estonian Human Development Reports, which have examined mental health, spatial policy and migration. Each addressed a knotty challenge – a complex set of interconnected problems for which there are no simple solutions but where inaction risks slowing or even reversing the country's development.

The Estonian Human Development Reports have helped make public debate on complex issues more focused and evidence-based. What matters is that our discussions ultimately help untangle these complex knots. In that effort, all of us have both an opportunity and a role to play.

ALAR KARIS

President of the Republic of Estonia

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Introduction

We know, but do we dare?

Eneli Kindsiko

KEY MESSAGES

- **Education is the foundation of Estonia's strength, but deepening inequality is eroding it.** The most important question facing Estonian education is not whether to focus on fostering excellence or supporting those who fall behind. The question is whether we can build an education system that does both at once: one that allows talented learners to thrive without leaving anyone behind. Educational inequality affects not only schools but also extracurricular education, which should be one of the most effective educational and social investments we can make, because it improves learning outcomes and reduces risk behaviour among young people.

  No area of government is untouched by educational inequality. It reaches into health and the labour market, social welfare services and the justice system, family relationships and people's sense of security. Children who are overlooked do not remain invisible – they reappear on hospital waiting lists, in police statistics, in cases of domestic violence and in social assistance registers. The question is not whether inequality will impose costs on society, but when the bill will come due and what price we will have to pay.

- **Smart education must support smart development across Estonia.** Estonian education is internationally recognised, but our real challenge is not reaching the top of the rankings. More important than international comparisons is ensuring that education drives development across Estonia, not only in a few major urban areas. Although our educational indicators are strong, this is not sufficiently reflected in people's health or in the country's economic development.

- **We know a great deal; now we need the courage to take responsibility and act.** Education is one of the most extensively researched and evidence-based fields in Estonia – we have more knowledge, data and analysis than we can fully process. The problem is no longer a lack of knowledge but the failure to translate existing knowledge into decisions. Responsibility is dispersed among different actors and is too often subordinated to day-to-day politics, making research a substitute for action rather than a catalyst for it. We know the problems exist; what we need are decisions that turn knowledge into action.

- **As a digital state, Estonia is not using its full potential in education.** Estonia's digital data infrastructure is world-class, but its use in education remains limited. Data are not used effectively enough to identify problems early and respond in time. Data protection barriers and limited data literacy prevent the full potential of the digital state from reaching education. We have built our data protection walls so high that we have forgotten whom and what we are actually protecting. The state has ended up protecting itself from itself.

- **Estonian education needs a healthy subtraction exercise.** We have become accustomed to asking what more schools should do. Today, a more important question is what schools should no longer be expected to do. Every new responsibility added to education comes at the expense of something we have not had the courage to remove. One of the first things to suffer is teachers' ability to serve as role models. Today's young people no longer grow up under the authority of teachers and parents alone, but within a global network of influences. Teachers compete with social media influencers and artificial intelligence; they cannot be motivators unless they are also role models. Relationships are the new currency of education, and teachers need time to build meaningful relationships – from early childhood education through to university.

LEARNING THE ART OF BEING HUMAN

On a sunny day in May, under the watchful eye of the then elected earthly representative of the legendary Seto king Peko, a discussion took place in Obinitsa about the future of Estonian education. Among the assembled adults sat two sofafuls worth of pupils from the Obinitsa community class of Setomaa School. When the children were asked what made them happy at school, the first quick answer left the adults momentarily speechless: 'What makes me happy is doing mathematics!' After a brief pause of surprise, the adults asked: 'Why mathematics?' The child replied: 'Because I understand it.'

That day, a child from a remote corner of Estonia answered a question that has occupied philosophers for centuries: what is the purpose of human existence? It is to achieve happiness, though not in a hedonistic sense, but through personal growth. The ancient Greeks called this *eudaimonia* – the fulfilment of a person's unique potential and the attainment of inner maturity.[1] Eudaimonism is not the same as hedonism: it does not prize momentary pleasure, but rather a person's growth into the best version of themselves.[2] Thus, when a child encountered a profound question, the adults were reminded that the purpose of education is understanding. Education makes people happy when it enables them to make sense of the world.

According to the Education Act of the Republic of Estonia, the purpose of education is to create favourable conditions for the development of the individual and society, shape individuals who respect and abide by the law, and create opportunities for everyone to engage in lifelong learning.[3] Education is therefore both personal growth and growing together with others – learning how to become fully human, because a person cannot be fully human in isolation from society. That is why this Human Development Report is titled *Education Reflected in Society*.

Understandably, this is no easy task. Our education is based on yesterday's experience, yet pupils will live in a future that we cannot yet fully imagine. How do we prepare people for the unknown? This is why education is more than the transmission of knowledge. It is about nurturing curiosity and a desire to learn, so that people can remain adaptable as the world around them continues to change.

Thirty years ago, on 21 February 1996, President Lennart Meri announced the Tiger Leap programme

on an Estonian Television broadcast. This bold initiative, which aimed to equip all Estonian schools with computers and internet connections, laid the foundations for the country's development as a digital state. As he put it: 'The entire story of personal growth is really nothing more than the ability to store information within ourselves and to pass it on as accurately and as free from noise as possible.'[4]

Where social change once unfolded so gradually that people scarcely noticed it, we are now racing from one transformation to the next within a single generation. An 80-year-old Estonian, for example, has lived through changes of political regime, several education systems, the emergence of the internet and social media, the spread of smart devices and now the rise of artificial intelligence. Thirty years ago, Estonia dared to leap into the future on the back of a tiger. Today, we stand at the threshold of another leap – into the age of artificial intelligence. That is why we must continually relearn the art of being human.

EDUCATION IS THE FOUNDATION OF ESTONIA'S STRENGTH, BUT DEEPENING INEQUALITY IS ERODING IT

While Estonians have a habit of downplaying their successes, the view from abroad tells a different story. *The Economist* describes Estonia as a country where education is not a privilege but a national responsibility.[5] The BBC writes that Estonia is emerging as 'Europe's newest education powerhouse'.[6] According to the OECD, Estonia shows how education can be delivered intelligently rather than expensively.[7]

Until now, Estonian education has been a success story. Yet a central theme running through this Human Development Report is the need to recognise educational inequality. It is in Estonia's interest that even those with the weakest starting points are able to succeed in life.

CHILDHOOD INEQUALITIES SHAPE LIVES

We are facing growing educational inequality in general education, adult education and extracurricular education alike. Parents' income is increasingly associated with their children's educational outcomes. Between 2017 and 2021, the relationship between mothers' and fathers' average incomes and schools' average mathematics results strengthened, indicating the growing influence of families' economic background. Educational stratification is particularly pronounced in Tallinn. The data show that schools with a higher proportion of families receiving social benefits consistently achieve weaker results.

In Estonia, 28% of families use private tutoring, which is a relatively high figure.[8] On the one hand, this reflects parents' desire to give their children a competitive advantage in education. On the other, it may indicate that parents increasingly have to compensate from their own pockets for shortcomings in the school system, such as shortages of qualified subject teachers. This suggests that we have entered a negative spiral.

One might ask why mathematics is given greater prominence than other subjects. Yet we have already made that choice through legislation that designates mathematics, Estonian and a foreign language as upper secondary school leaving examinations. If these subjects serve as benchmarks of educational attainment, the state has a responsibility to ensure that every school in Estonia provides the best possible teachers and learning environment in them. Mathematics is not merely the art of numbers; it is the backbone of our digital state and a foundation of national security. The foundations of cybersecurity and engineering are laid in mathematics classrooms in basic school, and even in kindergarten. After all, who will sustain our digital state in the future if not the children sitting in mathematics lessons today?

In Estonia, educational inequality exists not only among individual children but also between generations. According to OECD data, Estonia has the largest difference in information-processing skills between older workers aged 55–65 and younger workers aged 25–44. This is a warning signal: we are losing not only the potential of young people but also that of the older generation.[9] Chapter 2 of this report states explicitly that adult education in Estonia is not reaching those who need it most. Instead, it primarily benefits those

who already hold higher education qualifications and occupy favourable positions. The most active participants in continuing education are women aged 25–49 with higher education. Rather than reducing inequalities, the system is deepening them.

Chapter 4 underscores the importance of completing the transition to Estonian-language education. While Russian-medium schools tend to reproduce social separation and more limited social networks, Estonian-medium schools give Russian-speaking young people significantly better opportunities to integrate into society, doubling the likelihood that they will live in an Estonian-speaking neighbourhood as adults. Educational choices shape not only individuals' skills and opportunities but also cohesion between ethnic groups and whether social inequalities are reduced or reinforced.

EXTRACURRICULAR EDUCATION CAN MULTIPLY EDUCATIONAL IMPACT

We tend to think that knowledge is created in the classroom. Research suggests otherwise: lasting interests are often sparked beyond the school building. Studies show that non-formal learning environments – museums and extracurricular activities – are often better able than schools to spark sustained interest in so-called difficult subjects, such as science. Through practical, non-formal activities, theory can be connected to real life.[10] Extracurricular education is therefore not peripheral but a powerful complement to formal schooling that directly improves academic outcomes.

At the same time, extracurricular education supports not only academic success but also public safety. As noted in Chapter 7, education has a strong preventive effect on deviant behaviour. When young people feel weak ties to their school and community, the risk of offending rises sharply; a strong sense of belonging reduces that risk by nearly one third.

Data from the Estonian Police and Border Guard Board are sobering. The most vulnerable period for young people is between 14:00 and 20:00 on school days – precisely when parents are at work and children are often left unsupervised. This is also when most offences occur. At the same time, it is the key window for extracurricular activities. High-quality extracurricular education helps prevent offending by providing a safe environment during these high-risk hours while supporting values and social skills. For example, every euro invested in sports programmes for at-risk young people may generate an average social return of 44 euros, particularly when activities target disadvantaged youth.[11] Extracurricular education is therefore not simply a leisure activity but a cost-effective preventive investment that contributes to public safety.

Unfortunately, Estonian data point to an uncomfortable truth: extracurricular education is often least available where it is needed most. Among young people aged 16 to 19 – a stage of life when strong ties to both school and community are especially important – only one quarter participate in extracurricular education. The situation is even more challenging for those from less affluent families. Unsurprisingly, young people who do not participate in extracurricular education all too often leave education early.

Research shows that the most important benefits of extracurricular education lie much deeper than the acquisition of specific skills. Where schools alone struggle to provide sufficient support, extracurricular education can help keep young people engaged. Studies indicate that extracurricular activities can also help schools reduce absenteeism by improving pupils' attitudes towards school, increasing their interest in learning and strengthening their motivation to attend classes.[12]

HOW DO WE MOVE FORWARD?

Recruitment competitions for teachers and heads of schools increasingly fail to attract suitable candidates, and comments such as 'there is nobody else available' or 'could you stay for just one more year?' are becoming ever more common. When there is no real competition, quality suffers. The situation will not improve on its own; it requires deliberate action. We should be much bolder in proposing and testing new solutions.

For example, why not invite the private sector to help address shortages in fields where employers themselves face the greatest need? Could businesses help bridge the gap between the state minimum salary for mathematics teachers and a wage that is genuinely competitive in the labour market? If mathematics teachers were offered truly competitive salaries, more might choose to enter the profession and remain in schools for longer. Better pay would mean more teachers, which in turn would allow smaller classes and more manageable workloads. Countries are increasingly trying to address shortages of science and mathematics teachers through private-sector-supported philanthropic foundations.[13] Most of these funds support the development of learning materials or the improvement of teachers' competences, including in Estonia. Yet without competitive salaries, their impact is likely to remain limited. This requires the courage to make difficult decisions, even at the risk of causing dissatisfaction in staff rooms. In time, such an approach could perhaps be extended to other subjects facing the most acute recruitment shortages.

We should show similar boldness in supporting heads of schools. What if the private sector helped recognise and reward leaders who choose to work in schools serving more disadvantaged communities and succeed there?

Education and society are closely intertwined, which requires confronting difficult questions. What is the impact of a good teacher or a good head of school on pupils and, through them, on society? And what is the impact of a poor teacher or a poor head of school? At this point, readers may wish to pause and reflect on an age-old question: how do we distinguish between what is good and what is not?

Alongside fair teacher remuneration, extra-curricular education is equally important and should become a key driver of young people's development in Estonia. Iceland, one of the world's leading countries in human development, shows that even deep-rooted problems can be overcome. In the 1990s, Icelandic young people ranked among the highest in Europe in terms of risk behaviour and addiction.[14] Today, the country is a leader in prevention. The transformation did not come through lectures or campaigns but through a clear decision: every young person, regardless of family background, should have access to high-quality extracurricular education. Not just any extracurricular education but opportunities that genuinely engage and inspire. Iceland achieved this through a data- and evidence-based approach, creating child and youth well-being dashboards that serve as management tools for ministries, local authorities and heads of schools.[15] If we want the next generation to be safer and healthier, we must invest in high-quality extracurricular education. Here too, local authorities should be much bolder and experiment with new ways of expanding access. We should not fear the unknown. The real danger lies not in new and untested ideas, but in an old system that no longer delivers.

SMART EDUCATION MUST SUPPORT SMART DEVELOPMENT ACROSS ESTONIA

Each edition of the global Human Development Report has focused on the issues shaping the world most profoundly at the time. In 2019, the focus was inequality, combined with the message that every person matters. In 2020, attention turned to the future of the planet in an era when human activity shapes the Earth's environment more than any other force. The 2021/22 report emphasised growing uncertainty and a weakening sense of security, while the 2022/23 edition examined deepening social divisions. In 2025, artificial intelligence took centre stage – a technology that brings both opportunity and disruption. In

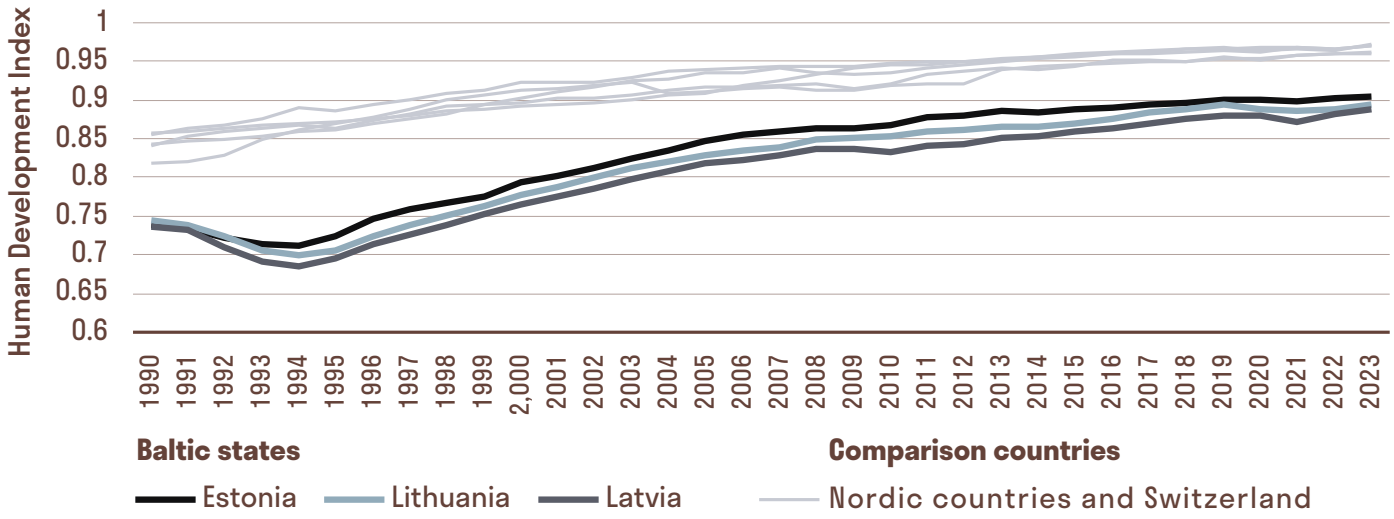
The **Human Development Index (HDI),** created by the United Nations Development Programme in 1990, is a composite measure of human development. It combines three dimensions: health, measured by life expectancy at birth; education, measured by mean years of schooling among adults aged 25 and over and expected years of schooling for children of school age; and economic well-being, measured by gross domestic product per capita at comparable prices. In the 2025 report, Estonia ranked 36th, down from 31st place in the previous edition.

this sense, each report offers a snapshot of its time, showing where we stand and prompting us to ask how human development can continue amidst profound change.

Figure 0.1 shows two distinct development trajectories. The world's leading countries in 2023 – Iceland, Norway, Switzerland, Denmark and Sweden – maintained high levels of human development throughout the period from 1990 to 2023. The Baltic states present a more dynamic picture. In the early 1990s, amid economic and political transition, the index declined, but since 1995 the trend has been one of steady improvement. Estonia has maintained a small lead over Lithuania and Latvia and, by the 2020s, had moved significantly closer to the leading countries. In recent years, however, the Baltic states have lost momentum: the earlier upward trend has given way to stagnation and, in some cases, decline.

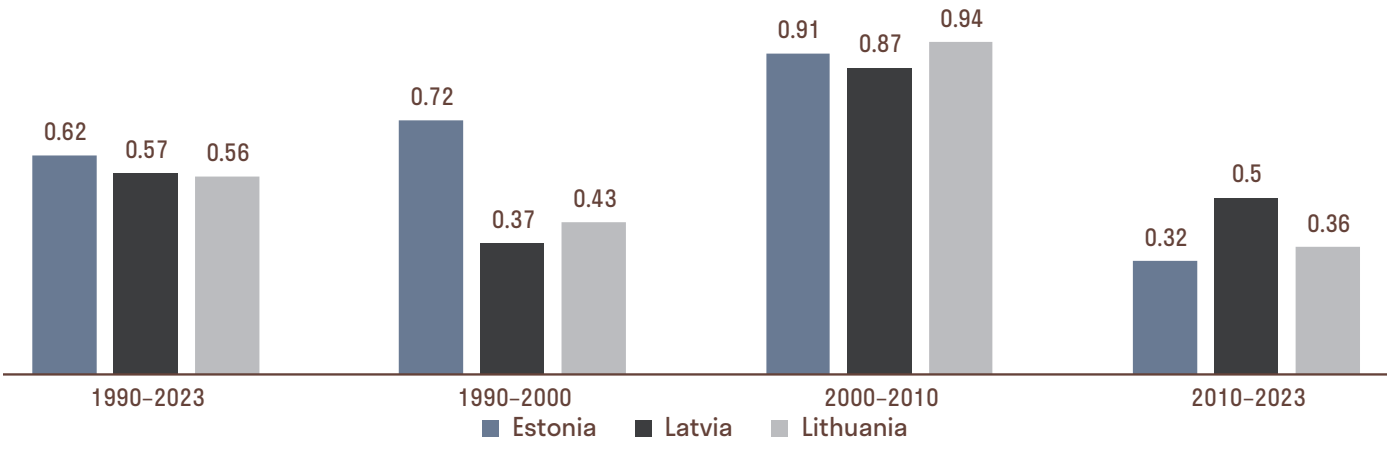
A comparison of average annual growth rates further illustrates the trajectory of the Baltic states (Figure 0.2). Between 1990 and 2010, Estonia advanced more rapidly than Latvia and

Figure 0.1 Top five countries in the Human Development Index and the Baltic states, 1990–2023



SOURCE: United Nations[16]

Figure 0.2 Average annual growth rate of the Human Development Index in the Baltic states



SOURCE: United Nations[17]

Lithuania. Economic growth was the main driver, while education and health provided a slower but steady contribution. Between 2010 and 2023, however, the picture changed: economic growth slowed relative to the other Baltic states, while educational progress approached a ceiling beyond which further gains became increasingly difficult. Latvia has since recorded the fastest rate of improvement. In the 2025 Human Development Report, Estonia ranked 36th, Lithuania 39th and Latvia 41st.

THE INDEX OBSCURES KEY FEATURES OF ESTONIAN EDUCATION

Iceland ranks first in the 2025 report. How has a country with a population three times smaller than Estonia achieved such success? The answer is simple: Iceland started from a higher baseline and continues to outperform Estonia in both health and education.

Estonia ranks 36th in the Human Development Index (Table 0.1). A closer look at the individual components, however, reveals a different picture: Estonia ranks 45th in health and 44th in economic performance. The education indicators tell a more complex story. Estonia ranks 7th in the world for mean years of schooling, but only 44th for expected years of schooling.

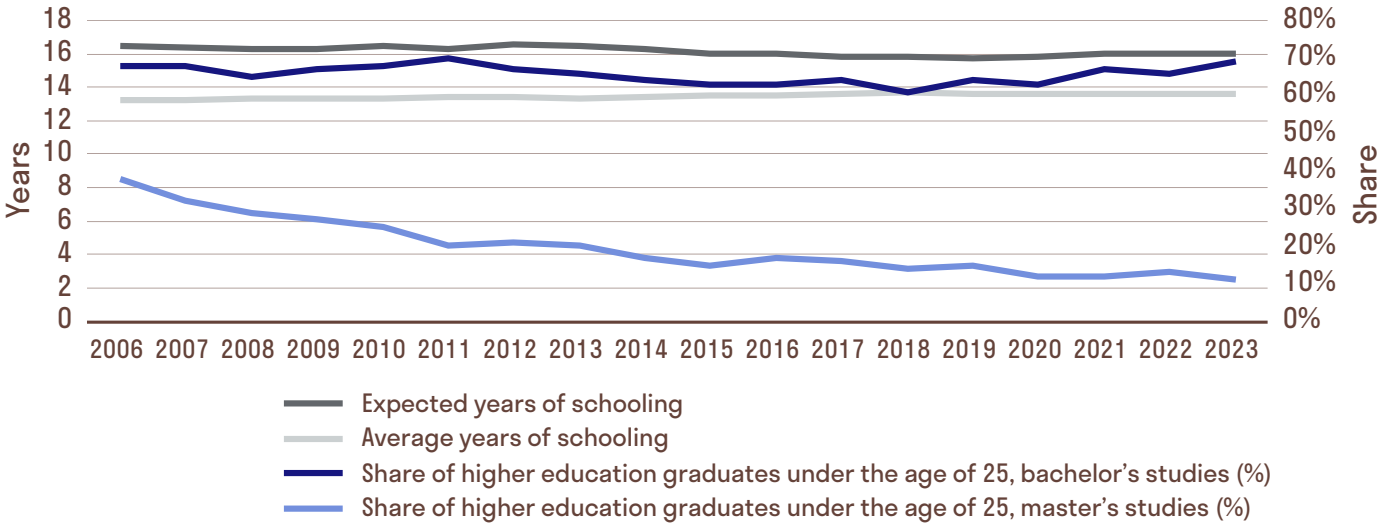
The discrepancy arises from an international methodology that does not fit Estonia's circumstances particularly well. The index calculates expected years of schooling based on participation rates among 5–24-year-olds, whereas mean years of schooling are based on the actual educational attainment of people aged 25 and over.[18] In Estonia, a large share of people complete higher education after the age of 25, meaning that their actual educational pathways are longer than the youth-centred indicator suggests.

Table 0.1 The Human Development Index and its component indicators: top ten countries and Estonia

Rank	Country	Human Development Index	Life expectancy at birth (years, 2023)	Expected years of schooling (2023)	Mean years of schooling (2023)	GNI per capita, PPP (USD, 2021)
1	Iceland	0.972	82.7	18.9	13.9	69,117
2	Norway	0.970	83.3	18.8	13.1	112,710
3	Switzerland	0.970	84.0	16.7	13.9	81,949
4	Denmark	0.962	81.9	18.7	13.0	76,008
5	Germany	0.959	81.4	17.3	14.3	64,053
5	Sweden	0.959	83.3	19.0	12.7	66,102
7	Australia	0.958	83.9	20.7	12.9	58,277
8	Hong Kong	0.955	85.5	16.9	12.4	69,436
8	The Netherlands	0.955	82.2	18.6	12.7	68,344
10	Belgium	0.951	82.1	19.0	12.7	63,582
…	…	…	…	…	…	…
36	Estonia	0.905	79.2	16.0	13.6	40,881
Estonia's gap from the top-ranked country		**0.067**	**3.5 years**	**2.9 years**	**0.3 years**	**USD 28,236 (40,9%)**

SOURCE: United Nations[19]

Figure 0.3 Education indicators in Estonia, 2006–2023



SOURCE: United Nations and Haridussilm[20]

NOTE. Expected years of schooling refer to the projected number of years in education for people aged 5–24; mean years of schooling refer to the actual number of years spent in education by people aged 25 and over.

As a result, Estonia ranks among the world leaders in mean years of schooling, while the expected years of schooling indicator places it artificially lower (see Figure 0.3).

International rankings do not always capture the realities of national education systems because their indicators assume similar educational pathways across countries. This assumption does not fit flexible or distinctive education systems particularly well. Estonia's education system is flexible and supports learning across the life course, which means that part of the educational journey remains invisible to these indicators. Ultimately, a country's position in a ranking matters less than how well its education system functions under local conditions.

ESTONIA'S STRONG EDUCATION INDICATORS CANNOT FULLY OFFSET SHORTCOMINGS IN HEALTH AND THE ECONOMY

This report explores how education is reflected in broader developments across Estonian society – in the economy, sustainability, the justice system, data governance and other areas of public life. Chapter 1 shows that Estonians place a high value on education, yet unlike Finns, we struggle to translate this into economic gains. Estonian education enjoys a strong international reputation, but its export potential remains largely untapped. Chapter 3 presents an unvarnished economic perspective: each additional year of education increases wages by only 6% in Estonia, whereas 8–10% is more typical internationally. The main exception is the so-called 'generation of winners' – those who gained an advantage in the labour market during the transition period in the 1990s. Among younger cohorts, the effect is no longer as pronounced.

To what extent does education truly meet the needs of today's and tomorrow's labour market? An audit by the National Audit Office shows that study programmes in Estonia are often opened without adequate consideration of labour market demand – not on the basis of workforce forecasts but according to institutional habit and cost-efficiency considerations.[21] Education policy thus emerges not from need but from inertia. As a result, some fields train several times more people than the labour market actually requires. As shown in Chapter 3, graduates of vocational education in some fields earn less than graduates of general secondary education, raising questions about the value of vocational study and of spending additional years in education. This revives an old

question: does education fail to understand the labour market, or does the labour market fail to understand education?

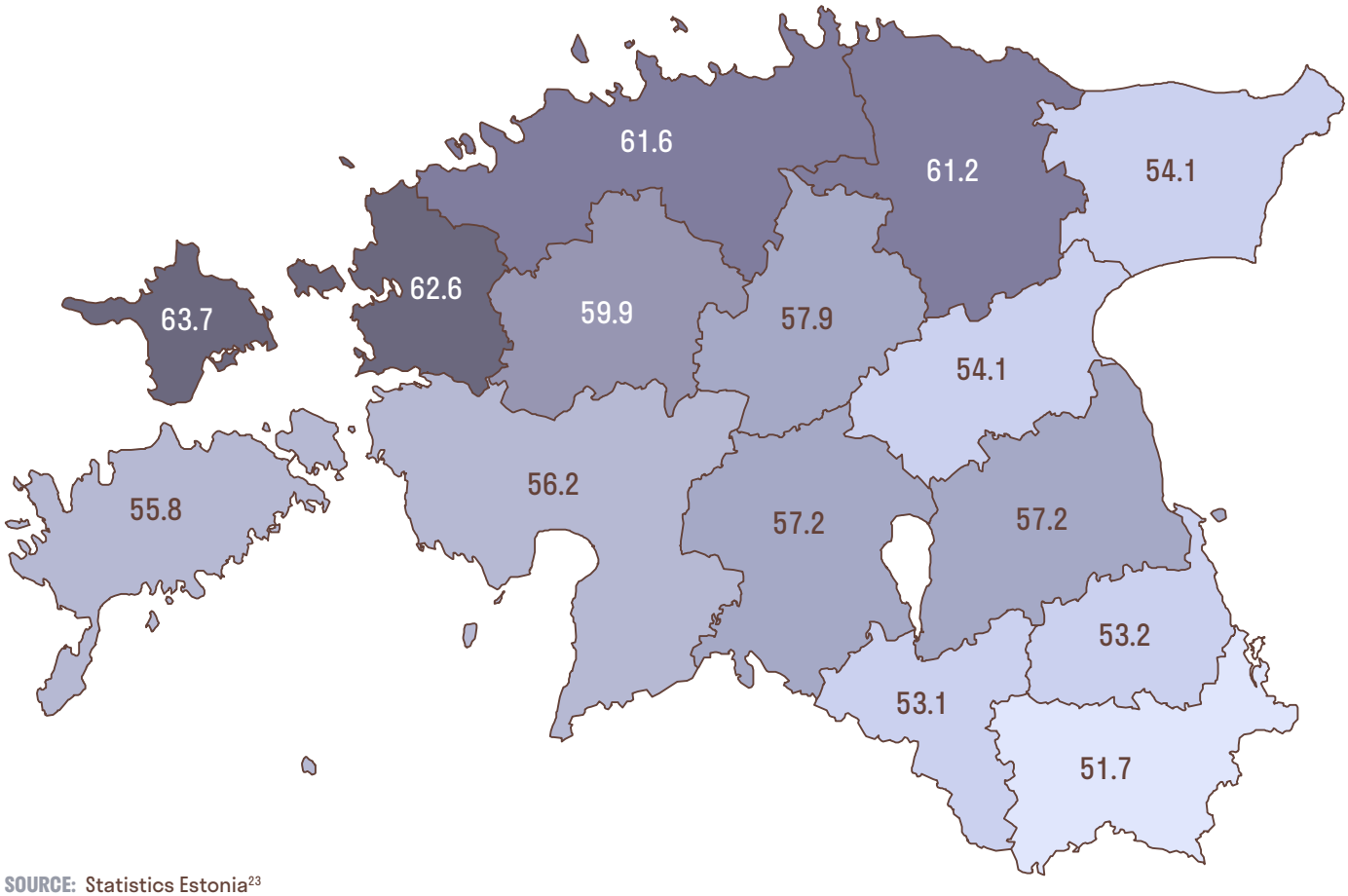
Global forecasts are forcing countries to think more carefully about the future of their labour markets, and education must stay several steps ahead. Whereas 20th-century automation primarily displaced blue-collar jobs in manufacturing and logistics, artificial intelligence is now reaching into white-collar occupations. Research suggests that lower-paid entry-level positions are most vulnerable – junior analysts, programmers, assistants and similar roles. Artificial intelligence is therefore likely to affect young people most severely. Forecasts suggest that entry-level positions are particularly vulnerable, threatening young people's first steps into the labour market.[22]

INEQUALITIES WITHIN ESTONIA MATTER MORE THAN INTERNATIONAL RANKINGS

Any assessment of human development in Estonia must take account of differences in education, health and economic well-being across the country. Just 100 kilometres east of Tallinn, or 200 kilometres to the south-east, disability-free life expectancy declines by almost ten years while relative poverty doubles. The average number of disability-free life years in Estonia is 58.6, but the gap between counties is nearly 12 years: 51.7 years in Võru County and 63.7 years in Hiiu County (Figure 0.4).

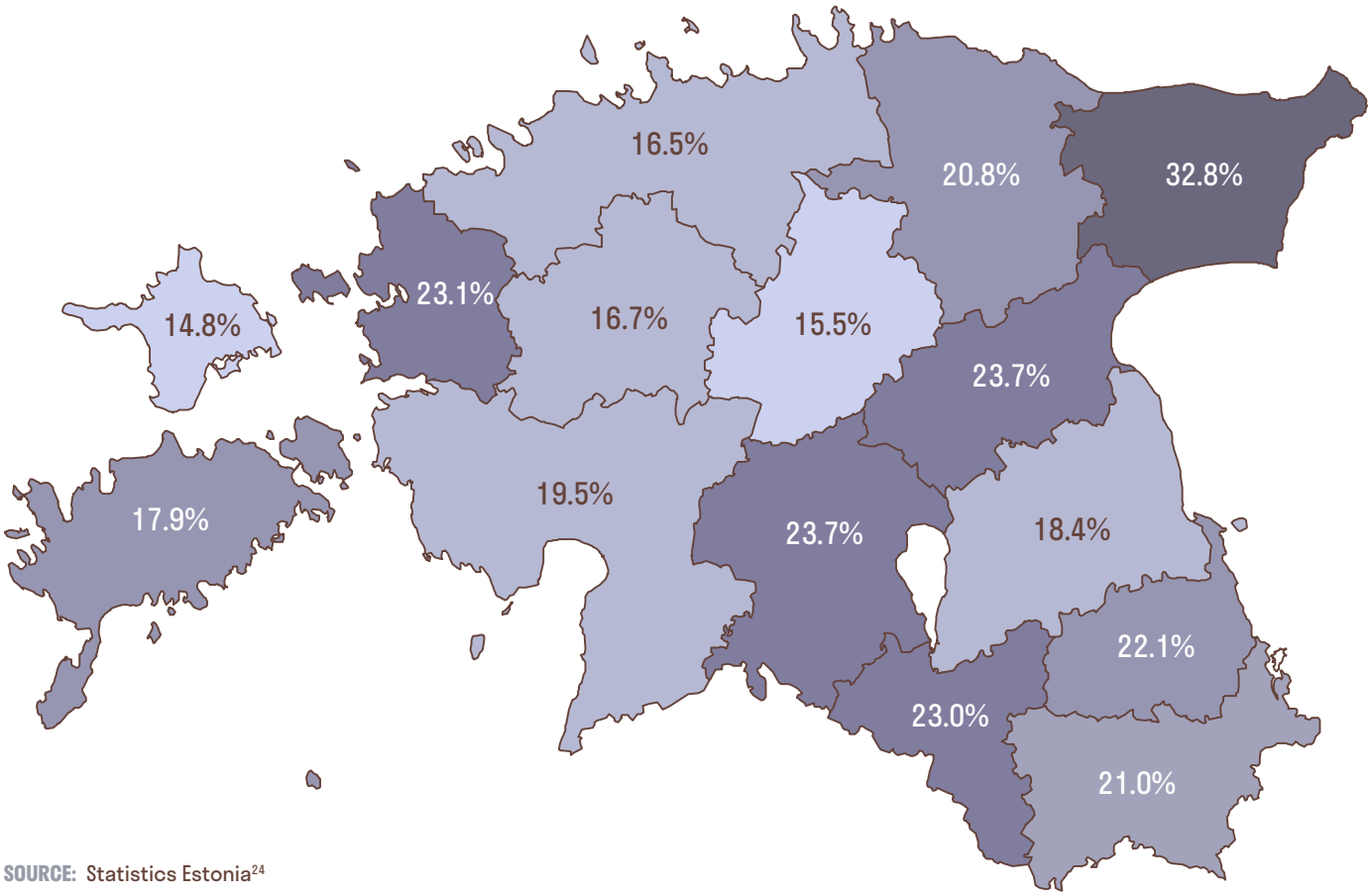
The same pattern is evident in relative poverty. In 2024, the national average was 19.4%, but rates ranged from 16.5% in Harju County to 32.8% in Ida-Viru County (Figure 0.5). In Estonia, life expectancy and well-being continue to depend on place of residence more than we may wish to

Figure 0.4 Disability-free life expectancy at birth by county, 2023/24



SOURCE: Statistics Estonia[23]

Figure 0.5 Relative poverty rate by county, 2024



SOURCE: Statistics Estonia[24]

acknowledge. In the context of this report, we must ask a pointed question: does the same hold true for education?

The OECD adds an important labour market dimension that is particularly relevant for Estonia: in an ageing society, we must find ways to increase employment among older people. This means ensuring opportunities for retraining later in life. Otherwise, part of the population risks drifting into a pre-retirement waiting room while labour shortages continue to deepen.[25] Estonia's greatest obstacle is its low number of disability-free life years, which often end before retirement age (see Table 0.2). A man with basic education can expect only 48.5 disability-free years of life despite a life expectancy of 68.4 years, meaning that nearly 20 years are spent living with illness. As noted in Chapter 4, men with higher education live 11 years longer in good health than their peers with basic education. For this reason, inequalities in education, health and economic well-being within Estonia matter more than the country's position in global human development rankings.

HOW DO WE MOVE FORWARD?

International rankings – whether PISA or the Human Development Index – provide an external perspective, but they do not reveal internal disparities. If life expectancy can be ten years shorter only a short distance from the capital, then our real challenge is inequality within Estonia, not our position in global rankings.

Estonia is moving in the right direction. The strongest part of our education system is not found in university lecture halls or PISA rankings but where the first steps of life begin – in early childhood education. Success there is not measured in medals, examination scores or rankings, but its impact is greater than anywhere else.

According to Nobel laureate James Heckman, environment plays a greater role than genetics in shaping human development.[26] When children grow up in a safe, caring and stimulating environment from their earliest years, they

Table 0.2 Life expectancy and disability-free life expectancy by sex and educational attainment, 2024

	Sex		Educational attainment						Place of residence			
			Basic education		Secondary and vocational education		Higher education		Rural		Urban	
	M	W	M	W	M	W	M	W	M	W	M	W
Life expectancy	75.1	83.4	68.4	77.8	75.0	83.4	79.2	86.0	73.7	82.5	76.1	84.4
Disability-free life expectancy	56.8	60.6	48.5	51.1	56.3	58.5	61.4	64.5	54.8	58.5	57.8	61.5
Gap	**18.3**	**22.8**	**19.9**	**26.7**	**18.7**	**24.9**	**17.8**	**21.5**	**18.9**	**24**	**18.3**	**22.9**

SOURCE: Statistics Estonia[27]

develop a stronger motivation to learn. Estonia's own experience bears this out. A smart country begins with a smart childhood.

Estonia's education system does not always fit neatly into international frameworks. Indeed, those frameworks are not necessarily designed for us. We have a habit of doing things our own way: entering the labour market at a young age, gaining life experience and then returning to university. Some people even pursue a second master's degree because completing the first only deepened their appetite for learning.

We are good at identifying where Estonia is succeeding. Now it is time to pay equal attention to where it is not. Above all, we must focus on those who are left out of Estonia's success stories – those who remain invisible in statistics, rankings and slogans. Whether in health, the economy or education, inequalities exist and will not disappear on their own. They must be reduced deliberately and persistently.

WE KNOW A GREAT DEAL; NOW WE NEED THE COURAGE TO TAKE RESPONSIBILITY AND ACT

Teacher workload and shortages of new entrants to the profession. Excessive homework and growing mental health concerns among pupils. The alignment of vocational and higher education with labour market needs, shortages of engineers and specialists, the transition to Estonian-language education, higher-education funding, brain drain … The list is long and familiar to anyone involved in education policy. It is also a list of expectations that were placed on this report: that it should address every issue and offer solutions to every problem.

However, a Human Development Report is neither a catalogue of solutions nor a toolbox for day-to-day policymaking. The central challenge in today's educational landscape is no longer a lack of research, but whether we are prepared to act on what we already know. Can we see the bigger picture? Research is not a solution if conducting research becomes a substitute for solving problems.

THE SCALE OF EDUCATIONAL RESEARCH: FROM PIKK HERMANN TO PÄRNU

To understand how much educational research Estonia produced between 2016 and 2025, we examined more than twenty websites, ranging from ministries to research consultancies. Together, they contain more than 20,000 pages of educational reviews and analyses. During the same period, nearly 8,000 education-related theses were completed at Estonian universities, amounting to approximately 360,000 pages. Scientific publications add a further 40,000 pages. A conservative estimate suggests that Estonia

produces at least 420,000 pages of educational analyses and reports over a ten-year period.

If all of those pages were printed on A4 paper and stacked one on top of another, the resulting pile would rise to approximately 45 metres – about the height of Pikk Hermann, the iconic tower of Toompea Castle in Tallinn. Laid end to end, the pages would stretch for 125 kilometres, roughly the distance from Tallinn to Pärnu.

And this concerns education alone. Across all fields, more than 90,000 theses were completed during the same period, amounting to approximately 4.4 million pages. Adding government strategies, think tank reports and scientific articles brings the total to more than five million pages over ten years. Stacked one on top of another, those pages would form a tower half a kilometre high.

The question, then, is no longer whether we possess knowledge. The question is whether we use it.

IS THE HUMAN DEVELOPMENT REPORT SIMPLY ANOTHER REPORT?

It is reasonable to ask why we need yet another report. Indeed, while preparing this one, it became increasingly clear how extensively educational issues have already been examined in Estonia – often returning to the same problems time and again. How did we arrive at this situation? We must accept our share of the responsibility. Human Development Reports, too, have repeatedly returned to education. The concerns have remained remarkably consistent across decades: the mismatch between education and the labour market, a continuing education cycle that repeatedly favours the same groups of people, and educational inequality.[28] At the same time, this report serves another purpose. It shows not only how much we have studied, but also how much knowledge remains unused. The abundance of research is not a weakness but an untapped resource. We no longer need to keep studying the same problems; we need to turn existing knowledge into action.

A review of recommendations from studies conducted in Estonia reveals five recurring types of recommendation:

1. involve and integrate different stakeholders and activities;
2. develop and strengthen competences and systems;
3. improve processes and the use of resources;
4. develop monitoring and evaluation systems;
5. conduct additional research.

In most cases, these recommendations fall between ministerial areas of responsibility and therefore become matters of shared responsibility. Why?

First, we have become trapped in an implementation gap. Under poorly coordinated network governance, many actors conduct research, but responsibility for implementing solutions is often left unclear.[29] Both the United Nations and the World Bank have shown that reports often vanish into the cloud without reaching either readers or decision-makers, creating a significant gap between investment in research and its actual impact. United Nations Secretary-General António Guterres has noted that in 2024 the UN system supported 27,000 meetings and the Secretariat produced 1,100 reports – 20% more than in 1990.[30] The volume of reporting has pushed the system towards a breaking point, as only 5% of reports reach a broad readership. This raises an uncomfortable question: what is the value of research if it remains on a digital shelf?

Over the past two decades, Estonia has moved steadily towards becoming a knowledge-based society. Few countries link education policy as closely to data, research and international comparison as Estonia does. Yet there is a risk that science-based or evidence-based policymaking may become little more than a fad or hype, invoked without the rigorous use of scientific evidence that it requires.[31]

A second possible explanation is the weakness of institutional memory in the public sector, a phenomenon sometimes described as 'institutional amnesia'.[32] In simple terms, institutional amnesia is an organisation's inability to recall and make use of existing knowledge.[33]

When a civil servant leaves, knowledge often leaves with them. Their successor starts again from scratch, commissioning studies that have already been carried out. What repeats itself is not history but bureaucracy, with each cycle generating new costs.

A third problem is the short time horizon of political cycles. Education, by contrast, requires a long-term perspective that is insulated from day-to-day politics. Research can become a form of cover: new initiatives are launched while old ones remain unfinished. Audit culture reinforces this tendency. We measure, monitor and evaluate until measurement itself becomes the objective rather than a tool for achieving change.[34] A telling example is that many municipalities commission analyses of their school networks without asking how those networks might function together.

Finally, the deeper cause often lies in the diffusion of responsibility embedded in legislation itself. In practice, collective responsibility often becomes collective irresponsibility.[35] The problem, therefore, is not a lack of knowledge but a lack of willingness to use it.

HOW DO WE MOVE FORWARD?

This Human Development Report does not call for less research. Instead, it calls for making smarter use of the knowledge we already possess. The problem is not the volume of analysis but the fact that too much of it fails to inform decisions or generate change. Research cannot be an end in itself. The solution lies not in producing yet another analysis but in reaching the next set of agreements.

- Every study should reach decision-makers.
- Someone must be responsible for implementing the findings.
- Instead of repeating studies, greater emphasis should be placed on implementation.

In the public sector, the value of research should be measured by its impact, not its volume. Every study requires an assessment of its return, not only in financial terms but also in terms of its societal value. As the OECD has observed, no vaccine reaches the public – even during a pandemic – before its effectiveness and safety have been thoroughly demonstrated.[36] In education, the situation is often the reverse. According to OECD analysis, nine out of ten education reforms are not evaluated for their long-term impact. This means that educational decisions are frequently made without being tested, measured or assessed according to the standards that are taken for granted in other fields. If we continue producing tens of thousands of pages of analysis that never translate into action, research becomes a cost rather than an investment. The true output of research is not a report but the change it produces.

The problem is not only the volume of research but also the lack of a clear overview. Estonia has no single database that would allow users to quickly identify what has already been studied, what work is underway and which conclusions remain unimplemented. The knowledge exists, but it is fragmented across the websites of ministries, funding organisations, universities and research consultancies. The result is a paradox: studies are repeated because people do not realise they have already been conducted.

Alongside funded research, several thousand theses are completed each year, many of which are read by no more than a handful of people – typically the author, supervisor, reviewer and examination committee. Yet many of these works contain as much data, as many conclusions and as many policy recommendations as analyses commissioned by ministries. For example, the first article in Chapter 4 of this report is based on the doctoral dissertation of David Knapp, which examined the relationship between residential segregation, school segregation and family background.[37] The knowledge exists in Estonia; it simply does not circulate.

AS A DIGITAL STATE, ESTONIA IS NOT USING ITS FULL POTENTIAL IN EDUCATION

In 2017, The Economist declared that the world's most valuable resource was no longer oil, but data.[38] Estonia had recognised this long before. We pay taxes in minutes and sign documents digitally in seconds, while many countries still

rely on scanned paperwork. Parents can monitor their children's progress through eKool, patients can access their medical records through the national health portal, and citizens can establish a company or vote in elections without leaving home. These are everyday conveniences that we take for granted, and all of them have emerged within just the past 20–30 years.

ESTONIA NEEDS LESS 'WHY IT CANNOT BE DONE' AND MORE 'HOW IT CAN BE DONE' THINKING ABOUT DATA IN EDUCATION

As noted in Chapter 2, we continue to rely on slow and often highly subjective surveys even when addressing some of the most important issues, including educational inequality, despite the fact that much of the necessary information already exists in administrative registers. This report invites us to recognise two realities at once: our registers contain enormous potential, and in education that potential is particularly important for early identification and prevention. Data breaches and controversies over the use of personal data have made us cautious, but there is a risk of drifting to the opposite extreme, where everything is prohibited as a precaution.

At a time when the public sector faces significant financial constraints – in education, social welfare and healthcare – Estonia has an opportunity to lead by example. The capabilities of the digital state and the wealth of existing administrative data make it possible to develop smarter education policy without increasing costs.

THE GREATEST WEAKNESS IN EDUCATION IS POOR DATA GOVERNANCE

The problem is not a lack of data but limited awareness of what data exist and how they can be used. The shortage of expertise in data-informed policymaking and the economics of education is particularly acute in the area of education expenditure. Jaak Aaviksoo's review of education spending reached a striking conclusion: our greatest weakness is poor data governance, as the education system lacks data-based management: 'Educational institutions, including the Ministry of Education and Research, do not have publicly available budgets. Officials and senior managers lack a clear overview of how education funding is allocated and of the sector's financial position, relying instead on ad hoc enquiries. Educational governance and financial management operate separately from one another, and cooperation between them rarely extends beyond formal procedures.'[39]

Estonia spends 6% of its gross domestic product on education, one of the highest shares among OECD and European Union countries, but we are unable to say with confidence where that money actually goes.[40]

HOW DO WE MOVE FORWARD?

If we want Estonia's digital state to extend fully into education, we must first ask ourselves about data literacy in the public sector – not in collecting data but in using them. At present, we are diligent collectors but limited users. As confirmed in Chapter 2 of this report, the administrative register data collected and maintained by Statistics Estonia enable education policy decisions to be grounded in facts rather than repeatedly relying on large-scale and costly surveys.

Several countries, including Finland, have in recent years created data-based national dashboards to monitor the well-being of children and young people.[41] Iceland, with a population three times smaller than Estonia's, offers a particularly strong example. Its national dashboard, Farsæld Barna,[42] extends all the way to the municipal level. One quarter of its indicators are based on administrative registers and three quarters on youth surveys. The process is so highly automated that a head of school receives a well-being report for their school immediately after the survey has been completed.

ESTONIAN EDUCATION NEEDS A HEALTHY SUBTRACTION EXERCISE

Education is fertile ground for opinions. Parents demand the best teachers, public authorities specify what must be taught, the media debate teachers' salaries, and employers ask where all the engineers have gone. Heads of schools search tirelessly for teachers, while teachers themselves are no longer sure whether human intelligence

or artificial intelligence requires more of their attention. And in the middle of all this stands the pupil, asking the simplest and at the same time the most uncomfortable questions: why am I here, and how does this school relate to a world that is changing faster than my timetable?

EVERYONE KNOWS WHAT SCHOOLS SHOULD DO, BUT FEW DARE ASK WHAT SCHOOLS SHOULD STOP DOING

The journey to adulthood is different for everyone, but there are two places where those journeys intersect every day: kindergarten and school. Today's classroom is tomorrow's society. This means that when we shape education, we are also shaping the society we will become. The classroom is both the foundation of the future and a reflection of the present. Family and societal concerns arrive there with pupils, teachers, parents and heads of schools alike. Schools – whether kindergartens, general education schools, vocational schools or higher education institutions – cannot serve as treatment centres for all of society's problems, particularly given the burden of responsibilities they already carry. Every new requirement comes at the expense of an existing responsibility that we have not had the courage to remove.

We have therefore reached a point where we must decide whether to acknowledge reality or ignore it. The reality is that we have little choice. Schools cannot be merely places where knowledge is transmitted; they must also be places where society learns how to hold itself together. Today's schools bring together the risks of both the physical and the digital world, while the path from childhood to adulthood has become considerably more complex than it once was. For some children and young people, a head of school or a teacher may be the only adult in their lives who genuinely notices them and perhaps even the only positive role model they encounter. From kindergarten onwards, children and young people spend nearly fifteen years with adults in educational institutions who, alongside parents, help shape their understanding of the world.

If we want educational goals in Estonia – such as personal development, fostering law-abiding citizens and creating the foundations for lifelong learning – to be realised in practice, then in shaping the education system we must decide not only what to add, but also what to remove. We need to create space for schools and higher education institutions to provide a healthy environment for personal development – not only for pupils and students, but also for teachers, academic staff and heads of schools.

Today's young people no longer grow up under the authority of teachers and parents alone but within a global network of influences. Teachers are no longer competing only with the school down the road, but with a streamer in Tokyo and an influencer in Berlin. If teachers no longer serve as role models, they also lose the ability to shape learning motivation. Interest in learning is therefore determined not only by the curriculum but also by relationships built on trust. Relationships are the new currency of education. Children do not learn simply because they must; they learn because someone believes in them. Building those relationships requires giving all educators – from kindergarten to university – the time to do so.

The OECD has repeatedly noted that countries tend to keep adding new requirements while giving little thought to what should be removed.[43] What burdens Estonian education is not a lack of knowledge but an excess of initiatives. Every new minister, official or committee launches another programme, but few ask what is already underway or what could be discontinued. Schools and teachers are overwhelmed by reforms, strategies and projects, but no additional resources appear and existing responsibilities are rarely reduced. The result is a system that tries to do everything at once and therefore struggles to do anything particularly well.

The greatest challenge facing Estonian education today is the combination of pupils' low enjoyment of learning and poor mental health, combined with the exhaustion of teachers and heads of schools. The priority for the education system should be to free itself from tasks that undermine the joy of learning and teaching. Every educational institution already knows which responsibilities create the greatest burden and contribute least to learning. There is no need to prescribe such a list from above. What is needed is the courage to

identify those burdens honestly and then to begin removing them.

HOW DO WE MOVE FORWARD?

The two most dangerous sentences in education are: 'This subject cannot be taught any other way' and 'We have always done it this way'.

Around the world, there is growing discussion about which tasks and practices education systems could abandon. Homework is one example. While excessive work by teachers outside the school day is widely recognised as a problem, work performed by pupils after school is often taken for granted (see Chapter 7). According to a study by Stanford University, more than two hours of homework per evening may be counterproductive, contributing to sleep deprivation and poorer mental health.[44]

Every technological transformation raises the same question: what purpose will it serve? This report is being prepared at a moment of profound change brought about by artificial intelligence. AI should become a guillotine for educational overload, taking over tasks that teachers, heads of schools and pupils no longer need to perform themselves. At the same time, there is a risk of becoming trapped in an 'AI policing' mindset, where energy is directed towards monitoring whether pupils are using AI, thereby creating even more work for educators.

The entire education system is currently developing AI competence, which means that the introduction of AI into education cannot be treated merely as a technological innovation. If schools adopt new tools while leaving teachers' roles, work organisation and leadership practices unchanged, the impact will remain limited. AI will not transform the system on its own. Change depends on whether the system is prepared to change itself. The question is not only how we use new tools, but whether we are willing to rethink established practices. This is precisely the question posed in Chapter 5 of this report: 'Software updated – but what about learning?'

SUMMARY

We have burdened the education system with responsibilities it cannot fulfil, and the result is growing inequality. Unless we create room to breathe – room for difficult choices and healthy subtraction – the system will eventually buckle under the pressure.

We must also ask ourselves honestly why we have been unable to translate our educational strengths into broader gains. How is it possible that high levels of educational attainment are not matched by similar gains in people's economic well-being and health? Estonia's educational success story will continue only if we have the courage to let go of some things, make wise choices and use existing resources more effectively. Looking towards the future (see the education scenarios presented in Chapter 8), we need a clear understanding of both today's and tomorrow's operating environment in order to know how to move forward: charging ahead in a wild boar's rampage, advancing cautiously with the fox's stealth in search of the best opportunities, observing events unfold with the measured confidence of the elk's stride or making agile adjustments with the hare's zigzag. At the same time, we must avoid the illusion that educational success, once achieved, is permanent. The belief that high-quality education is equally available everywhere in Estonia may already be outdated – and it certainly does not guarantee success tomorrow.

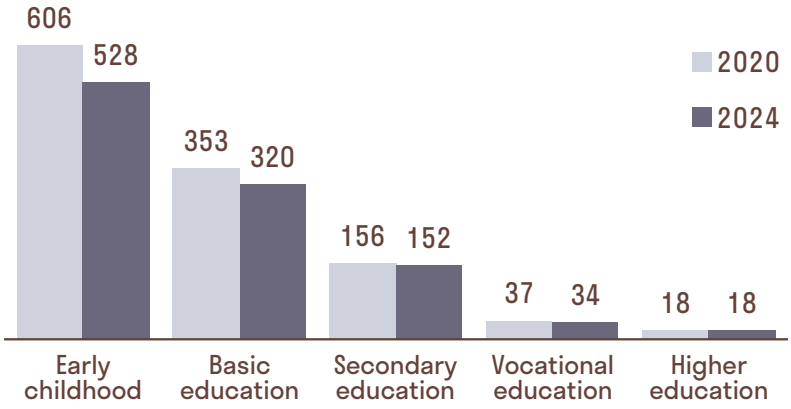
We have reached the top of the PISA rankings and brought Estonia's digital-state story to the front pages of major international publications. But do the strengths that brought us here still have the power to carry us forward? More importantly, are we smart and bold enough to change direction at the right moment, before habit becomes an obstacle?



ESTONIAN EDUCATION AT A GLANCE



The number of early childhood education institutions has declined the most (–13%)



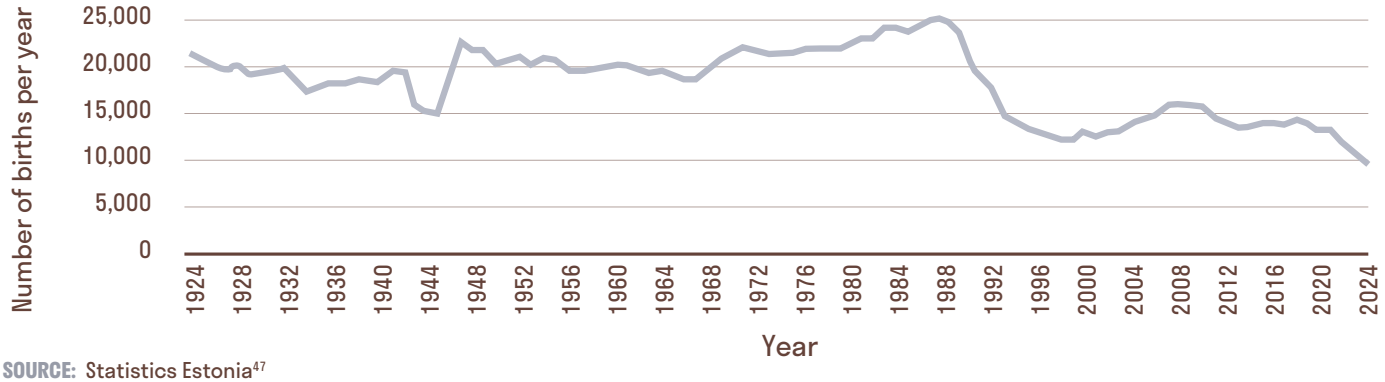
SOURCE: Statistics Estonia[45]

Most general education schools are small: 48% have fewer than 200 pupils

Number of pupils per school						
Pupils	< 50	50–99	100–199	200–499	500–999	> 1000
Schools	54 (12%)	75 (16%)	95 (20%)	118 (25%)	96 (21%)	28 (6%)

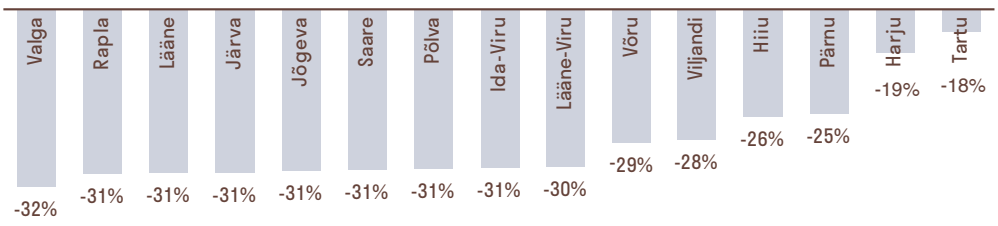
SOURCE: Haridussilm 2024/25[46]

Demographic pressure on the education system is increasing



SOURCE: Statistics Estonia[47]

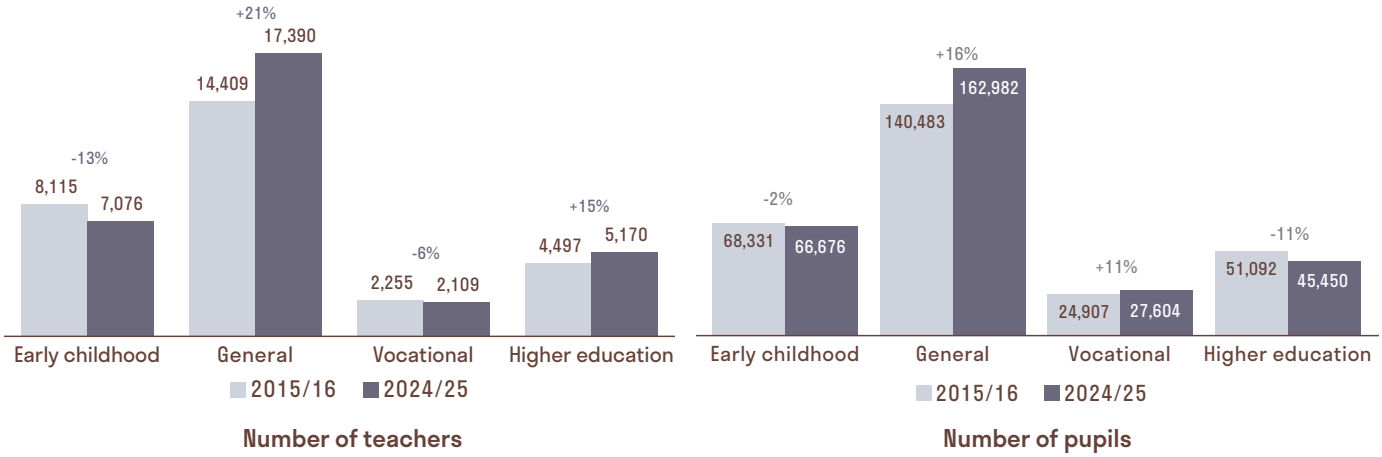
The number of 5–19-year-olds will decline significantly by 2050 (compared with 2024)





SOURCE: Statistics Estonia[48]

Pupil and teacher numbers are changing in different directions across educational levels
General education has gained both pupils and teachers, early childhood education has lost both, while changes in vocational education have moved in opposite directions.



SOURCE: Haridussilm[49]

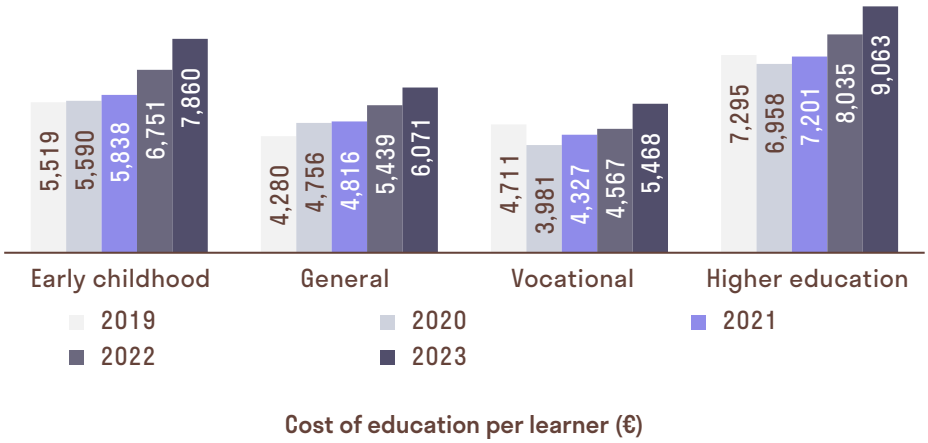
The shortage of support specialists is greatest in vocational education
There are more than 2,000 pupils for every school psychologist in vocational education.



Early childhood education	General education	Vocational education
95:1 overall	108:1 overall	531:1 overall
214:1 special education teacher	328:1 special education teacher	3067:1 special education teacher
172:1 speech therapist	657:1 speech therapist	2300:1 school psychologist
	572:1 school psychologist	890:1 social pedagogue
	337:1 social pedagogue	

SOURCE: Haridussilm 2024/25[50]

Expenditure has increased rapidly across all levels of education
Costs per learner have risen fastest in early childhood and general education.





SOURCE: Haridussilm[51]

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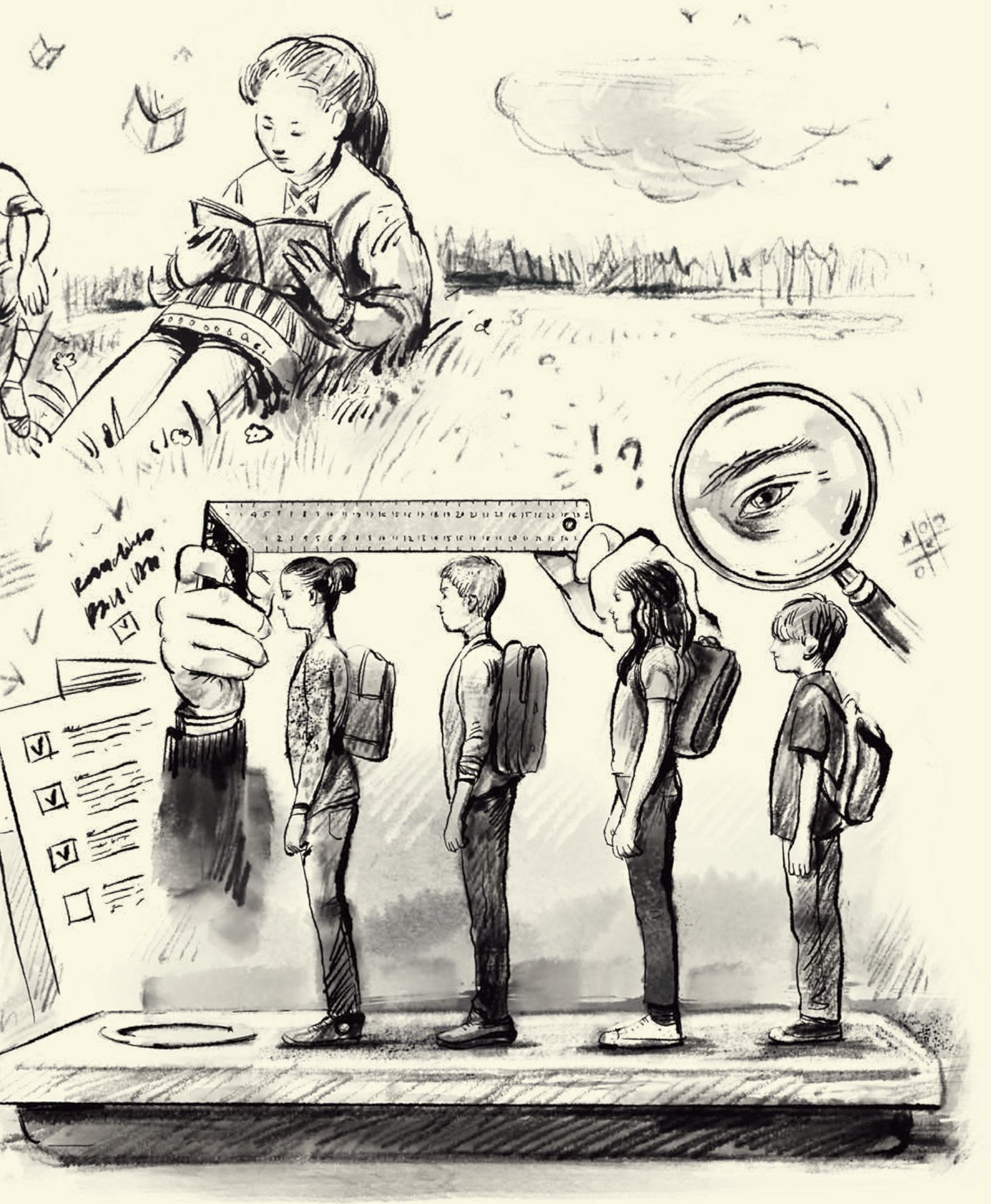
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1.0 Introduction

Education at a turning point

Maaja Vadi

KEY MESSAGES

- **The will to pursue education is deeply rooted in Estonian society. It reflects society's belief in the value of education and the aspiration to strive for high-quality learning.** Education is predominantly discussed in positive terms – it is more often associated with something elevated and beneficial than with something inferior or inadequate. To sustain this educational drive, it is important to address shortcomings in the education system while also recognising its strengths that support further development.

- **Educational indicators should be used to assess development rather than to compile and monitor rankings, as rankings may deepen educational inequality.** Tracking and stratification are matters of concern in Estonia. For example, pupils' mathematics examination results are associated with their mother's income: higher maternal income correlates with better grades. Performance is also influenced by the language of instruction and the pupil's place of residence. Reducing stratification within the education system requires ensuring access to education throughout the life course.

- **High-quality education builds trust and strengthens society.** Education opens positive future prospects for both pupils and the country as a whole. Education exports reinforce Estonia's international position. There is a growing need to develop social and learning skills so that young people are prepared not only for current jobs but also for those that will emerge in the future.

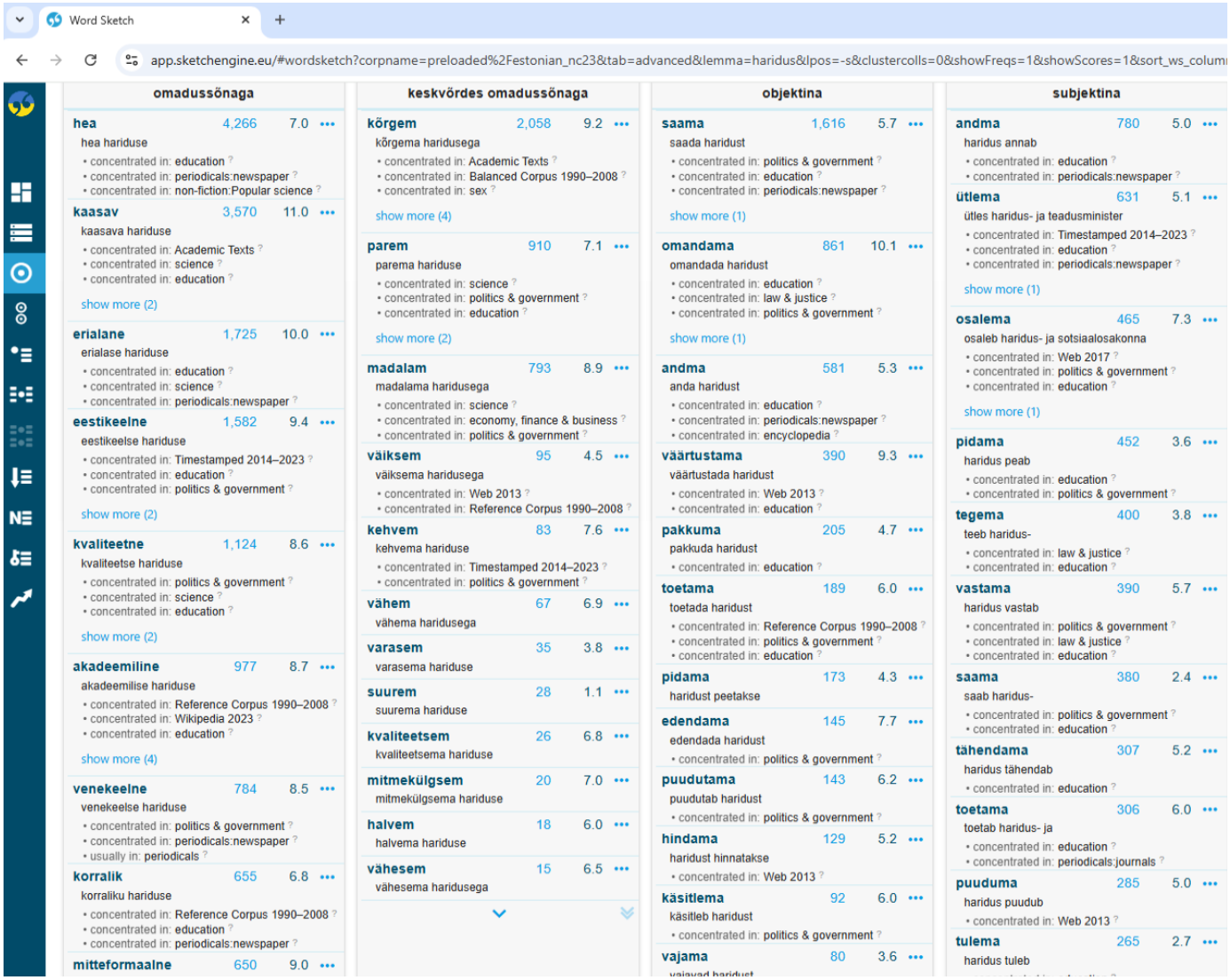
- **Education is a continuous, experiential process in which each life stage brings new learning experiences.** It is essential to ensure a supportive school climate and the mental well-being of pupils and teachers in order to create an education system that fosters development throughout the entire journey, connecting formal schooling with learning through life.

INTRODUCTION

Education is a bridge to the future – but what happens when its supports begin to shift and the destination recedes beyond the horizon? Estonian education is undergoing a period of transition. Traditional approaches to learning and institutional arrangements may no longer fully meet the increasingly diverse expectations of the labour market, society and learners. Schools are expected simultaneously to deliver academic excellence, foster values and support well-being. Pupils seek greater agency in shaping their learning pathways, while parents expect meaningful cooperation. These are not temporary deviations but signs of a deeper transformation that requires a clear vision and collaboration from all stakeholders – from policymakers to teachers, pupils and parents.

The will to pursue education continues to play a significant role in Estonia and forms one of the central messages of this chapter. Tõnis Lukas, however, draws attention to the contrast between willingness and unwillingness to pursue education. The predominantly positive connotations associated with education are also evident in an analysis of the Estonian language

Figure 1.0.1 Frequency of the word *haridus* ('education') in the Estonian language corpus



SOURCE: Sketch Engine analysis[2]

corpus conducted using Sketch Engine,[1] which identifies the semantic contexts in which the word *haridus* ('education') appears (Figure 1.0.1).

The collocation good education is the most frequent combination (4,266 occurrences), although it accounts for only about one per cent of all instances of the word *haridus* in the Estonian language corpus (422,175 occurrences as of 21 May 2025). The distribution of collocations suggests that education is discussed more often in positive than in negative terms – it is more frequently associated with something higher and better than with something lower or inadequate. To ensure that this remains the case, we must understand which shortcomings must be addressed. The challenges facing education are analysed from the perspectives of input (investment), process and output, with illustrative examples drawn from the discussions presented in this chapter.

INVESTMENT IN EDUCATION IS ESSENTIAL, AS EDUCATION SHAPES SOCIETY

This chapter examines the role of education from both domestic and international perspectives. Outward-oriented educational activities hold considerable potential. In his reflection, Erkki Raasuke notes that if Estonia succeeds in creating an integrated solution that encompasses study, living and working in the country, education could become the next engine of growth – an export sector that brings revenue, skills and new international connections. Eero Loonurm and Heli Aru-Chabilan provide numerous examples of how education exports elsewhere contribute to both economic development and social life. In Finland, for example, learning materials are an important export product. This inevitably raises questions: Why should Estonia not follow a similar path, and what would need to change for it to do so more effectively?

From a domestic perspective, several contributions in the chapter engage with the influence of neoliberal principles that have shaped the content and form of education in recent decades. Aune Valk argues that educational success should not be assessed solely through economic returns but also through human values. She proposes counterbalancing neoliberal approaches with humanistic indicators.

The chapter devotes significant attention to the causes and manifestations of educational inequality among both school-age children (in the article by Sandra Haugas and Eve Mägi) and adults (in the article by Kirsti Melesk and Märt Masso). These barriers must be addressed, as otherwise social inequality will deepen and frustration will increase, reducing motivation and willingness to cooperate across social groups.

Several examples of educational tracking and related stratification are presented in the chapter. Evidence shows that Estonian pupils' mathematics final examination results are associated with their mother's income: the higher the mother's income, the higher the child's mathematics grade, and vice versa. The language of instruction is also associated with differences in pupil achievement across several domains. It is therefore understandable that Eve Kikas calls for the abolition of first-grade entrance tests to reduce early tracking. To reduce educational inequality among adults, Anneki Teelahk recommends supporting vulnerable target groups and strengthening self-esteem, as well as increasing the flexibility of education. This is crucial, as Kirsti Melesk and Märt Masso note that adults with lower levels of education, people with reduced work capacity and older men participate in continuing education far less frequently. Maintaining and supporting the will to pursue education must therefore be ensured across the entire life course.

LEARNING IS A JOURNEY, NOT A DESTINATION

'The substance of education is shaped not only by formal schooling but also by the experiences of everyday life.' This idea, drawn from Jüri Allik and Maaja Vadi's discussion of the foundations of education, underlines that the educational process is, on the one hand, planned and regulated, and on the other shaped by everyday experience. The interplay between these dimensions can be better understood through the perspectives of different stakeholder groups, which help explain

why some voices are at times more vocal or influential than others. Yet all voices connected to education should resonate together and form a functional whole. The meaning of education therefore emerges through collaboration among multiple stakeholders, where formal learning and lived experience intertwine and diverse viewpoints help shape the substantive development of the educational process. Tõnis Lukas illustrates the importance of such cooperation by remarking that a child's daily journey to and from school should not become so long that it shapes the child more than family and school together are able to do.

When considering what is currently taught – and what should be taught – a growing need for social and learning skills becomes evident. It is important not to focus solely on existing occupations and fields of study but also to prepare young people for professions that do not yet exist. The effectiveness of learning often depends on who teaches and with whom one learns – for example, in the development of digital skills.[3] This highlights a potential tension in educational aims: should education primarily prepare young people for the labour market, or should it more broadly foster human development and the formation of critically minded citizens?

Schools are the most extensive and numerous educational institutions, and the chapter also examines school climate and patterns of interaction. There are positive examples, including the development of new state upper secondary schools, yet shortcomings also require attention. Eneli Kindsiko, Maaja Vadi and Urmo Uiboleht point out that physical conditions in educational institutions can at times be unhealthy. In large school cafeterias, for example, noise levels during lunch breaks may reach 100 decibels, and elsewhere in the school they are not always much lower. In a kindergarten group of up to 20 children with one teacher, the teacher manages around 210 interactions per day. When parents are included, the number of communication situations increases further. In a general education school where 21 contact hours per week are recommended and classes include 24 pupils, a teacher may manage up to 300 potential interactions per lesson and approximately 6,300 communication situations per week. In light of these and other pressures, the mental well-being and health of both pupils and teachers warrant serious attention.

At the same time, working in a school and in the teaching profession offers elements that support job satisfaction and may contribute to teachers tending to live longer and remain professionally active for longer than many other occupational groups.

ESTONIA'S EDUCATIONAL OUTCOMES REFLECT BOTH SUCCESS AND STRAIN

High-quality education is visible and has tangible effects. Jüri Allik and Maaja Vadi show that there is a strong association between a country's economic prosperity and the average intelligence score of its population. Educational attainment is also linked to a greater willingness to trust others. From a global perspective, the high level of Estonian education is reflected in indicators of scientific impact, and it is notable that Estonia ranks among the five most successful countries in the world in terms of citation rates of research articles. Estonia's strong performance in international PISA comparisons is also widely recognised. However, global recognition of pupils' achievements also compels discussion of the other side of this success story – burnout, discouragement, anger and other negative emotions and conditions experienced by nearly all participants in the education system. The chapter outlines several ways in which plans could – and should – be shaped to ensure that high performance does not come at the cost of joy in learning within a free and intelligent society.

A positive perspective on educational outcomes is offered in the article by Kirsti Melesk and Märt Masso, which notes that in recent years some progress has been made in reducing inequalities between population groups in adult education.

Several contributions in the first chapter stress that the aim of education is to teach the art of being human. At the same time, the importance of critical thinking and factual knowledge cannot be underestimated. If we assume that artificial

intelligence can fully replace these functions, we risk reaching a dead end: while AI may serve as a useful tool, human intellect remains central to forming a coherent and comprehensive understanding.

The same conclusion emerged during the preparation of this chapter's introduction, when we asked ChatGPT to use the Sketch Engine language analysis tool to compile a list of the words most frequently co-occurring with the term 'haridus' ('education'). Comparing the two analyses – one based on corpus data generated by specialist software (see Figure 1.0.1) and the other produced by AI – showed that the latter did not include the adjective good. When asked why this word was absent from the list of frequent collocates, the AI responded that good was so self-evident in connection with education that it did not register as a distinctive co-occurrence.

This response leaves an open question: Was the AI mistaken, or was it in fact correct? The chapter explores this and other related questions.

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1.1

The foundations of education: Human capital, strong institutions and the will to pursue education

Jüri Allik and Maaja Vadi

KEY MESSAGES

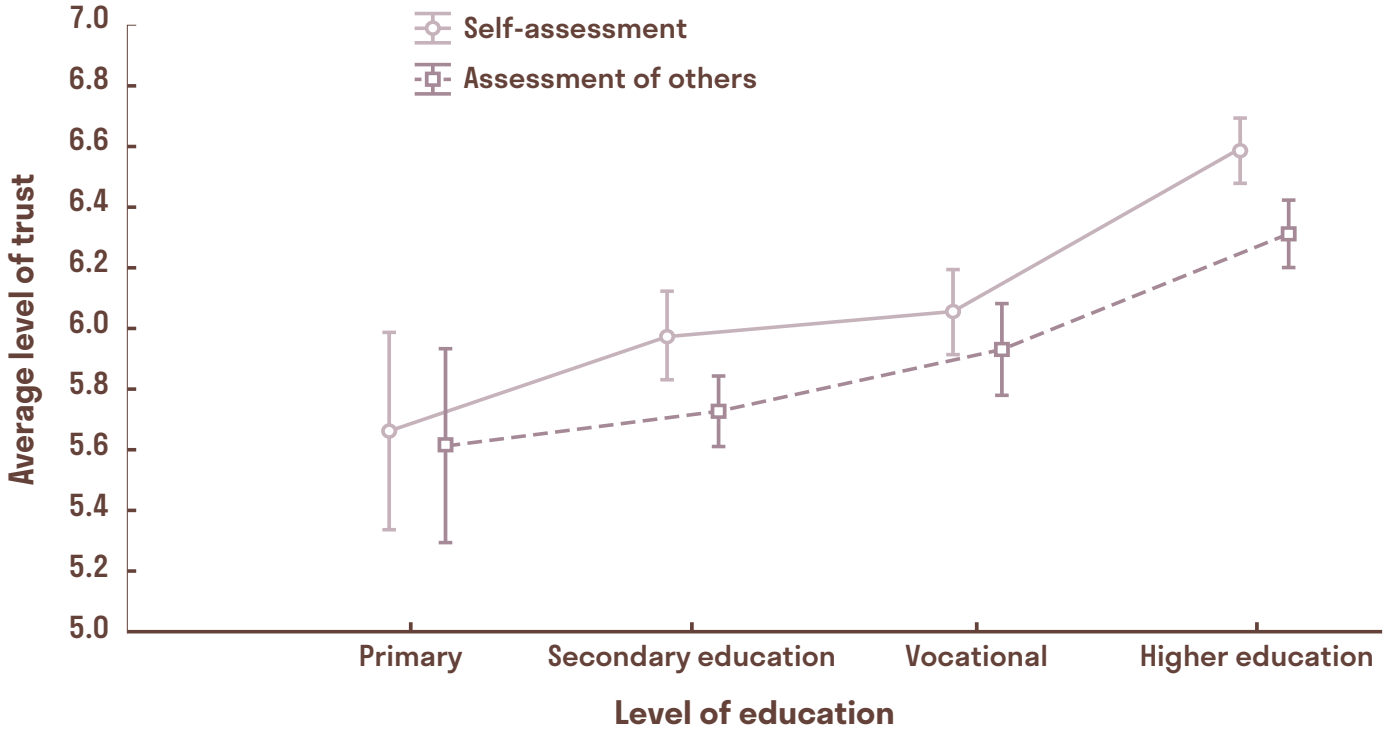
- The will to pursue education reflects a society's values and its commitment to invest in education.
- A strong correlation exists between a nation's economic prosperity and the average intelligence score of its population.
- The substance of education is shaped not only by formal schooling but also by the experiences of everyday life.

INTRODUCTION

Education is the sum of knowledge, skills, competencies, attitudes and behavioural norms that a person acquires over a lifetime, including through formal learning in educational institutions. However, education can also be seen as the capacity to shape a better world. Better educated people tend to experience fewer social frictions; they are more likely to trust others. This relationship between education and trust is illustrated by a study conducted by the Estonian Biobank at the University of Tartu (Figure 1.1.1).

The relationship between trust and education level indicates that, beyond preparing individuals for specific occupations, a key function of education may be to cultivate democratic culture

Figure 1.1.1 Relationship between trust and level of education



SOURCE: figure by the authors

NOTE. The figure shows the average level of trust by educational attainment. Presented side by side are respondents' self-assessments ('self-rating') and the assessments made by another person who knows them well ('other rating'). Respondents were asked, 'Generally speaking, would you say that most people can be trusted?' The person who knows the respondent well was asked whether, in their opinion, the respondent believes that most people can be trusted. Answers were given on an eleven-point scale from zero ('Not at all') to ten ('Completely agree'). Data was collected from 3,345 gene donors (average age 46.5 years). The results indicate that trust increases with higher levels of education, both in respondents' own assessments and in those made by others who know them well. There is also a high degree of agreement between the two assessments (correlation coefficient r = 0.34).

and a sense of citizenship. A strong argument can be made in favour of education: it enhances a person's skills and knowledge, which in turn improve well-being.[1] When skill-based measures of knowledge capital are taken into account, the explanatory power of long-term economic growth models increases to three quarters. Models that omit skills explain only one quarter of growth.[2] Education thus builds individuals' knowledge and skills and is directly linked to both individual well-being and national economic growth.

In what follows, we explore how, in Estonian society, the will to pursue education has inspired motivation to study, how knowledge and skills have created potential, and how supporting institutions have enabled that potential to be realised.

THE WILL TO PURSUE EDUCATION: A READINESS TO INVEST IN EDUCATION ROOTED IN SOCIETY'S CORE VALUES

The will to pursue education is a driving force – a locomotive of progress – as education remains deeply embedded in Estonia's value system and is seen as a pursuit worthy of sustained effort. A historical example is the fundraising campaign for the Estonian Alexander School – a nationwide initiative to establish an advanced Estonian-language school – which by 1888 had collected 100,000 roubles in voluntary donations. Throughout Estonian history, education has been a vital tool of self-determination and advancement. In the most difficult times, a good education was regarded as both a hallmark of national culture[3]

and a testament to the deeply held belief that knowledge is essential for success.[4]

The importance attached to education in Estonia is reflected in the fact that educational expenditure exceeds the European Union average by about one quarter and is higher than in most member states, ranking below only Sweden and Belgium. Moreover, the share of education expenditure in Estonia's total government spending is the highest in the European Union, exceeding the EU average by 50%, which demonstrates a long-term commitment to funding education. Estonia's education spending has remained relatively stable, consistently standing 20–30% above the average.[5]

The will to pursue education can also be shaped by compulsion. In 1965, the Soviet Union introduced compulsory eight-year schooling. By 1960, a policy of mass secondary education had been adopted, and by 1980, 99% of 18-year-olds had completed secondary education.[6] Completion of compulsory schooling, or basic education between the ages of 7 and 18, serves as one indicator of the will to pursue education. According to a 2001 audit by the Estonian National Audit Office, 98.4% of children in Estonia with normal intellectual ability met the compulsory education requirement. In the 2023/24 academic year, 94.7% of lower secondary graduates continued their studies.[7] Among Estonia's 25–54-year-old population, 46% have completed secondary education – slightly above the EU average of 43.4%[8] – indicating a willingness to pursue education beyond the compulsory level, although the share remains notably lower than in Slovakia, the Czech Republic, Croatia and Poland.

Education holds both symbolic and practical value. For many people, higher education is important not only for expanding professional opportunities but also as a means of self-realisation and social recognition. Completing a university degree is often associated with self-esteem and social status. Parents, too, take pride in their children's achievements. For the older generations, supporting education is both a duty and a means of ensuring a secure future for their children and grandchildren, while younger generations see it as a path to a broader worldview and a stronger career.

Perhaps the clearest expression of Estonia's will to pursue education is reflected in the quality of its universities. Admission remains competitive in many fields, and the most reliable indicator of university quality is research performance. Comparing countries by scientific impact or research performance, measured by the average number of citations received per published article, Estonia ranks among the five most successful nations in the world.[9] Notably, Estonia's strong position in science has not been achieved through exceptional performance in a single discipline, but through a consistently high level of development across all fields of research.[10]

NATIONAL WEALTH AND THE AVERAGE INTELLIGENCE SCORE OF THE POPULATION

One of the cornerstones of education is human capital – people's abilities, skills and knowledge. Studies of human capital drive educational innovation by identifying the key points where resources need to be adjusted or processes restructured. As early as the 1930s, Estonian education leaders set out to study the intellectual abilities of Estonian children and to reform the education system accordingly. School director Juhan Tork was assigned to measure children's intelligence, completing the task with distinction and defending his doctoral dissertation, *The Intelligence of Estonian Children*, in 1939.[11] Tork's conclusions were encouraging because his results showed that Estonian children's cognitive abilities matched, and in some areas even exceeded, those of their peers in the United States and the United Kingdom.

Researchers studying cognitive abilities noticed more than half a century ago that the average scores on the same intelligence tests tended to increase over time across countries – a trend later termed the Flynn effect.[12] Because all the original test sheets from Tork's study had been preserved in the archives, Olev Must was able to repeat the same test with Estonian children of the same age 63 years later.[13] The results showed that although contemporary children perform less well in mental arithmetic, they were more adept at solving logical problems, and overall there was

no significant improvement in scores over the half century.

The Second World War and subsequent Soviet occupation brought several adverse demographic processes, making it important to reassess the cognitive abilities of modern Estonians. This question was addressed in a study by Helle Pullmann,[14] which found that although the developmental trajectories of cognitive abilities differ across Estonia, Iceland and the United Kingdom, by around age 14 Estonian children are as capable as, or even more capable than, their peers in those countries.[15]

One might assume that it hardly matters that, for nearly a century, the mental abilities of Estonian children have matched those of children in advanced Western societies. Yet this helps to explain why Estonian pupils perform so well in international PISA assessments.[16] The link is not surprising, as national average intelligence scores are strongly and directly correlated with mean results in education studies such as PISA, TIMSS and PIRLS.[17] Although the interpretation of these results has been debated, the underlying fact remains: there is a very strong correlation between a nation's economic prosperity and the average intelligence score of its population.[18] No highly prosperous country has citizens with consistently low cognitive ability. Researchers agree that the growth of modern economies depends less on geography or natural resources than on the twin engines of technological development and human capital, the latter encompassing people's ability to use new technologies effectively.

EDUCATION IS SHAPED BOTH BY FORMAL SCHOOL AND BY LIFE EXPERIENCES

An important question for the school as an institution is the pupil–teacher ratio, or the number of pupils a teacher must manage. Estonia's Basic Schools and Upper Secondary Schools Act sets the upper limit for class size in basic school at 24 pupils, which may be increased by decision of the school's governing body. Existing data show that excessively large classes lead to a moderate decline in academic performance.[19] Evidence indicates that when the pupil–teacher ratio is reduced from 1:30 to 1:25, the return on education rises by 0.4 percentage points.[20] However, there is no evidence that 1:24 is an optimal ratio. International data suggest that the negative impact of class size is mainly observed in countries where teachers' salaries are low and the quality of education is poor.[21] There is also evidence that school quality – including pupil–teacher ratios and average teacher pay – affects learning outcomes, at least in large countries such as the United States.[22] Overall, class size has an impact on academic performance, but the optimal number of pupils per class depends to a large extent on teacher salaries and the overall quality of education.

Formal education institutions play a central role in learning. However, pupils' academic outcomes, such as PISA test scores, cannot be attributed solely to the school system, teachers and curricula. When the 2016 PISA results placed Estonian pupils among the world's top performers, representatives of the Ministry of Education and Research interpreted this as proof of the strength and equal accessibility of Estonian education.[23] The same interpretation was repeated after the publication of the 2018 results, which were presented as a major achievement of Estonia's education system.[24] Foreign observers have echoed this view to varying degrees.[25] Unfortunately, this interpretation is not well supported by evidence.[26] The limitation lies in the fact that Estonian pupils' high performance depends on several factors, among which the quality of formal education institutions is certainly important but not the sole determinant.

The establishment of formal education institutions does not diminish the role of other institutions; on the contrary, it raises expectations of them. Parents are expected to prepare their children for school by, for example, teaching them the alphabet. It is also assumed that part of schoolwork is done at home. Education obtained outside formal institutions – through the family, peers or practical experience – is often referred to as the 'school of life'.

For example, a comparative study of pupils' academic success in 31 countries[27] found that academic achievement was higher in countries where children had larger home libraries. Estonian

children had, on average, 218 books at home, compared with the international average of 160. Naturally, the number of books – many of which the children may never have read – does not in itself make them more intelligent, but it does likely reflect the activities and values practised in their homes. This also serves as a reminder that correlation does not imply causation. Nevertheless, there is no reason for pessimism: in complex systems where everything is interconnected, identifying clear causal links is rarely possible.

When comparing the impact of school type – so-called elite schools versus ordinary schools – on Estonian pupils' PISA results, any difference disappears once parents' education and household wealth are taken into account.[28] However, the question of whether Estonia's 28 state secondary schools provide a better education than other schools still requires further research.

The 'school of life' can encompass work experience, social learning, community knowledge and cultural practices that impart skills and understanding. For example, in the case of sex education, informal learning often runs ahead of the official school curriculum. Peeter Tulviste examined how schooling shapes thought, showing that the transition from everyday to scientific reasoning occurs primarily at school.[29] Compared with the traditional societies he examined during his expeditions, many of the functions once performed by schools have now been assumed by families. It is now common for children to learn to read, or at least to recognise letters, before starting school, whether in kindergarten or at home. Whereas once a child encountered scientific concepts only after entering school, the growing complexity of life has brought such exposure earlier.

Too often, the quality or shortcomings of education are assessed narrowly through practical outcomes – for example, by noting a shortage of vocational schools producing welders or crane operators with sufficient skills. What critics of this situation often fail to recognise is that a narrow focus on occupational training would limit the broader educational mission. The aim here has been to show that education has wider functions whose importance for both society and the individual far exceeds that of specific occupational skills or competencies. Employers must accept that the existence of schools will never absolve them of educational responsibilities and that many practical skills and forms of knowledge are best acquired through work itself.

SUMMARY

Discussions of education often focus solely on educational institutions, the people working within them and the activities they undertake. This article emphasises the need for a broader perspective, as no educational institution can function without learners' will to pursue education and the ability to acquire knowledge. Generations of Estonians have shared the understanding that education matters and that it is a national value. Just as the will to defend the country is not only about weapons but also about people's determination to use them in the face of foreign aggression, the will to pursue education determines how strongly people wish to pursue education, whether through formal study or independently.

History has shown that the will to pursue education has helped the nation grow intellectually and culturally even in difficult times. Estonia has invested more in education than many other European countries, and its education expenditure exceeds the European Union average. Higher education is valued not only for its professional benefits but also for its contribution to personal development and social standing.

The development of educational quality is closely linked to human capital – the intellectual potential and skills that form the basis for economic and societal progress. While celebrating Estonian pupils' strong PISA results is entirely justified, it is too often forgotten that their success also depends on inherited and home-acquired abilities, skills and knowledge, without which such achievements would not be possible. It is essential that education not be limited to teaching vocational skills but also foster broader personal and social values.

The foundations of education – human capital, institutions and the will to pursue education – form the bedrock on which a successful and

sustainable society is built. All three must work in harmony for education to function and develop. The will to pursue education is the path that leads into the landscape of knowledge, human capital is the intellectual force that drives each step forward, and strong institutions are the bridges that support and guide the educational journey.

REFLECTION

Tõnis Lukas

The article's conclusion states that 'the will to pursue an education determines how strongly people wish to pursue education, whether through formal study or independently'. Estonians' success in international comparisons has long been grounded in the age-old wisdom that one studies not for the teacher but for oneself. It is well known that Estonians value personal effort – for example, in learning foreign languages. By contrast, many newcomers explain their lack of Estonian skills by saying that no one has taught them. This is a matter of willingness and unwillingness to pursue education.

When passing this culture of determination or will on to younger generations, we must set higher expectations. Since the time of Johannes Käis, Estonian pedagogy has recognised that education is best acquired through diverse activities that consider pupils' interests. Ülo Vooglaid has likewise emphasised that most knowledge and skills are acquired outside school – such as from family, friends, hobbies and the media. The aim of Estonia's education system should be to integrate the 'school of life' with the formal school curriculum into a coherent whole that supports pupils' development. At the same time, a child's daily journey to and from school should not become so long that it shapes the child more than family and school together are able to do.

The conclusion also notes: 'It is essential that education not be limited to teaching vocational skills but also foster broader personal and social values.' Only those who understand how knowledge is interconnected can build a cohesive society, for they see the bigger picture that narrow specialists often cannot. This stands in contrast to the demands of employers, who are calling for more specialists graduating from vocational and higher education institutions, and fast. Yet if social cohesion is lost, the resulting divisions could undermine the very progress hoped for from technological and economic development.

The article's essence is captured in the statement: 'The will to pursue education is the path that leads into the landscape of knowledge, human capital is the intellectual force that drives each step forward, and strong institutions are the bridges that support and guide the educational journey.' The will to learn arises from social attitudes and role models that have valued education for generations. Estonia's human capital is strong, yet its density has been shaped by history and will continue to be so. The nation lost much of its human capital, intellectual foundation and strong initiators during and after the Second World War. This weakened the gene pool and deprived the country of leaders, while institutions also suffered due to a shortage of inspiring academic successors. Our task now is to focus on ensuring a new generation of teachers and academics sufficient to sustain and renew a high-level Estonian-language cultural and economic sphere. This requires competitive master's scholarships and junior researcher salaries during doctoral studies to encourage young Estonians to continue along this path. The best foreign students should likewise be given the opportunity to envision their future in Estonia, which entails learning the Estonian language. Without renewal, the entire education system will stagnate, human capital will migrate abroad, and in the long run, the loss of leading minds will erode the nation's overall will to pursue education.

When a talented pupil leaves immediately after secondary school, their connection with Estonia may weaken, along with their motivation to return. We should reassure young people that Estonia's universities, applied higher education institutions and vocational schools offer education of a sufficiently high standard to continue their studies here. Later on, there will still be ample opportunities to refine their knowledge abroad, either as exchange students or as candidates for academic degrees. This way, after their years spent abroad, they are more likely to return and contribute to Estonian society, helping to preserve the Estonian-language educational and cultural sphere.



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1.2

Education at a turning point: The old system is crumbling, a new one is still emerging

Eneli Kindsiko, Maaja Vadi and Urmo Uiboleht

KEY MESSAGES

- Education is at a turning point and is searching for new meaning.
- A metrics-driven system may no longer function adequately in today's world.
- The art of being human must stand at the heart of education.

A NEW ERA, OLD ANSWERS? EDUCATION REQUIRES A PARADIGM SHIFT

From time to time, education arrives at a point where long-established ways of thinking and acting no longer work, while new solutions have yet to take shape. Such situations are described as anomalies, signalling that existing explanations or methods can no longer adequately make sense of the new reality. In education, as elsewhere, these situations can be understood through the theory of scientific revolutions proposed by philosopher Thomas Kuhn.[1] According to Kuhn, fundamental changes in science occur when the prevailing worldview, or paradigm, can no longer address new problems and is replaced.

The same applies to education. When old ways of thinking no longer help us understand the world or solve problems, they must be replaced by new ones. A paradigm is not merely an agreement or convention; it shapes how we think, teach and act. When problems (anomalies) grow too numerous and too deep, the existing way of thinking loses its validity. Estonian education today stands precisely at such a turning point. Contradictions are mounting, familiar solutions no longer work – clear signs that the old paradigm is in need of renewal. What is more, anomalies no longer appear in isolation but accumulate and amplify

one another. As a result, crises in education are becoming increasingly frequent. Let us look at a few examples to illustrate this trend.

ANOMALY 1. Work patterns have changed, but education has not caught up. The linear model of a lifelong career is disappearing. New generations are no longer drawn to the idea of a single job or lifelong occupation.[2] In fact, many young people do not know where they will be working a year from now, let alone ten years ahead. Research shows that they face a future of frequent job changes, where career shifts are the norm rather than the exception.[3] Physical location is no longer a limitation, as remote work – including spending several months abroad – is a growing trend.

This new work culture does not fit easily with the rigid logic of the old educational paradigm. The education system still assumes stability and long-term commitment. Teaching, whether in schools or universities, has traditionally been seen as a lifelong vocation within a career model based on long service. However, today's work ethic places greater value on flexibility, self-realisation and personal growth than on status or job security.

Educational institutions therefore face a major challenge: how to attract and retain competent teachers in a world where expectations of working life have fundamentally changed?

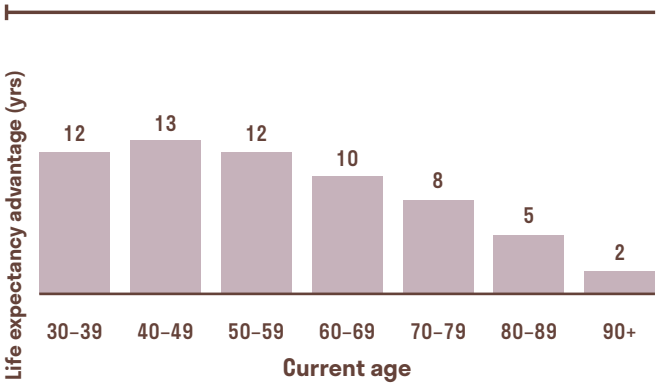
ANOMALY 2. Pupils of the digital age and 'pre-internet' teachers live in different worlds. There has probably never been a greater gap between teachers and pupils in how they consume information. Teachers from the pre-internet generation now face young people who have grown up with smart devices and artificial intelligence. Their knowledge, habits and expectations have developed in a world where information is constantly and universally available. Pupils no longer need the teacher as their sole source of knowledge. With the help of AI, they can find answers to their questions at an early age – often faster and in more varied ways than a teacher can offer. How should we teach children who are already using AI in kindergarten to seek answers to their questions? How should we teach mathematics to pupils who, through AI, can discover seven different ways to solve the same problem – while their teacher demonstrates just one on the classroom board?

Technical adaptation alone (for example, using digital tools) is not enough. What is needed is a deeper understanding of how children think and learn when their cognitive processes are shaped by smart technology and AI. The challenge is compounded by the fact that these two generations may not share the same world of meaning. Teachers and pupils may exist in parallel realities, where their ways of consuming information, their values and their understanding of knowledge do not align. This raises a central question: should education adapt to the logic of the new generation – and if so, how?

ANOMALY 3. The education labour market seeks young people, yet age brings advantages. Education policy discussions tend to focus on the shortage of young teachers, but one striking exception often goes unnoticed – the exceptionally long working lives and life expectancy of teachers and lecturers. Studies in the United States show that male teachers live on average to 88 and female teachers to 90 – longer than most public-sector employees.[4] Similar patterns appear in the Netherlands, where male teachers live to 83 and female teachers to 88.[5]

In Estonia, too, teachers and academics have a significantly higher life expectancy than other occupational groups (see Figure 1.2.1).

Figure 1.2.1 Life expectancy of teachers and lecturers compared with other occupations, by age group



SOURCE: figure by the authors based on Statistics Estonia calculations

The largest difference occurs among 40–49-year-olds, who have an average life expectancy 13 years higher than that of other occupations. A positive difference remains even in older age groups: five years among those aged 80–89 and two years among those aged 90 and over.

Even more significant is the fact that teachers often remain professionally active to an advanced age. Educational work, with its cognitive demands and high degree of autonomy, enables people to maintain their working capacity well beyond retirement age. This makes education one of the few fields where working in later life is not only possible but also desirable. However, this potential has largely gone unrecognised. In the past, the high average age of teachers drew little attention because labour shortages were less acute. Now that the shortage of teachers has become systemic, those who have reached pension age have become indispensable contributors – yet they are still not regarded as a strategic resource.

This is an anomaly: although the very nature of teaching allows for a longer working life than almost any other profession, the education system remains primarily oriented towards recruiting young people. The issue is not whether teachers should retire – of course they have that right – but whether we know how to value those who wish to continue contributing beyond official retirement age. With population ageing, education could set an example for other sectors by showing how to use the experience and potential of older workers wisely.

ANOMALY 4. The education system is shaped by many voices that are not always in harmony. The education system is both exhausted and pressured by a constant cacophony of interest groups, each voicing its own expectations and demands. Within educational institutions, dozens of actors exert influence: teachers, school leaders, parents, support specialists, school owners, alumni, the media, employers, policymakers, education researchers, communities and international networks. All have their own views and expectations regarding what constitutes good education – and all seek to make their voices heard.

This situation is no accident. Education is a complex system – a living organism shaped by the continual interaction of its parts. Such a system can remain stable even amid change, but sometimes a small shift can lead to vastly different outcomes. Therefore, education cannot be understood by listening only to teachers and pupils; it is also influenced by parents, school owners, officials and even the media, which as a driver of public attention often has a more decisive role than formal decision-making power.

The strength of stakeholder influence depends on three main factors:[6]

- Need for attention: how quickly and forcefully does the group make its position known? For example, parents have become increasingly demanding, expecting teachers and schools to maintain a work culture of constant availability.
- Impact: how much substantive influence can the group exert? School owners make decisions, but the media can shape public opinion and political pressure.
- Legitimacy: to what extent do groups have the legal or institutional authority to intervene in education governance? School owners do; the media do not – yet the media's role in steering public debate remains considerable.

In sum, the education system is shaped by many voices that are not always in harmony. The anomaly lies in the fact that numerous, often conflicting forces steer the system simultaneously, without a clear framework of accountability or governance. The result is constant tension: who should decide what constitutes 'good' education, and whose voice should ultimately prevail?

ANOMALY 5. Mental well-being as a mirror of systemic strain. The social environment of education is dense, and it remains healthy only up to a limit.[7] Teachers and school leaders must manage a vast number of daily social interactions, which makes it extremely difficult to ensure both personal attention and inclusion. For example, in a kindergarten group with 20 children and one teacher, there are at least 210 potential interaction moments each day. When parents and colleagues

are added, that number multiplies. The situation is even more complex in schools: a teacher with a class of 24 pupils and 21 contact lessons per week engages in hundreds of interactions each lesson and thousands over the course of a week. Such work requires not only pedagogical skills but also exceptional social intelligence and emotional resilience.

Leadership theory suggests that an effective team size for one manager is 5–15 people, which allows genuine support for each team member.[8] However, Estonian school leaders face a very different reality. In the 2023/24 academic year, 25 schools in Estonia had over 1,000 pupils, totalling nearly 31,537 children, or 19% of all pupils in general education. The principal of such a school is directly or indirectly responsible for more than 3,000 people, including more than 1,000 pupils, 2,000 parents, and numerous support and teaching staff. Unlike large enterprises, large schools do not have dedicated departments for finance, human resources and marketing to help manage this complexity.

How loud is the social environment of our schools? High noise levels (over 80 dB) impair concentration and hinder learning, directly affecting the quality of learning outcomes.[9]

- In classrooms, noise levels typically range from 60–65 dB but can rise to 80 dB.[10]
- In corridors during breaks, levels often exceed 80 dB.[11]
- In kindergartens, when two children argue over a toy, the noise can reach 80 dB.[12]
- In school canteens during lunch breaks, the level can rise to as high as 100 dB.[13]

For comparison:
100 dB – tractor
90 dB – lawnmower
80 dB – blender or hairdryer
70 dB – busy street
60 dB – normal conversation

Educators' working environment and the organisation of their work have a direct impact on their mental well-being and carry growing risks. A 2023 study by the Foresight Centre found that teachers are increasingly motivated not primarily by pay but by a supportive work culture.[14] This reflects a wider labour market trend – people are ten times more likely to leave a toxic workplace than one that simply offers lower pay.[15]

Mental health issues affect not only adults. The 2023 Estonian Human Development Report, which focused on mental health,[16] revealed that the well-being of Estonian lower secondary school pupils ranks among the lowest in Europe.[17] Half of all mental health problems begin before the age of 14 – that is, during school years.[18] This makes the school environment a critical factor in the nation's overall mental health. The issue is not only workload but also systemic preparedness: have we created conditions that enable educators to care for their own mental well-being? If a teacher cannot first 'put on their own oxygen mask', they cannot effectively support others. Perhaps the growing strain on well-being and mental health is the strongest signal yet that the old, metrics-centred educational paradigm no longer works – and that the need for a more humanistic, person-centred approach is becoming increasingly urgent.

A PARADIGM SHIFT: THE AGE OF METRICS AND RANKINGS IS COMING TO AN END

For decades, Estonia's education system has been shaped by a neoliberal paradigm that prioritises performance, standardisation, competition and cost efficiency. It is a system where metrics determine value – whether applied to pupils, teachers or researchers.

The funding of educational institutions often depends on the number of pupils or other indicators related to the school or learner. Results in international assessments such as the OECD's PISA and PIAAC programmes, along with global rankings, have become the calling card of Estonian education. Meanwhile, the media and parents rank schools according to examination results. Each spring, especially in larger cities, competition intensifies as families seek places in the most sought-after schools, creating

considerable pressure around admissions to both primary and upper secondary education.

The same metric-centred logic extends to higher education and research. The number of academic articles, the volume of research grants and the h-index determine whether an academic retains their position. In the Estonian Research Information System, only publications classified in categories 1.1 or 3.1 are recognised as relevant. Lower-category publications written in Estonian may go unrecognised despite their substantive merit. Metrics do not consider for whom or for what purpose research is conducted.

The culture of metrics not only affects content but also fuels increasing bureaucracy. From kindergarten to university, teachers and lecturers find themselves completing reports and applications, often spending more time on paperwork than on teaching, learning or research. Each new performance indicator brings with it another layer of reporting, consuming educators' time and energy.

This pattern was already described in the 1990s by sociologist George Ritzer[19] as McDonaldization – a process through which social institutions, including education, come to resemble the fast-food industry: efficient, predictable, standardised and tightly controlled. The result is that vital themes – well-being, equality, non-formal education or the societal impact of research – are frequently sidelined simply because they are difficult to measure.

A paradigm determines which problems are seen as solvable in the first place. We have now reached a paradigmatic turning point: old and new conceptions of good education coexist side by side. The question is not whether the old will vanish but which new paradigm will take the lead: can a humanist, person-centred and value-based approach finally shift the system's focus to the individual, to learning and to growth?

A NEW PARADIGM: PLACING THE ART OF BEING HUMAN AT THE HEART OF EDUCATION

The old educational paradigm is grounded in the belief that a well-functioning system produces measurable, high-level results (Table 1.2.1). The new, humanistic approach instead places the person as a whole at the centre: the goal of education is not merely to transmit knowledge but to cultivate the attitudes and skills needed for life – self-belief, resilience, adaptability and a sense of meaning. Education should nurture not only capable performers but also individuals who can adapt, make sense of their journey and remain true to themselves amid constant change.

The neoliberal mindset viewed school as a preparatory workshop for the labour market, but today's world of work evolves faster than education can respond. According to the World Economic Forum, creativity, social skills, analytical thinking and lifelong learning are becoming increasingly important – qualities that cannot be taught through facts alone.[20] The future demands that people be ready to learn for jobs and roles that do not yet exist.

Education can therefore no longer focus on fixed solutions or standardised competencies. The question 'Why is education important?' invites everyone involved – teachers, learners and leaders – to reconsider their roles and purpose. This brings to the forefront deeper questions: what and why do we teach at all? What helps shape a person capable of navigating both their inner world and an ever more complex world? It also requires the ability to let go – not only of outdated content but sometimes of our own role identity. In this sense, learning to learn always requires learning to forget. Perhaps the ones who need to learn forgetting first are not the pupils, but the teachers – and the system itself.

Table 1.2.1 Neoliberal and humanistic paradigms

The neoliberal paradigm prioritises metrics and rankings	The humanist paradigm prioritises the art of being human
Purpose of education: outcome-based education focused on economic benefit and labour market needs.	**Purpose of education:** education as a process of self-development and lifelong learning, emphasising meaning and personal growth.
Focus of teaching and learning: standardised curricula, metrics, tests and examinations determine learning outcomes.	**Focus of teaching and learning:** an adaptive learning environment that supports individual development, inner motivation and curiosity.
Role of teacher and learner: the teacher is a transmitter of knowledge; the pupil is an achiever adapting to the system.	**Role of teacher and learner:** the teacher is a mentor and guide; the pupil is an active participant creating their own personal worldview.
Measurement and assessment: focused on quantitative indicators, such as test results, school rankings and number of scientific publications.	**Measurement and assessment:** evaluates the learner's comprehensive development, including social and emotional skills and creativity.
Preparation for the future and societal impact: prepares for the labour market and competition, promoting efficiency and economic success.	**Preparation for the future and societal impact:** supports critical thinking, creativity, adaptability and the ability to lead a meaningful life.

SOURCE: table by the authors

SUMMARY

A paradigm shift occurs when old ways of thinking can no longer explain or sustain a new reality. In education, this means that established practices no longer meet today's societal needs and are not fit for the future. The transition from one paradigm to another is never smooth – it brings contradictions, value conflicts and clashes of understanding. This tension is clearly visible in Estonian education today: teachers are protesting, parents are challenging school decisions in court, universities are struggling to secure new generations of Estonian-speaking academics, and researchers are caught between two expectations: to serve society while remaining internationally measurable.

Estonia's education system is approaching change at varying speeds – some institutions are already experimenting with the new, while others still cling to the old. Yet a shared understanding is becoming increasingly evident: things cannot continue as before. The foundation of future-proof education lies not in ready-made solutions but in the willingness to ask essential questions and make decisions that look beyond today's needs – towards those who are only just beginning their educational journey.

REFLECTION

Aune Valk

The neoliberal, competition-driven educational paradigm that prioritises grades, rankings and standardisation is fading. The old system was built on the assumption of a stable and uniform labour market, an assumption that no longer holds in a changing world. This helps explain the tensions and dissatisfaction visible across the education system, despite its strong performance indicators. To understand and give direction to the need for change, we must return to fundamental questions: Why does education matter, what is learning, and what should be learned? A central theme in this period of transformation is the art of being human – the capacity to live with awareness, balance and purpose, in harmony with both one's inner needs and the surrounding world.

Examining and critically evaluating different educational approaches. Society and education evolve hand in hand. While education can drive certain social changes, it cannot depart too far from society itself. Estonia's education landscape is diverse: it includes competitive elite schools focused on national exam rankings as well as smaller (often private) schools that emphasise human relationships and personal growth through distinctive methods. If uniformity can be seen as a weakness of the old system, the comprehensive school model, with its shared standards, is also a strength – it sets high expectations for all children by default. To gauge society's readiness for change and assess its potential benefits and risks, the functioning and performance of different school types and educational approaches must be studied.

'Undermining' the neoliberal education system using humanist indicators. Greater attention should be given to developing and communicating indicators that measure well-being, the development of future-oriented skills and balanced life outcomes. Initially, these new indicators could be applied in familiar ways – for example, by replacing exam-based school rankings with well-being rankings. Ultimately, however, they should serve a different purpose: to provide feedback to learners, support personalised learning, guide the development of teaching methods and the education system as a whole, and advance related aims.

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1.3

Seven opportunities for developing Estonian education exports

Eero Loonurm and Heli Aru-Chabilan

KEY MESSAGES

- Estonia's education system enjoys a strong international reputation, but its export potential remains only partly realised.
- Beyond their academic contribution, international students support the Estonian economy through living expenditure and labour taxes, making education a revenue-generating export sector.
- Expanding opportunities to learn Estonian would enable more international students to remain in the country after graduation and help address labour shortages. International alumni also constitute a valuable resource for promoting Estonia abroad and strengthening economic ties.
- Estonia's educational expertise could be developed more strategically and exported as an internationally competitive service.
- Education exports could encompass a wide range of services and products with far-reaching impact.

INTRODUCTION

As a globally expanding sector, education could become a much more significant export for Estonia. According to United Nations data, 256 million students were enrolled in higher education institutions worldwide in 2022.[1] The number studying outside their home country tripled between 2000 and 2021, rising from 2.1 million to 6.4 million globally. This article examines education as a potential source of export revenue and considers its wider economic and societal impact.

A high-quality education system has become one of the three defining features for which Estonia is recognised internationally.[2] Interest comes from a wide range of countries, including Germany, South Korea, Spain, the United Kingdom and the United States; representatives from South America and Africa are also increasingly frequent visitors.[3] Interest has increased markedly over the years. Numerous educational institutions, the Ministry of Education and Research, and Education Estonia at the Education and Youth Board are involved in hosting delegations and developing cooperation.

Estonian universities and applied higher education institutions are integrated into global education networks and offer internationally competitive programmes. This provides a strong foundation for exporting Estonian higher education, although its full potential has yet to be realised. Over the past 15 years, the national Study in Estonia initiative, implemented in cooperation with higher education institutions, has promoted study opportunities in Estonia. During this period, the number of international degree students enrolled in Estonian higher education institutions has increased more than fourfold, from 908 in 2009 to 3,954 in 2024.[4]

The export of education extends beyond higher education programmes and international students studying in Estonia. In recent years, hundreds of delegations have visited the country to learn about its education system. Responding to this interest already generates additional income for schools. At the same time, it is worth considering whether the expertise of Estonian education professionals could be more systematically developed into exportable services and marketed strategically to increase revenue. Finland's experience offers a useful comparison, as it began pursuing education exports some 15 years ago.

What is the export potential of Estonian education, and how should Estonia position itself strategically in global competition? The following sections identify seven areas with potential for developing education exports.

THE ECONOMIC POTENTIAL OF INTERNATIONAL STUDENTS: FROM INVESTMENT TO ECONOMIC DRIVER

Data from the Organisation for Economic Co-operation and Development (OECD) indicate steady growth in the export of education-related services across most OECD countries.[5] These export figures include international students' spending on tuition fees, food, accommodation, local transport and healthcare. Expenditure by international students, and the corresponding total revenues of OECD countries, increased from €50 billion in 2010 to more than €115 billion in 2019. According to a global forecast by HolonIQ, by 2030 some 9 million students will be studying abroad, with annual spending exceeding US$500 billion.[6]

According to 2024 data from NAFSA, the Association of International Educators in the United States, the 1.1 million international students enrolled in US colleges and universities contributed US$43.8 billion to the US economy during the 2023/2024 academic year and supported more than 378,000 jobs. On average, three international students support one job in the United States.[7] Data from France show that in 2021 international students spent €461 million on transport, while visiting relatives and friends spent an additional €393 million.[8] Both studies underline that the presence of international students is economically valued, as their monthly expenditure flows directly into the host country's economy.

International students in Estonia likewise make a substantial economic contribution through tuition fees and everyday spending. According to an OECD study, Estonia's export of education services attributable to international student expenditure increased from €12 million in 2010 to €58 million in 2019.[9] The International Student Barometer[10] found that international students in Estonia spent on average €250 per month on housing and around €300 per month on daily activities, including food and domestic travel. During the 2023/2024 academic year, the 2,558 Erasmus+ exchange students studying in Estonia contributed at least €3.8 million to the economy.[11] Estonia's universities and applied

higher education institutions thus function as economic drivers whose impact extends beyond the education sector. Students are also regarded as an important target group for the tourism sector, as earlier studies have shown.[12]

According to Haridussilm, public expenditure per student in higher education amounted to €6,096 in 2020. Based on this figure, the annual spending of international students on housing and daily living expenses alone is sufficient to cover the state's investment per student.[13] When income and social taxes paid by international students participating in the Estonian labour market, tuition fees and visits by family members are also taken into account, public investment can be estimated to be recouped at roughly one and a half times its value.

THE POTENTIAL FOR PRESERVING THE ESTONIAN LANGUAGE: LIMITED PROFICIENCY RESTRICTS OPPORTUNITIES

In the 2018/2019 academic year, 156 international students were enrolled in Estonian-language programmes in applied higher education and integrated bachelor's and master's programmes in Estonia. Two years later the number had risen to 194, and by the 2024/2025 academic year to 225.[14] In addition, a number of doctoral candidates study in Estonian, although their exact number is difficult to determine.

The number of students studying in Estonian could be considerably higher. Each additional foreign national who acquires proficiency in Estonian represents both a cultural and an economic gain. Several countries have successfully implemented language policies that integrate language instruction with higher education. Spain and Germany provide notable examples, offering language courses through their international cultural institutes and directing learners towards universities in their respective countries. The Goethe-Institut offers German language courses that prepare participants for study or employment in Germany. The Instituto Cervantes promotes Spanish language learning and introduces study opportunities in cooperation with the Study in Spain initiative. Similar measures are also implemented by smaller countries, which offer preparatory foundation years during which international students can acquire the necessary language skills before beginning degree studies in the national language. Such systems operate, for example, at the Kraków University of Economics in Poland, UiT The Arctic University of Norway in Tromsø and Charles University in the Czech Republic, where successfully passing a language examination allows progression to a local-language degree programme. In Estonia, the University of Tartu offers a comparable pathway at its Narva College, where three Estonian-language programmes include an intensive language year that, upon successful completion, leads to bachelor's studies in Estonian.

Both large and small European countries recognise the strategic importance of language learning at the national level. Although Estonia cannot be directly compared with France, a French economic impact study highlights the revenue generated by language instruction.[15] One in four international students in France had attended French language courses either before or during their stay (58% of them in French institutions), paying on average €1,632 for this instruction. The strategic development of language education can therefore generate significant economic and societal benefits.

An increasing number of international students wish to remain in Estonia after graduation. For example, the authors of the RITA migration report,[16] which examined labour market change and the opportunities and challenges arising from migration in the education, labour market and social systems, emphasise the importance of measures that would help international students studying in Estonia secure internships and employment in both the private and the public sector. In international companies and startups, where many international graduates find employment, English is typically the working language. Public-sector positions, however, are generally accessible only to those who are proficient in Estonian.

Promoting the learning of Estonian, both within Estonia and internationally, would expand opportunities for international students and strengthen their competitiveness in the Estonian

labour market. A larger number of participants in the Estonian-language cultural space would support the country's intellectual and linguistic vitality.

THE POTENTIAL OF SMART MIGRATION: INTERNATIONAL STUDENTS BRING NEW SKILLS TO THE LABOUR MARKET

International students constitute a distinctive group of migrants and are often regarded as a source of future labour already partly integrated through their local study experience.[17] As part of talent policy, nearly half of OECD countries view international students as a strategic resource. According to Statistics Canada, international graduates who have studied at a domestic university enjoy advantages in the labour market compared with foreign nationals who obtained their degree abroad, as they face fewer obstacles in the recognition of qualifications and have established local networks.[18] In France, 91% of international alumni reported that their studies helped them secure their first job.[19]

As Estonia faces a declining population and the lowest birth rate in a century, it is essential to consider both current and future labour market needs. International students can play a significant role in alleviating labour shortages and bringing new skills into the economy. At the same time, the broader impact of demographic decline on education, the economy and society as a whole must be taken into account.

The Estonian Ministry of the Interior has likewise pointed to the positive contribution of international students to Estonian society, noting that recruiting international students and supporting their integration into the labour market is a more effective response to skilled labour shortages than recruiting foreign workers directly, as students adapt to the local environment during their studies.[20]

One of the most immediate ways to address labour shortages and respond to the needs of Estonia's business environment would be to take a further step in regulating legislation on study migration and skilled labour migration. In terms of post-graduation stay options, Estonia ranks among the more restrictive OECD countries. International graduates may remain in Estonia for 270 days, or nearly nine months, after completing their studies to seek employment and apply for a residence permit on a new basis. In most OECD countries – including Finland, Germany, Lithuania, the Netherlands, Norway and New Zealand – graduates are permitted to remain for 12–24 months. Estonia is therefore among the few countries offering a shorter period.

THE POTENTIAL TO REDUCE REGIONAL DISPARITIES: INTERNATIONAL STUDENTS AS A BALANCING FORCE

International students enliven regional student life, enhance the academic quality of higher education institutions and create an international learning environment for local students. However, fewer than 100 international degree students study outside Tallinn and Tartu. According to Statistics Estonia, the majority of international graduates who remain in Estonia are employed in Tallinn and Harju County (81%), with a smaller share in Tartu and Tartu County (14%).[21] The remaining counties together account for only 3% of international alumni.

Universities are integral to the cities in which they operate, including through their regional colleges. They contribute vitality and innovation to their host cities and play an important role in economic, social and business life.[22] However, the share of international students studying outside Tallinn and Tartu is below 2.5%, whereas in many OECD countries international students are seen as important contributors to local economies and talent policy across regions. To maximise the benefits of internationalisation and reduce regional disparities, several countries actively direct international students beyond major urban centres to smaller regions.

The Netherlands offers a useful example. Between 2013 and 2016, the national programme 'Make it in the Netherlands' promoted career opportunities to international students and encouraged them to work across different regions of the country.[23]

Table 1.3.1 Number of international graduates from the 2021/2022 academic year employed in the 2022/2023 academic year, by county of workplace

	Number of employed international graduates	Share of all employed international graduates
Harju County	519	81%
Tartu County	92	14%
Other counties	16	3%
Type of employment for which the workplace location need not be entered in the register	131	21%
Total number of employed international graduates	637	100%

SOURCE: Statistics Estonia[24]

NOTE. The same individual may work in more than one county or be recorded both under a specific county and under 'location unknown'. Therefore, the sum of all rows does not necessarily equal the total number of individuals employed.

In Estonia, the question is not only what education exports could contribute to the counties, but also what the counties – with their distinctive cultural environments and innovative business landscapes – can offer to the world.

THE POTENTIAL OF ALUMNI AS REPUTATION AMBASSADORS: INTERNATIONAL VISIBILITY BUILDS NEW ECONOMIC TIES

Each year, more than one thousand international students graduate in Estonia, and a growing share remain in the country after completing their studies. Of those who graduated in 2018, 33% were active in the Estonian labour market in the 2022/2023 academic year. Among 2020 graduates, the share had risen to 40%, and it is even higher among more recent cohorts.[25] Most alumni nevertheless leave Estonia, and their subsequent careers are not systematically monitored.

In the United States, total donations to colleges and universities amounted to US$49.6 billion in 2020, of which alumni contributed US$11.2 billion.[26] According to a French alumni survey, studying in France has a direct positive effect on the country's reputation.[27] Nine out of ten alumni reported that their study experience made them more open to cooperation with French individuals (88%) and French companies (85%). Among those who left France, 95% stated that their study experience made them more likely to return as tourists. France also views its alumni as ambassadors of French culture and lifestyle. A majority of alumni who left the country reported a continued habit of purchasing French food (49%) and French products (46%), and of consuming French cultural content, including music and films (58%). Alumni experiences thus strengthen a country's cultural and economic position in the global context.

In Estonia, the contribution of alumni remains underutilised, but its potential is evident in examples such as the more than €2 million donation to the University of Tartu from an Estonian family in Canada, and the billion-dollar valuation achieved by Glia, a startup founded in Estonia by University of Tartu alumnus Carlos

Paniagua. A larger global community of individuals who have studied in Estonia could support the country diplomatically and help tell Estonia's story on the international stage. Education can thereby contribute to strengthening Estonia's reputation and security.

THE POTENTIAL OF EDUCATIONAL EXPERTISE: STRONG PISA PERFORMANCE HAS GENERATED INTERNATIONAL INTEREST AND OPPORTUNITIES

The OECD's PISA assessments have become a significant driver of international developments in education. Countries that consistently achieve strong results attract the attention of experts and media alike. Observers seek to understand the reasons behind success and whether lessons can be applied to address challenges in their own education systems. Although education traditionally falls within national competence, analyses, rankings and recommendations based on PISA data generate broad international interest and a desire to learn from leading performers.

The value of educational expertise is rising further in the context of major global transformations. Knowledge and skills are increasingly viewed as key determinants of national competitiveness. Global trends, such as technological development and rapid population growth in certain regions, are driving demand for new and scalable solutions. The HolonIQ report 'Education 2030' notes that many countries, particularly in Asia and Africa, struggle to provide access to modern education due to rapid population growth.[28] Shortages are widespread: teachers, knowledge in contemporary teaching methods, school leadership and learning materials, among other areas. In addition to young learners, pressure is growing in adult and vocational education to equip people with new skills. Developments in artificial intelligence, machine learning and other emerging technologies create new opportunities to respond effectively to these challenges.

All these factors increase the value of educational expertise. International rankings and comparison tables are closely followed, and there is strong demand for identifying best practices, learning from them and exchanging experience. Estonia's strong performance, achieved with financial investments at around the international average and in a country that remains relatively little known globally, has made it a destination for those seeking inspiration. Interest spans a wide range of topics, including school autonomy, the use of digital tools in teaching and administration, social support services and entrepreneurship education.

It is also important that investment in education is growing. According to HolonIQ analyses, the global financial volume of the sector is projected to grow by approximately 8% annually until 2030.[29] In addition to governments, private-sector interest – particularly from venture capital funds – in investing in technological solutions has increased. Education reforms in developing countries are financed through multilateral and bilateral initiatives, with such funding instruments amounting to US$16.6 billion in 2022.[30] Several countries have recognised these trends as an opportunity to build an export sector focused on educational expertise. Finland provides a nearby example,[31] where the export of education services has grown into a €773 million industry over the past 15 years.[32]

THE POTENTIAL FOR EXPORTING EDUCATION SERVICES: STRATEGIC ACTION DRIVES GROWTH

Education exports are traditionally understood as the expenditure of international students in the host country, but this is a narrow interpretation. In many countries, the range of revenue sources included under education exports is far broader. It extends from international conferences, education tourism and educational technology solutions to international students' living expenses and labour taxes. A review prepared by the London School of Economics and Political Science for the United Kingdom's Department for Business and Trade identifies additional sources of national income, including overseas branch campuses of educational institutions at different levels, continuing education and training, the administration of examinations and tests, foreign subscriptions to academic journals,

online courses and the living expenses of Erasmus exchange students.[33] An analysis of education exports commissioned by the Finnish National Agency for Education shows that publishing and selling educational materials accounts for the largest share of turnover, amounting to €682 million, or nearly 88% of total education exports.[34] Universities, applied higher education institutions and school furniture manufacturers each contributed around €15 million. In both Finland and the United Kingdom, compiling a comprehensive picture of education service exports required additional analysis, as these figures are not fully reflected in regular national statistics.

How has Finland managed to expand its education exports so significantly within a relatively short period? The answer lies in strong state leadership, strategic cooperation between higher education institutions, private enterprises and public authorities, a well-designed service ecosystem, clearly targeted support schemes, consistent international branding, and focused engagement with priority countries.[35]

According to Statistics Estonia, the value of Estonia's education service exports in 2023 amounted to €26 million, primarily reflecting services provided by private companies. This figure could be substantially higher if other related activities were included. For example, Erasmus+ mobility participants visiting Estonia contributed €7.4 million in the 2023/2024 academic year; international delegations visiting as education tourists generated at least €1.6 million in 2024 (based on EISA methodology); and in the 2022/2023 academic year international students and alumni contributed €23.5 million in labour taxes.[36] Furthermore, 68% of Estonian educational technology companies have paying clients outside Estonia,[37] and the growth potential of this sector remains far from fully realised. While further analysis is needed to determine the full scope of education service exports, available data indicate that in 2023 their value was at least €58 million, comparable to exports in the accommodation and food service sector.

SUMMARY

Estonian education has strong export potential, which has not been fully realised. International students make a significant contribution to the Estonian economy through tuition fees and living expenses, but more targeted measures are needed to support their retention in Estonia. Expanding language education would facilitate their integration into the labour market and help address labour shortages. International alumni represent a valuable resource for promoting Estonia abroad and strengthening economic ties, but their engagement requires a more systematic approach. In addition, the expertise embedded in Estonia's education system has the potential to develop into an independent export sector, offering innovative educational solutions internationally.

Finland and the Netherlands have conceptualised the broader societal role of education and built their export strategies accordingly. Estonia could draw lessons from their experience. Fully realising the export potential of Estonian education will require coordinated action among government, educational institutions and the private sector to create a coherent and sustainable system that maximises the international value of Estonia's educational strengths.

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Erkki Raasuke

According to United Nations data, 256 million students were enrolled in higher education institutions worldwide in 2022. The number studying outside their home country tripled between 2000 and 2021, rising from 2.1 million to 6.4 million. This trend is not accidental. The broad and lasting benefits of studying abroad are increasingly recognised. Beyond the acquisition of academic knowledge, international study strengthens cognitive skills, enhances cultural competence and deepens self-awareness. It also enables students to build valuable social and professional networks, develop language proficiency and increase their mobility.

For a small, open economy such as Estonia, enabling young people to study abroad is critically important. Equally important is being an attractive destination for international students. Eero Loonurm and Heli Aru-Chabilan identify seven areas in which Estonia could make more effective use of the export potential of education. Their analysis is persuasive and calls for decisive action.

Estonia's education system should set an ambitious goal of multiplying the scale of education exports. It rests on a strong and internationally recognised foundation, reflected in its PISA results, but higher education should play a stronger role in driving economic growth and innovation. Ambitious targets can open new perspectives and make existing constraints irrelevant. Strategic focus is essential: Estonia should compete at the highest level in fields that align with its strengths – information technology, engineering and biomedicine.

A comprehensive approach to the international student experience is equally important. All key elements of academic and everyday life must be addressed. For me, two areas stand out where even countries active in education exports continue to face challenges. First, investment in purpose-built student accommodation is needed, as Estonia's rental market is neither large enough nor sufficiently developed. The start of studies in Estonia should be smooth, allowing students to focus fully on learning. Second, greater investment in high-quality internship opportunities is necessary. In the priority fields mentioned above, Estonian companies – especially those with international ambitions and export markets – have a strong demand for skilled professionals. Offering international students an initial positive work experience and access to professional networks would generate significant benefits.

International students should also be viewed as ambassadors for Estonia. Whether their period of study lasts a few months or several years, sustained contact should be maintained with those who have studied in Estonia. For Estonian companies, they can serve as bridgeheads to foreign markets for products and services. Estonia does not have the centuries-long tradition of global engagement and self-assurance associated with former colonial powers, but it must assert itself internationally and act with confidence regardless. Its most effective partners and advocates are likely to be young people who have had a positive experience in Estonia and who trust the country.

If Estonia succeeds in creating an integrated model that combines learning, living and working, education can become the country's next engine of growth – an export sector that brings revenue, skills and long-term partnerships.

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1.4

Educational inequality in Estonia: Where does it persist and how effectively has it been reduced?

Sandra Haugas and Eve Mägi

KEY MESSAGES

- Educational inequality has not declined significantly in Western countries in recent decades. In some countries, including Estonia, developments in recent years suggest that gaps are widening.
- Educational inequality is a wicked problem; reducing it requires systematic action and cooperation between stakeholders.
- Although Estonia has introduced measures to prevent educational inequality, it lacks a coherent strategic approach. In particular, reducing inequalities between schools requires sustained attention.

INTRODUCTION

Education is critically important for life chances.[1] People with higher levels of education are more likely to hold better-paid positions and face a lower risk of unemployment.[2] High-quality education also promotes good health, greater life satisfaction and civic engagement.[3] Despite the substantial expansion of access to education in recent decades, educational inequality – that is, the extent to which pupils' educational outcomes are shaped by their background characteristics (such as parental education or income) – has not significantly diminished in Western countries. In several countries, the opposite trend has been observed.[4]

Educational inequality, in turn, contributes to wider socio-economic divides. In other words, pupils from more advantaged backgrounds tend to receive a higher-quality education and subsequently earn higher incomes, while those from less advantaged backgrounds are more likely to receive a lower-quality education and earn less. Thus, the education system – traditionally viewed as a driver of social mobility,[5] a means of attaining a stronger labour market position than one's parents – may instead reproduce and deepen existing patterns of social inequality.[6]

However, educational inequality is not limited to cases where socio-economic background or other characteristics statistically explain measurable academic outcomes. It may also be expressed in other ways. For example, inequality is evident when pupils' backgrounds influence their educational expectations and choices, or their mental well-being. This broader understanding rests on the premise that the purpose of education extends beyond academic achievement. Although in many Western countries the aims of education have narrowed somewhat in recent decades,[7] with less emphasis on pupils' social and cultural development and greater focus on labour market relevance, few education systems explicitly define their sole objective as academic performance. Estonia, too, adopts a broader view. Under the Estonian Education Act, the objectives of education are 'to create favourable conditions for the development of the individual, the family and the Estonian nation, including ethnic minorities, as well as for economic, political and cultural life in Estonian society and for nature conservation, within the context of the global economy and global culture; to shape individuals who respect and abide by the law; and to create opportunities for everyone to engage in lifelong learning'.[8]

This suggests that a meaningful description of educational inequalities requires a broader range of indicators than those typically used in dominant studies in the field. For example, in the international PISA study, educational inequality is defined by analysing the relationship between pupils' socio-economic background and their academic performance; this approach has also been criticised, both for how PISA conceptualises social background and for the conclusions it draws about educational inequality.[9] In this article, we adopt a broader perspective on educational disparities, examining patterns of inequality in education and, as a related field, public health, which may both influence and be influenced by developments in education. We approach the issue from multiple angles, with particular attention to the role of family socio-economic background. What kinds of educational inequalities exist in Estonia, and does our education policy mitigate or reproduce them?

WHAT EDUCATIONAL INEQUALITIES EXIST IN ESTONIA?

Differences in learning outcomes or in patterns of (health) behaviour do not in themselves indicate educational inequality. Educational inequality exists when such differences can be explained by background factors beyond the pupil's control. For example, a recent study by the Foresight Centre[10] shows that Estonian pupils' results in the mathematics final examination are associated with family socio-economic background, particularly the mother's income. Children of higher-income parents achieve better mathematics results.[11]

The existence of educational inequalities in Estonia is also reflected in PISA data, which indicate that, compared with 2018, the influence of socio-economic background on pupils' mathematics skills has increased.[12] This is primarily due to a decline in the mathematics performance of pupils from less advantaged backgrounds. The gap in mathematics performance between pupils from weaker and stronger socio-economic backgrounds has widened by 18 PISA points (from 63 to 81 points). This constitutes a substantial change, as it corresponds roughly to half a year of learning for an average 15-year-old pupil. The pattern is further reinforced by the high share (25%) of low-performing pupils in mathematics among those from weaker socio-economic backgrounds. Over the past four years, the proportion of low performers in this group has increased by 8.5%. Among pupils from stronger socio-economic backgrounds, the share of low performers has remained stable at 6%.

Only 6% of pupils from weaker socio-economic backgrounds are top performers in mathematics,

compared with 26% among pupils from stronger backgrounds. A positive trend is that the share of top performers among pupils from weaker backgrounds has not declined in recent years. Among pupils from stronger backgrounds, however, it has fallen slightly (by 4%).[13]

The impact of social background on mathematics skills has also grown when comparing Estonian- and Russian-language schools. Notably, mathematics performance among pupils from weaker socio-economic backgrounds does not differ significantly between these school types. By contrast, pupils from stronger socio-economic backgrounds in Estonian-language schools scored 45 PISA points higher than their peers in Russian-language schools.[14] The recently implemented reform to transition to Estonian as the language of instruction is expected to help reduce educational inequalities associated with the language of instruction. Public readiness for this change is evident in the marked decline in opposition to Estonian-language education among both ethnic Estonians and members of other ethnic groups.[15]

Fifteen-year-olds in the final year of basic school display high expectations regarding further education, future labour market prospects and social position.[16] Nearly half believe they are moving towards a higher social position than their current one. However, there is a marked ambition gap associated with parental education. Pupils with at least one parent holding a higher education degree are far more likely to plan to pursue higher education than those whose parents do not (70% versus 35%). This gap in aspirations is reflected in reality: a majority (63%) of Estonia's university students have at least one parent with higher education.[17] As in many other European countries, individuals with at least one parent who has higher education are overrepresented in the student population relative to their share of the wider population.[18]

A broad range of learning opportunities and effective participation in the contemporary labour market and society require digital competence. A recent DigiEfekt study[19] shows that educational inequality in the development of digital competence – one of the general competences defined in the national curriculum – is considerable. Digital competence depends to an unusually large extent on the class a pupil attends – that is, on the teacher and on the peers with whom the pupil learns.[20] (For further detail, see Article 5.4.)

From a broader perspective, educational inequality may also be observed in the association between pupils' socio-economic background and indicators of mental health, given that the aims of education extend beyond academic knowledge to include the development of skills that support further learning and successful life outcomes, including skills for maintaining mental well-being.

A recent study on schoolchildren's health behaviour[21] highlights several concerning patterns. The most recent data (2021/2022) show that feelings of depression or sadness during the six months preceding the survey were significantly more common among young people in a poor economic situation: 36.2% of those in poorer circumstances, compared with 26.1% of those in better circumstances, reported feeling depressed or sad more than once a week in the previous six months. At the same time, around one third (30.9%) of young people in poorer economic circumstances, compared with 42.6% of those in better circumstances, reported rarely or never experiencing such feelings. A similar gap is evident in the occurrence of depressive episodes: while about two thirds (67.7%) of young people in good economic circumstances reported no episodes, the corresponding figure among those in poorer circumstances was 58.7%.[22] Although Estonia has made notable progress in developing mental health services for children and young people and access to treatment has improved, provision does not meet demand. In addition to being insufficient, services remain fragmented.[23] This exacerbates inequality, as faster access to support is available through paid private services, which are more accessible to families in stronger socio-economic positions.

Several factors support mental well-being, including positive family relationships (for example, parents having time for the child and the child feeling understood) and satisfaction with school. However, these factors are influenced

by family financial circumstances.[24] In families facing financial hardship, relationships are rated more negatively than in families with average or good financial situations. Family conflicts are also more frequent in financially fragile households. Similarly, children growing up in economically disadvantaged families report lower levels of school satisfaction than those from families in average or good financial circumstances.

EDUCATION POLICY CAN REDUCE OR DEEPEN EDUCATIONAL INEQUALITIES

As noted above, the education system can either mitigate or exacerbate socio-economic inequality, depending on the presence and scale of educational inequalities. These, in turn, are shaped by policy choices. There is broad consensus in the research literature on which measures help reduce educational inequality and which contribute to its persistence or growth. To what extent has Estonian education policy drawn on this knowledge?

First, among measures known to reduce educational inequalities, Estonia's avoidance of early tracking deserves attention. Tracking refers to the deliberate separation of pupils into different school types or programmes with distinct learning objectives and pathways.[25] From the perspective of educational inequality, the problem lies in the fact that selection into tracks is closely associated with parental background: pupils from weaker socio-economic backgrounds are disproportionately directed into vocational tracks, which limits their access to higher education and, in turn, narrows their life opportunities.[26] The research literature consistently finds that tracking is one of the clearest drivers of educational inequality: the later pupils are separated into different tracks, the fewer disparities tend to arise. In Europe, some countries (such as Germany and Austria) begin tracking at around age ten, while others (including Finland and Spain) postpone it until after the completion of basic education.[27] Estonia belongs to the latter group. Since regaining independence, it has followed a comprehensive school model inspired by Finland, under which all pupils complete a common academic basic education and choices between academic and vocational pathways are deferred until the end of basic schooling. One positive outcome of later tracking in Estonia has been identified as pupils' comparatively high average scores in civic knowledge.[28] Although Estonia has avoided early tracking, attention must also be paid to the risk of inequality in later stages of educational differentiation. At present, caution is warranted in relation to the ongoing school network reform. The concentration of upper secondary schools in regional centres, the reduction in available places and increasing competition may heighten the selectivity of upper secondary education. This development will likely favour pupils from stronger socio-economic backgrounds.[29]

Second, the research literature increasingly emphasises investment in high-quality early childhood education and care as a means of reducing educational inequality. This priority appears to be recognised in Estonian policymaking. The primary function of pre-school institutions (such as kindergartens) is no longer merely to provide childcare that enables parents to participate in the labour market. Equally important is children's comprehensive development, including the foundation of social and emotional skills that support successful learning and life outcomes.[30] High-quality early childhood education and care is particularly important for children from weaker socio-economic backgrounds, as it can help level the starting position for later schooling.[31] Investment at this stage is also among the most cost-effective ways to address educational inequalities, since the disadvantages that accumulate over time have not yet taken root.[32]

All children in Estonia have the right to high-quality early childhood education and care, and participation rates are high (81% of children aged 1.5–3 and around 94% of those aged 4–7 attend kindergarten).[33] Nevertheless, access remains uneven. In municipalities experiencing rapid population growth, it can be difficult to secure a place, especially for children under three.[34] Qualification requirements are in place for kindergarten teachers (higher education and pedagogical competence), and although comprehensive data on compliance is lacking, it

is known that approximately three quarters hold a higher education degree.[35] Continued efforts are needed to ensure that early childhood educators are valued on a par with general education teachers, as their salaries often lag behind those of school teachers and their societal recognition is lower.[36] It is also important to examine whether families from different backgrounds can in practice access high-quality early childhood education and care, and to consider this evidence when allocating places and setting fees. From the perspective of reducing educational inequalities, preferential access for children from weaker socio-economic or otherwise vulnerable backgrounds may be justified. At the same time, provision must take into account the needs of parents working night shifts, weekends or late hours, ensuring that services are genuinely accessible.[37]

Third, among approaches known to reduce educational inequality where Estonia still has room for development, preventing segregation between schools deserves particular attention. Warning signs have been evident for years. As early as 2019, PISA data showed that Estonia's level of socio-economic segregation was close to the OECD average.[38] A 2023 study by the Foresight Centre presents an even starker picture, showing that in Estonia, in some schools the median monthly income of pupils' families is below €1,000, while in others it exceeds €4,500. Segregation between schools contributes to educational inequalities because factors that support educational outcomes tend to cluster in some schools, while undermining factors accumulate in others. These include positive peer effects, strong parental support and cooperation with the school, and a high proportion of qualified teachers, as opposed to low peer motivation, behavioural difficulties, challenging family circumstances and a shortage of qualified teachers. Such a situation requires deliberate policy intervention. Otherwise, patterns of inequality reproduce themselves, giving rise to the so-called Matthew effect, whereby the strong – schools and pupils – grow stronger and the weak fall further behind.

To prevent the accumulation of advantage and disadvantage, targeted support for those lagging behind – both pupils and schools – must be a central focus. This, in turn, requires a diverse set of policy instruments:

- controlled school choice,[39] meaning the central allocation of school places based on agreed principles of fairness, combined with counselling and meaningful options for families;[40]
- recruitment systems that incentivise qualified and experienced teachers to work in more challenging schools;[41]
- training for teachers and school leaders that strengthens awareness of the links between pupils' socio-economic background and educational outcomes;[42]
- funding models that allocate additional resources to schools with a higher proportion of pupils from weaker socio-economic backgrounds.[43]

In Tallinn's selective schools, information about admission policies is not equally accessible to all families. This gives an advantage to those from stronger socio-economic backgrounds and reproduces educational inequality year after year. As a result, there is still a considerable distance to go before a genuinely regulated system of school choice is in place.[44] To date, Estonia has not systematically incentivised qualified teachers to work in more challenging schools, with the partial exception of recruitment efforts in Ida-Viru County in the context of the transition to Estonian-language instruction. While necessary, this step alone is insufficient to reduce educational inequalities. Moreover, training for school leaders and teachers does not appear to place sufficient emphasis on the relationship between socio-economic background and educational outcomes.[45] Although the school funding system takes into account the higher costs associated with educating pupils with special educational needs, the same logic has not been applied to pupils from weaker socio-economic backgrounds, even though effective teaching in such contexts similarly requires additional resources.[46] In general, while a systemic approach – including a legal framework, clearly defined roles and coordinated measures – has been developed to support pupils with special educational

needs, no comparable systemic strategy has been implemented to address socio-economic inequalities in education.[47]

SUMMARY: EDUCATIONAL INEQUALITY AS A WICKED PROBLEM

Estonia has implemented measures that can be regarded as exemplary from the perspective of preventing and mitigating educational inequality. Notably, early tracking – a practice widely identified in the research literature as one of the most powerful drivers of educational inequality – has been avoided. Investment in high-quality and accessible early childhood education and care is another approach with preventive potential. Expectations are also high that the ongoing transition to Estonian-language instruction will help reduce disparities, although only time will tell whether the reform achieves this aim.

From the standpoint of educational inequality, one of the most serious concerns is the insufficient policy focus on preventing segregation between schools. Measures suitable for addressing this challenge – such as controlled school choice, targeted school funding, and targeted teacher recruitment and training that addresses educational inequality – have either not been implemented in Estonia or have not been applied systematically. As a result, family background continues to exert a strong influence on learning outcomes and career expectations, while significant differences between schools create favourable conditions for the reproduction of inequality. This situation will not resolve itself. Meaningful change requires coordinated and systematic policy action based on a clear strategy for reducing educational inequalities.

Educational inequality is often described as a wicked problem because of its inherent complexity.[48] Wicked problems require equally complex solutions. Addressing only a single strand may do more harm than good, as tackling one aspect in isolation can generate new problems elsewhere.[49] The admission policies of Tallinn's selective schools provide a clear example. Shifting to strictly proximity-based admissions is unlikely to reduce inequality in a context of residential segregation. Families with stronger socio-economic backgrounds would continue to benefit, as they are more likely to afford housing in central districts. In such circumstances, multifaceted solutions are required, combining controlled school choice with targeted school funding and other measures outlined above. The key point to remember – with educational inequality as with other wicked problems – is that these problems are not inevitable. While it may be impossible to

REFLECTION

Eve Kikas

Education is critical for life chances, as it opens pathways to better employment, improved health and greater life satisfaction. In Estonia, educational inequality has deepened – pupils' educational outcomes and ability to cope with schooling are shaped to a significant extent by factors only weakly related to their individual characteristics, such as family socio-economic background or home language. The problem is complex and requires a comprehensive response that addresses its multiple dimensions.

Change must begin in the pupil's immediate environment and can be supported by municipalities and the state. Estonia currently lacks a coherent strategic approach to addressing this challenge. The article identifies several areas that require reform and outlines possible solutions.

A strong starting position. Life trajectories begin in early childhood. High-quality early education and effective parental support can lay the foundation for a successful life course. Estonia benefits from qualified kindergarten teachers and child-centred pedagogical approaches, but access to early childhood education places remains uneven. Action at the national level is needed: raising kindergarten teachers' salaries, improving working conditions and ensuring access for children from vulnerable backgrounds.

Reducing segregation between schools. Educational attainment varies markedly between neighbourhoods: some are characterised by highly educated parents, while in others average parental education levels are lower. For children, attending a local school is generally advantageous. A short journey to school not only reduces travel time but also supports friendships and a sense of community. At the same time, segregation can be addressed through a range of targeted policy measures:

- Training and professional development should strengthen teachers' and support specialists' understanding of the fundamentals of learning and of evidence-based teaching methods. All pupils benefit when instruction builds on prior knowledge through individualisation, supports autonomous motivation, develops general competences, reconsiders assessment practices, reduces fear and excessive competition, and ensures access to support services.
- Qualified and early-career teachers should be incentivised and comprehensively supported – through competitive salaries, housing assistance and other measures – to work in disadvantaged areas and schools.
- University teams can provide targeted support to schools facing greater challenges. Change is more effective when the entire school is involved in the process. Whole-school development programmes are already implemented at Tallinn University and the University of Tartu, but state support is needed to ensure that teams from disadvantaged schools can participate.
- Finally, entry tests for the first grade should be abolished. Although Estonia has largely avoided early academic selection, or tracking, some schools in larger cities still admit pupils through entrance tests and provide additional instruction, often in a foreign language. Higher parental education levels – and the greater capacity to prepare children before school that this entails – contribute to social stratification.

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1.5

Lifelong learning must engage both the university-educated engineer and the low-skilled worker

Kirsti Melesk and Märt Masso

KEY MESSAGES

- Participation in adult education has increased rapidly in Estonia, and the country places among the leading European performers.
- Education spending also reflects the strength of adult education: sustained investment in the education system helps reduce inequalities in participation across Europe.
- With participation in adult learning already high, Estonia must now focus more clearly on improving access and reducing inequality in adult learning.
- Over the past six years, inequalities between social groups have narrowed somewhat. However, adults with higher education and women continue to benefit most from opportunities to acquire new knowledge and skills. Adults with lower levels of education, people with reduced work capacity and older men participate in continuing education far less frequently.

INTRODUCTION

In today's world, the role of the adult learner is increasingly important. People need to learn at different stages of life, and reskilling and upskilling throughout one's career are increasingly necessary. In 2023 alone, approximately 168,000 people in Estonia reported participating in some

form of learning activity during the four weeks preceding the survey, which illustrates the scale of adult participation in learning.[1]

Learning remains essential throughout life, as digitalisation and automation are reshaping the world of work. New sectors and occupations are emerging, while others decline, and career paths have become less linear, with more frequent job changes and varied forms of employment. The education landscape and modes of learning are also evolving: alongside multi-year degree programmes, providers now offer more short courses, micro-credential programmes and modular skill units that allow learners to update their knowledge and competences in shorter, more targeted formats.

Several actors shape the development of adult education. The state sets the framework by establishing the conditions and opportunities for continuous learning. Employers create opportunities to apply skills at work and support employees' competence development in line with organisational needs. Education institutions and training providers design learning opportunities, determining both content (what to learn) and format (how to learn). Adults themselves must be willing and motivated to seek out and use these opportunities. Advancing adult education requires coordinated effort from all stakeholders.

For three decades, Estonian Human Development Reports have examined adult training as a key link between the labour market and education.[2] Key challenges include the limited availability of jobs that require advanced skills – which partly reduces incentives to participate in adult learning – and limited access to suitable learning opportunities.[3] Expanding learning opportunities for adults and reducing inequalities in participation have therefore remained central priorities in Estonian education and labour market policy.

In the following, we assess Estonia's progress as a society that promotes lifelong learning and examine how effectively it has reduced inequalities – in comparison with other countries and within Estonia itself. The ability to involve diverse social groups in skills renewal is essential for enhancing competitiveness – for individuals, for businesses and for Estonian society as a whole.

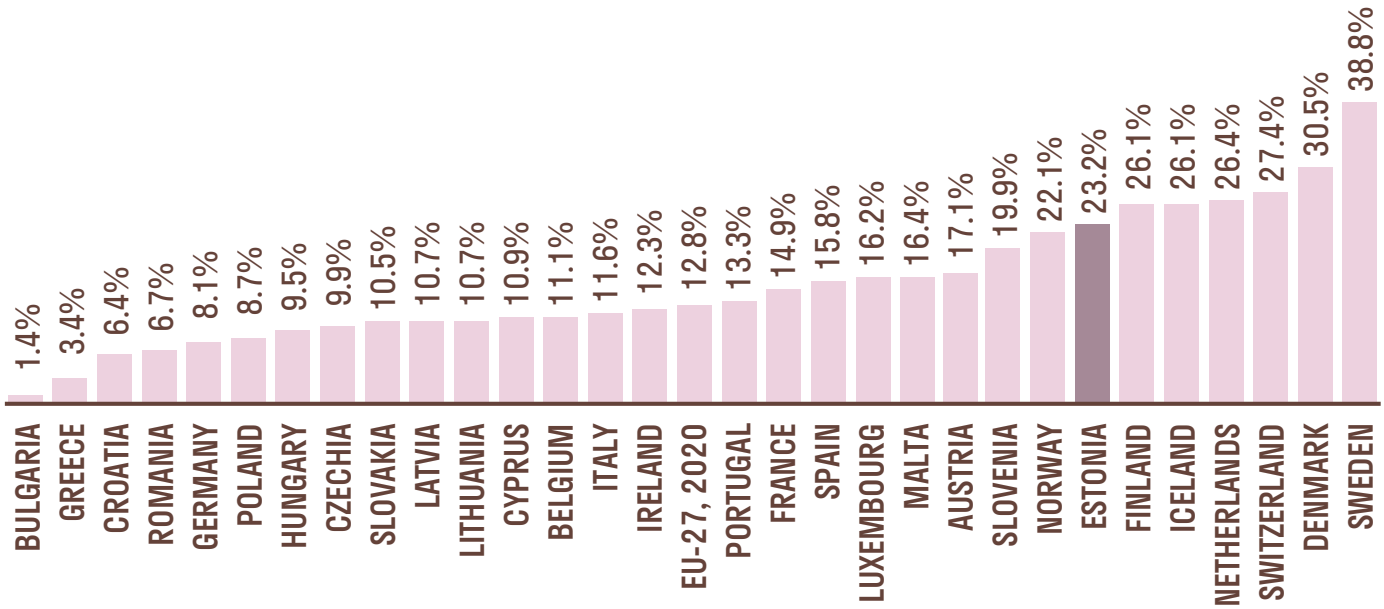
INEQUALITIES BETWEEN EUROPEAN COUNTRIES IN ADULT LEARNING HAVE WIDENED, BUT ESTONIA REMAINS AMONG THE LEADERS

Adult education holds a prominent place in European Union policy. Access to learning throughout the life course forms one of the core principles of the European Pillar of Social Rights. The European Commission that took office in 2025 reinforced this priority by launching the Union of Skills initiative, which stresses the need to guarantee regular opportunities for skills development and renewal.[4] The Commission's latest objectives in this field are set out in the European Agenda for Adult Learning.[5] The overarching goal is to raise participation rates in all member states. By 2030, nearly 170 million Europeans aged 25 to 64 – around 60% of the EU's adult population – are expected to take part in learning each year.[6] To distribute participation more evenly across social groups and reach those who need it most, additional interim targets were set for 2025. These required that 30% of adults with low qualifications and 20% of jobseekers participate in adult education. The targets were ambitious. Meeting them required not only overall growth in participation but also greater convergence between member states – in other words, faster progress in countries with lower participation rates so that they could catch up with those already performing at a high level.

According to Eurostat data for 2023, Estonia ranks seventh among EU countries in adult participation in lifelong learning (Figure 1.5.1). With 23% of adults reporting that they had taken part in learning activities in the four weeks preceding the survey, Estonia's participation rate is well above the EU average (13%), though it remains about 16 percentage points lower than that of Sweden, the highest-performing country with 39%.

Although average participation in adult education has increased across the EU, national trajectories differ considerably. Despite overall growth, disparities between member states remain persistent. The EU as a whole is moving closer to its targets and the average participation rate

Figure 1.5.1 Participation of adults in lifelong learning in EU member states, 2023



SOURCE: Eurostat[7]

NOTE. The figure shows the share of adults aged 25–64 who reported participation in lifelong learning during the four weeks preceding the survey.

has risen, yet inequality between countries has not narrowed. Much of the increase in the EU average stems from a group of faster-advancing countries whose participation rates have grown more quickly than the EU mean. Estonia is among these contributors, with participation rising by nearly four percentage points over six years. The Netherlands and Denmark have been particularly dynamic, starting from a position similar to Estonia's in 2018 but recording even stronger growth. Slovenia has also progressed rapidly, narrowing the gap with Estonia after beginning from a lower baseline. By contrast, in several countries growth has lagged behind the EU average, and in some cases participation has declined. As a result of its faster progress, Estonia has widened its lead over Luxembourg and France. Growth has also slowed in some previously leading countries, such as Switzerland and Finland, allowing Estonia to draw level with them.

Two factors explain why inequality in adult learning participation across Europe has not declined. First, Sweden – already the frontrunner – has also recorded growth well above the EU average over the past six years, further extending its lead. Second, countries with the lowest participation rates, such as Greece and Bulgaria, have not managed to increase their rates over the same period. As a result, disparities between member states persist. While Sweden continues to pull further ahead, lower-participation countries struggle to close the gap. Meeting the EU's objectives therefore requires targeted support for lagging countries and measures that reduce disparities across member states. In Estonia, where participation is already relatively high and progress towards EU targets has been consistent, there is no longer any need to benchmark against the lowest-performing countries. Sustaining competitiveness instead calls for more ambitious national goals.

One factor that clearly distinguishes leading from lagging countries is public expenditure on education. Across the EU, higher government spending on education as a share of GDP is associated with higher participation in lifelong

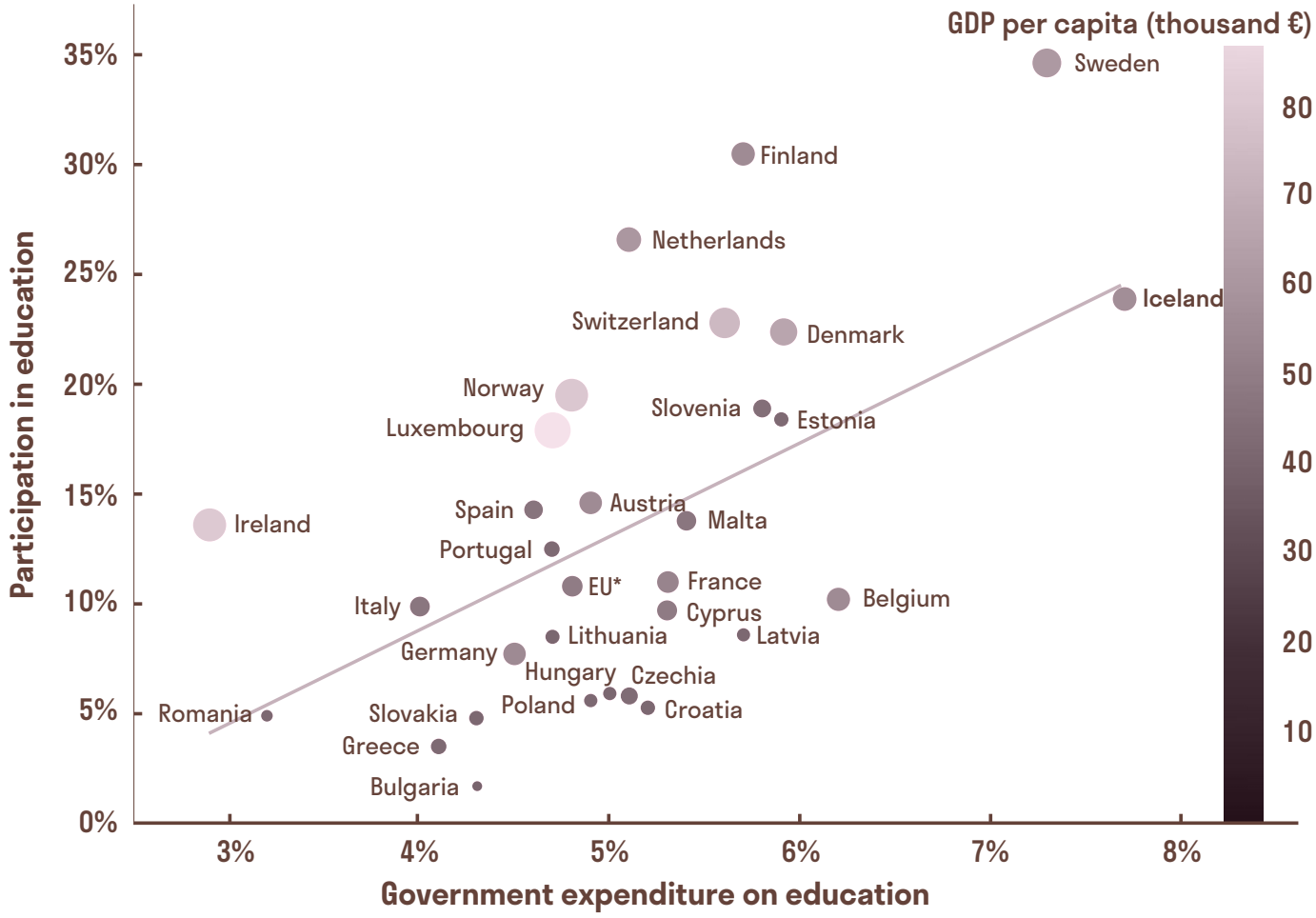
learning. Estonia belongs to the group of countries that combine relatively high education expenditure with high adult participation rates (Figure 1.5.2). Sweden, which has led recent growth in participation, also invests heavily in education, while lower-performing countries, such as Greece and Bulgaria, allocate the smallest shares of GDP to this sector. Although higher overall spending on education does not automatically mean that funding for adult education increases in the same proportion, a solid, well-funded education system also supports adult education.

EDUCATIONAL INEQUALITIES ARE NARROWING, BUT ADULT LEARNING REMAINS MORE COMMON AMONG WOMEN

Next, we will examine inequalities in participation in adult education within Estonia, including differences between social groups.

In 2023, 23% of Estonia's population participated in lifelong learning. Over the previous six years, the participation rate rose by seven percentage points, from 16% in 2018. Participation was lowest

Figure 1.5.2 Participation of adults in lifelong learning and public expenditure on education in EU member states, 2021



SOURCE: Eurostat[8]

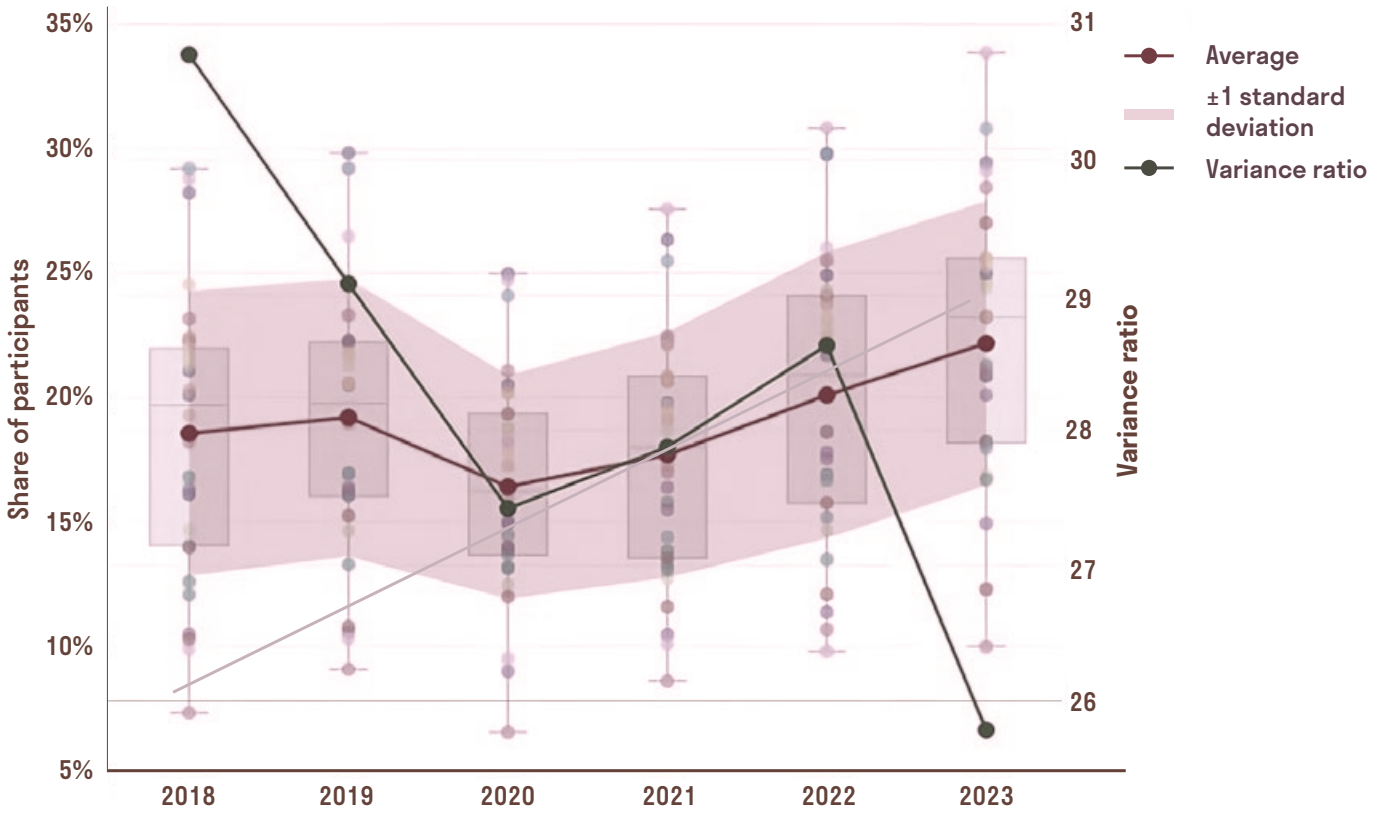
NOTE. The figure shows the share of adults aged 25–64 who reported participation in lifelong learning during the four weeks preceding the survey. * European Union member states (27); data for 2020.

among adults with at most basic education (10%) and highest among those with higher education (34%). Gender differences are pronounced and become more marked at higher levels of education. Among adults with at most basic education, participation rates do not differ significantly by gender. Among those with higher education, however, 37% of women and 29% of men took part in learning. Women aged 50–64 participate more than men aged 25–49, and women of other ethnic backgrounds participate more than Estonian men. Overall, women aged 25–49 with higher education are the most active participants in adult learning. Participation is also high among unemployed women, 32% of whom engaged in learning. This share exceeds that of employed women and indicates good access to learning opportunities for unemployed women, while unemployed men make considerably less use of them (17%). Particularly low participation rates are observed among men and women with at most basic education (10% and 11%, respectively), economically inactive men (10%) and men with reduced work capacity (7%). At the same time, participation has increased across all analysed groups in Estonia, albeit at different rates.

To assess changes in inequality over time, we analysed convergence indicators. We first examined how differences between social groups have evolved. Although overall participation in adult education has increased, the coefficient of variation – which captures disparities between groups – has declined, though only by six percentage points (Figure 1.5.3). This indicates that inequality in participation between groups has narrowed somewhat over time.

Examining the mechanisms behind this decline shows that groups with initially lower participation rates have recorded slightly faster growth than those with higher initial rates, which indicates a degree of catch-up. We tested this by analysing

Figure 1.5.3 Indicators of convergence in participation in lifelong learning



SOURCE: Statistics Estonia[9]

NOTE. The coefficient of variation is a relative measure that shows how widely values are spread in relation to the mean. When the coefficient decreases, it indicates that differences between population groups have become smaller.

whether subsequent growth in participation was inversely related to the initial level of participation. The results confirm such a relationship. If current trends were to continue, groups with lower participation rates would close half the gap with higher-participation groups within approximately seven to eight years (coefficient –0.09, p-value 0.04). The narrowing of inequality has therefore proceeded at a relatively slow pace.

Time trends also become visible when we compare each group's participation rate with that of the highest-participation group, namely adults with higher education. Although lower-participation groups have, on average, narrowed their differences with one another, they have not significantly converged with the group with higher education. In fact, the gap relative to adults with higher education has widened somewhat over time. This suggests that individuals with higher education continue to benefit most from adult learning opportunities, while other groups participate to a lesser extent.

Over time, the lowest participation rates in Estonia have consistently been observed among adults with low educational attainment (at most basic education) and older adults (aged 55 to 64). Nevertheless, Estonia performs better than many other European countries in these groups. While the EU average participation rate among older adults is 5%, it is 10% in Estonia. Similarly, whereas the EU average for adults with low educational attainment is 8%, Estonia's rate stands at 15%. Participation in both groups has also increased compared to 2020 (by six and three percentage points, respectively). The Nordic countries again stand out for particularly strong participation among low-educated and older adults, suggesting the presence of effective inclusive adult learning programmes. However, differences between member states in these groups have not significantly narrowed. Disparities remain pronounced among low-participation groups, and despite policy measures and targets aimed at involving all segments of society in adult learning, these ambitions have not been fully realised. Differences between countries therefore remain substantial.

SUMMARY: ESTONIA NEEDS MORE AMBITIOUS GOALS IN ADULT EDUCATION

This Estonian Human Development Report examines educational inequalities in Estonian society. In adult education, a persistent pattern has been observed: those who already possess more knowledge and skills tend to acquire even more, while those who would benefit most from learning opportunities participate far less. Social scientists describe this as the Matthew effect, or cumulative advantage. It refers to a dynamic in which the benefits of education and skills development accrue mainly to those who already have stronger prior access to education or other resources that enable them to take fuller advantage of learning opportunities. We analyse educational disparities from the perspective of adult education. Given the efforts made in both the European Union and Estonia to promote adult learning, we assess whether these efforts have reduced inequality in participation over the past six years.

European data confirm that although the EU as a whole is gradually moving closer to its targets – average participation in adult education is increasing – inequalities between member states have not significantly decreased. As Sweden continues to advance with its already high participation rate, countries with lower rates struggle to keep pace. This underlines the need, at the EU level, to support lagging countries, including through increased investment in education and the sharing of best practices, in order to reduce disparities between member states. In Estonia, where participation in adult education is relatively high and progress towards EU targets has been rapid, there is no longer a need to benchmark against lagging countries. More ambitious goals are required to maintain competitiveness.

At the national level, participation in adult learning has increased across all social groups analysed. Growth has been somewhat faster in groups that had lower participation rates in 2018, indicating a degree of catch-up. Relative differences between groups have also narrowed, meaning that disparities between social groups have decreased. However, since there has been

no significant convergence with adults holding higher education – the group with the highest participation rate – it remains essential to direct investment in adult education more effectively towards the lagging groups: adults with low educational attainment, those aged 55 to 64, economically inactive individuals and people with reduced work capacity. Gender disparities in adult education remain substantial in Estonia, and women with higher education emerge as the most active participants. It is noteworthy that unemployed women also participate at high rates, which indicates good access to labour market services, particularly skills-related services, during unemployment. At the same time, unemployed men use these opportunities far less frequently (a difference of 15 percentage points). Targeted investment, along with strategies and actions to identify and motivate underrepresented groups, provide positive learning experiences and raise awareness of existing opportunities, are therefore essential. General funding for adult education, if not targeted, may inadvertently increase inequality, as those who are already better positioned – particularly adults with higher education – are more likely to take advantage of available opportunities.

Data and methodology. In this article, we use convergence indicators to assess whether participation rates in adult education have become more similar over time and to identify the mechanisms underlying such changes (for a more detailed discussion of convergence measures, see Eurofound[10]). We examine convergence both between European Union member states and between social groups within Estonia. The indicator analysed is participation in adult education during the four weeks preceding the survey. Adult education covers participation in formal education at any level as well as in continuing education, such as job-related courses or self-development programmes, among individuals aged between 25 and 64. Although more recent approaches measure participation over the previous 12 months, this indicator does not yet permit sufficiently long-term analysis. For cross-country comparisons, we use Eurostat data. For the national analysis, we rely on relevant indicators from Statistics Estonia's Labour Force Survey. This dataset captures participation in adult education across 27 population groups, defined by gender, age, ethnicity, education, region, work capacity, labour market status, household income (divided into quartiles) and the presence of children in the household. We use data for 2023, the most recent year available at the time of writing.

REFLECTION

Anneki Teelahk

Developments in the labour market point to the need to prepare for change, as today's economy demands very different skills from those required decades ago. Individuals must be ready to upskill or to acquire entirely new competencies. Lifelong learning is indispensable for remaining competitive.

Participation in adult education has increased rapidly in Estonia, placing the country among the leading European nations. Significant investments have been made in education, learning pathways have become more flexible, educational inequalities are narrowing, and more people are engaging in reskilling and continuing education. The educational landscape and modes of learning have evolved and continue to evolve.

As in other European Union countries, participation in adult education in Estonia follows a familiar pattern: those with higher prior educational attainment or other supportive resources are more likely to engage in learning. More ambitious goals are therefore needed to support lagging groups and reduce inequality.

How can resilience and development be ensured?

The decision to extend Estonian as the language of instruction to all schools is historic, above all because it lays the foundation for a shared value space that also extends to adult education. Once such far-reaching decisions have been made, the focus must shift to supporting their implementation. This will be one of the key priorities in the coming years and is directly relevant to adult education as well.

The continued development of adult education requires the contribution of all stakeholders, including entrepreneurship policy, retraining opportunities, labour market services and social protection measures.

Supporting the motivation and self-confidence of vulnerable target groups and reducing segregation are essential.

Greater flexibility in education is also needed, including micro-degree programmes, micro-qualifications, broader application of the principles for recognising prior learning and work experience (VÕTA), work-based learning, and regionally tailored programmes.

Existing strengths must be maintained and further developed. Cooperation with universities and researchers should continue, as should initiatives such as the OSKA labour market monitoring and future skills forecasting.

Practitioners and collaboration networks should be supported and strengthened. Greater emphasis should be placed on communicating what works well; criticism is rarely in short supply.

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Data literacy in education


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2.0 Introduction

Data literacy in education

Mihkel Solvak

KEY MESSAGES

- **In Estonia, the truism that administrative register data offer broad coverage but limited depth while surveys provide rich detail but limited coverage does not hold.** High-quality research can be conducted directly using register data, and survey research can be strengthened through their integration.
- **Stronger data protection in education may inadvertently shield us from future opportunities.** If sensitive administrative register data cannot be linked with education system data, we risk substantially underestimating problems within the system.
- **The underuse of register data generates recurring financial costs, while commissioning new surveys entails opportunity costs.** Archiving virtual datasets created for register-based research would help reduce future research expenses.
- **The revolutionary use of microdata should be accompanied by a corresponding shift in policy impact assessment and monitoring.** Alongside cross-sectional surveys, greater emphasis should be placed on automated evaluation of policy measures.

INTRODUCTION

Data-driven decision-making and governance require the collection and storage of data, but their real value lies in using enhanced data to make better decisions. Data are not an end in themselves but a means of reducing uncertainty in future decisions and of assessing the efficiency and effectiveness of those already taken, allowing course corrections where necessary. In theory, this sounds straightforward; in practice, it is more complex. The first article in this chapter (Terje Trasberg, Marre Karu, Liina Osila and Kadri Rootalu) illustrates how data can be used more effectively, while the second (Eneli Kindsiko and Liis Roosaar) examines what happens when valuable data are left unused. The first draws on broader examples; the second focuses on a specific case and shows, using new data, how even a high-quality study may significantly underestimate developments in the education system.

The broader aim of both articles is to demonstrate the substantial potential of Estonia's administrative register data to improve policy-making.

LINKING REGISTERS AND ENHANCING SURVEYS

Administrative register data are collected to carry out public functions and typically cover the population as a whole. However, from the perspective of targeted research, such data are secondary and often limited in depth, containing only indirect or partial information relevant to specific research questions. Surveys, by contrast, are designed to answer clearly defined questions and usually gather highly detailed data. This richness, however, applies only to the survey sample, and findings must therefore be generalised to the wider population. Register data are generated automatically through the operation of state systems, whereas survey data are collected at considerable additional cost in response to identified research needs. In practice, this often means that data with broad population coverage but less detail are continuously updated, while more detailed data cover only a narrow sample and are either not updated at all or updated only infrequently through repeat surveys.

Both types of data present distinct challenges. With register data, researchers may need to rely on proxy indicators where precise, purpose-built measures are unavailable. Registers also tend to capture behavioural outcomes rather than the motivations behind them. Survey data, in turn, raise concerns about sampling bias, the rapid ageing of data and, in the case of questionnaires, potential inaccuracies in self-reported information compared with administrative register data.

In this chapter, we show that these generalisations do not apply in the Estonian context, as we have both the theoretical and technical capacity to link register data with one another and with survey data. The article by Terje Trasberg, Marre Karu, Liina Osila and Kadri Rootalu outlines several examples of how the limitations of both registers and standalone surveys can be addressed through linkage, thereby enhancing the value of the data. For example, in the recent register-based population census, place of residence was determined using around 20 data sources – that is, a more accurate indicator was constructed through the combination of proxy measures. Another approach is to link a purpose-designed survey with a register in order to collect separately only the data missing from the register and to incorporate directly those already available there as reliable indicators. For example, data from the Estonian Education Information System (EHIS) on ongoing studies are integrated into the Estonian Labour Force Survey to reduce the need for respondents to provide the same information again in full.

Linkage can serve not only as a way to improve registers or surveys but also as a default principle to avoid collecting the same data repeatedly.

The Public Information Act requires institutions collecting data for the performance of public functions to follow the once-only principle and to justify any exceptions. However, how can it be justified that, in surveys commissioned by these same institutions, the repeated collection of identical data remains common practice, while linkage with registers – that is, the application of the once-only principle – must be separately requested and justified? It would be reasonable to apply the once-only principle more consistently. Where data already exist in registers, it should be the decision not to link them that requires justification, rather than the linkage itself.

DATA PROTECTION SHOULD NOT SHIELD US FROM A BETTER FUTURE

The article by Eneli Kindsiko and Liis Roosaar on the educational inequality hidden in PISA results offers a striking example: because an imprecise indicator is used, the impact of socioeconomic background is underestimated by roughly half. In the most recent PISA study – whose methodological quality is generally not in doubt – 13% of the variance in mathematics test results is attributed to parental background. However, when mathematics examination results are linked with administrative register data on parents' income

at aggregate level, mothers' or fathers' income explains 24–26% of the variance – approximately twice as much (see Article 2.2, Table 2.2.2). The difference is even more pronounced in Tallinn, where nearly 60% of the variance is explained in this way (see Table 2.2.3).

How can the PISA results and the picture derived from administrative register data differ so markedly? The explanation lies in how PISA measures parental income: in the absence of a better option, pupils are asked about household possessions. While possessions may at times serve as a proxy for family wealth, in a context where administrative registers contain parents' actual income and education levels, it would be more appropriate to enable the use of these data rather than rely on pupils' assessments of proxy indicators. The article concludes: 'Educational inequality in Estonia has the face of a child who studies in an under-resourced school and comes from a disadvantaged socioeconomic background.' Although Estonia's internationally high PISA results – which are not in dispute – are a source of justified pride, the underlying inequality appears blurred, as if viewed through lenses that fail to bring the picture into focus. If, out of concern for children's and parents' privacy, we refrain from enabling data linkage, we may paradoxically be shielding these children from better educational opportunities in the future. The scale of educational inequality that is both growing and underestimated by roughly half directly influences whether and how education and social policy are directed to address it.

UNDERUSED DATA, RECURRING COSTS AND RECURRING RETURNS

This Human Development Report is data-driven and presents several findings in the field of education based on data that have so far been underused. A central premise of data-driven decision-making and governance is that the real value of data lies in their repeated and varied use. Data collection and storage are pure costs, whereas linking datasets creates added value, and using them to inform better decisions generates a return. Terje Trasberg, Marre Karu, Liina Osila and Kadri Rootalu describe studies conducted entirely or largely on the basis of administrative registers as so-called extra-programme statistical work. Such projects produce temporary, unique virtual linked datasets, which are typically deleted once the study is completed. There are valid reasons for deletion, but an unavoidable consequence – beyond the initial cost – is that each similar study, or any study relying on the same data, generates new costs. This creates a recurring and significant opportunity cost in both time and money, as recreating the same virtual dataset requires new authorisations and reconstruction of the data, even though those resources could be used elsewhere. One solution would be to archive the virtual datasets created and, subject to approval by the relevant ethics committee, allow controlled access to them. This would reduce recurring data-use costs and increase the returns from existing data.

FROM CROSS-SECTIONAL MEASUREMENT TO CONTINUOUS MONITORING

Milton Friedman argued that policies should be judged not by their intentions but by their results.[1] However noble the objective, a policy that is ineffective or produces the opposite outcome is ultimately a poor policy. Since the 2010s, Europe has witnessed what can be described as a microdata revolution: raw administrative register data have increasingly been linked and used for analysis, particularly to assess the impact of policy measures. Yet even when based on linked datasets, impact assessments typically take the form of static reports, and each new question requires a separate evaluation.

In the conclusion of their article, Eneli Kindsiko and Liis Roosaar propose practical steps to address the identified educational inequality. Implementing such measures, however, presupposes a data-driven approach to impact evaluation. Administrative register data are generated automatically through the routine activities of public institutions, meaning that when policy impacts are assessed using register data, additional data collection costs are minimal or already covered by the register owner. We should therefore commission fewer static cross-

sectional studies and place greater emphasis on the automated generation of knowledge from data that already exist.

Accurately identifying the scale of educational inequality determines the form and scope of possible policy interventions, while their effectiveness can be assessed only through continuous, automated monitoring. It would be problematic to discover three or four years later, after spending millions of euros, that although a policy was well-intentioned, its real-world effects were limited or even counterproductive. The need for course correction must be identified before substantial and irreversible costs are incurred.

The reflections accompanying the articles in this chapter consider how to move forward in light of these challenges. Dan Bogdanov notes that the Official Statistics Act both permits and restricts data processing: Statistics Estonia is well equipped to process data but less able to share them. Liiri Oja explores how to balance data protection and data use through the proportionate application of legal principles and the use of technological solutions. At times, achieving change may require renaming an established institution and using that moment to redefine its substance and expand its mandate. Dan Bogdanov raises the idea of transforming Statistics Estonia into a Data Agency – a proposal that warrants discussion.

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2.1

From data to decisions: How does Statistics Estonia help make society more informed?

Terje Trasberg, Marre Karu, Liina Osila and Kadri Rootalu

KEY MESSAGES

- In Estonia, administrative register data provide a strong foundation for the cost-effective analysis of societal developments, supporting evidence-based policymaking and practical solutions. Surveys are primarily used to collect data on attitudes, opinions and perceptions.
- In addition to producing official statistics, Statistics Estonia conducts commissioned studies and enables the use of its data for academic research.
- Faster and more effective reuse of data in Estonia requires stronger data governance and higher levels of data literacy.

INTRODUCTION

A vast amount of administrative data is generated in Estonia every day – in schools, businesses, public authorities and daily life. However, its potential often remains underused, as awareness of available data and their effective use is limited. Statistics Estonia plays a central role as the producer of official statistics, linking data from different domains to create a comprehensive and reliable picture of how Estonian society functions. The example of education shows how data linkage and analysis support evidence-based policymaking, labour-market planning and overall societal well-being. This article examines how administrative and survey data are currently used, why they must be further developed and how Statistics Estonia helps embed data-driven decision-making in public governance.

Education is at the heart of this Human Development Report. It is a field that affects everyone,

from national education policy to each individual's learning pathway across the life course. The education system collects data on pupils, teachers, curricula, the school network and levels of education. When these data are linked with one another and with other registers – such as population, employment and social registers – it becomes possible to analyse which educational pathways lead to higher earnings, how educational attainment affects migration, and in which regions shortages of teachers and support specialists are most acute. Such data linkage provides a comprehensive and up-to-date overview of Estonia's education system and supports more informed decisions in education policy and labour market planning, which in turn shape economic performance and overall societal well-being.

In a data-driven world, the clarity and accessibility of reliable information are as essential as individuals' own critical thinking. This is where Statistics Estonia plays a central role. As a producer of official statistics, it is responsible not only for describing social and economic phenomena but also for promoting data literacy, helping people in Estonia understand what data are available and how to use them effectively. Estonia has only two producers of official statistics – Statistics Estonia and Eesti Pank. The production of official statistics is governed by the Official Statistics Act, which sets out the obligations, rights, rules and principles that official statistics producers must follow. Its purpose is to ensure that users can rely on the quality and integrity of the data. Statistics Estonia thus bears significant responsibility in serving the public interest.

Official statistics offer a reliable picture of societal conditions and change, equipping decision-makers with information on developments in the population, social sphere, economy and environment. The data collected by Statistics Estonia are used in drafting development plans and forecasts, shaping policy, conducting academic and applied research and supporting evidence-based decision-making.

THE USE OF REGISTERS AND OTHER DATABASES IN OFFICIAL STATISTICS

Only statistical activities that are clearly justified and necessary for the regular monitoring of societal developments are included in the national official statistics programme. Under this programme, Statistics Estonia publishes data, infographics and other outputs in its database and applications, and transmits statistics to Eurostat, the statistical office of the European Union. These data are used by policymakers and other stakeholders in decisions that affect society.

Under the Official Statistics Act, Statistics Estonia may request data from various registers for statistical activities included in the national official statistics programme. The required variables are specified in agreements concluded between Statistics Estonia and the owner of the relevant register. The principle of data minimisation applies: the register holder provides only the data strictly necessary for carrying out the specific statistical activity.

Statistics Estonia also collects data through thematic surveys. As a result, it holds an extensive body of data covering multiple fields and time periods, which can also be used for academic research.

National registers offer considerably broader potential than official statistics alone, whose scope is defined by European Union regulations and the data needs of public authorities. When collecting data for official statistics and investing in registers, their potential for reuse should therefore always be considered – including uses that Statistics Estonia may not anticipate but that could prove valuable to other public sector institutions, researchers, the private sector or society more broadly.

THE ADVANTAGE OF A REGISTER-BASED CENSUS IS SPEED

A clear example of the extensive use of register data is the 2021 Population and Housing Census. The mandatory variables required under the

relevant European regulation – such as place of residence and educational attainment – were obtained from national registers. As a result, the lengthy questionnaire used in the 2000 and 2011 censuses was no longer necessary. Following the example of the Nordic countries, Estonia moved to a register-based census, as did the other Baltic states.

The main advantage of a register-based census is speed: the data were published within one year of the reference date, whereas in 2011 the process took nearly two years. In a context where timely data are expected, such a delay would now be difficult to justify. A register-based approach also makes it possible to update census information annually without repeatedly surveying the population, rather than only once a decade as in the past. Importantly, the use of register data does not compromise data quality.

However, the census variables were not available in registers in a one-to-one format; most had to be constructed from multiple sources. For example, around 20 different data sources were combined to determine place of residence. This illustrates the flexibility of reusing register data, compared with survey data, which are often used only once.

EDUCATION DATA ARE USED IN MULTIPLE WAYS

In education statistics, a clear example of data linkage is the derivation of the highest level of educational attainment of the population – that is, the highest completed level of formal education for each individual – by combining data from several sources, including the Estonian Education Information System (EHIS), which contains documentary records, and the Population Register, which is based on individuals' self-declared information. Although documentary sources are preferred, Population Register data are important where a person has completed their education outside the Estonian education system and this information is not fully recorded in EHIS.

EHIS also underpins other areas of education statistics, including early childhood education, general education, vocational education and higher education. Similar information is published by the owner of EHIS, the Ministry of Education and Research, on its Haridussilm platform. However, the added value of statistics compiled and published by Statistics Estonia lies in the possibility of linking these data with variables from other domains, such as population statistics, including mother tongue and socioeconomic background.

In addition, education data are collected through the Labour Force Survey, which forms the basis for calculating Eurostat's education indicators.[1] When conducting surveys, increasing attention is paid to reducing administrative burden and reusing existing data. For example, the Estonian Labour Force Survey draws on EHIS to obtain information on individuals' ongoing studies, meaning that respondents generally do not need to provide these details themselves.

Beyond the annual education indicators, more comprehensive adult education surveys are carried out every five to six years under Eurostat's coordination, both as household and enterprise surveys (AES – Adult Education Survey; CVTS – Continuing Vocational Training Survey). These provide information on the scope, forms and trends of adult education and job-related training.

The AES examines the extent and forms of adult participation in learning, including formal, non-formal and informal education. It also gathers information on the motivations and barriers affecting participation.

The CVTS focuses on job-related training provided by enterprises. It collects data on the scale of training activities, employee participation, training expenditure and the types of training offered. The results help assess employers' contribution to skills development.

WHEN OFFICIAL STATISTICS ARE NOT ENOUGH

Public governance and institutional decision-making often require information that goes beyond regular official statistics. Society evolves continuously – new phenomena emerge and new challenges arise that cannot always be addressed through standard statistical outputs.

In some cases, a one-off and more in-depth analysis is needed. A clear example is the Covid-19 crisis, when urgent analytical needs concerned remote working, mobility patterns and the rapid production of mortality and hospital capacity statistics.

New data sources and methods for producing and analysing statistics are continually emerging. At the same time, different stakeholder groups may require information on more specific target groups than is usually available in national statistical outputs.

If a required breakdown is not available in published tables but the underlying data exist, it is possible to commission a paid extra-programme statistical analysis. Such work may be requested by researchers, those preparing legislative amendments, companies such as research firms, or representatives of interest groups such as farmers' organisations. This makes it possible to combine data sources and carry out analyses that fall outside the scope of regular official statistics.

Extra-programme statistical work may also include commissioned surveys. For example, at the request of the Ministry of Education and Research, Statistics Estonia conducts the Programme for the International Assessment of Adult Competencies (PIAAC).[2] As in the production of official statistics, register data were used in this survey to pre-fill parts of the questionnaire. Respondents could review and correct the pre-filled information. These data included, for example, year and month of birth, sex, highest completed level of education, and job title and occupation, based on information from the Employment Register.

At the request of various public institutions, Statistics Estonia has prepared analyses based on existing or previously collected data, including both register and survey data. For example, an analysis of the economic impact of international students[3] combined education and employment data, while a study of young entrepreneurs[4] examined the factors influencing young people's transition into entrepreneurship.

Education policymaking has benefited significantly from the possibility of commissioning such studies and analyses. These activities have generated substantial knowledge about the education sector – insights that would not have been possible without the extensive use of register data. Let us now consider recent examples of commissioned work related to education.

EXAMPLE 1. The impact of introducing tuition fees in vocational education: adult learners in vocational education and lifelong learning

An analysis of adult participation in formal vocational education and lifelong learning[5] examined how the introduction of tuition fees in vocational education affects adult learners and what alternatives to vocational study exist, such as other forms of training. For this purpose, data from the Estonian Education Information System, the Statistical Population Register, the Employment Register of the Tax and Customs Board, and the Estonian Labour Force Survey were combined. The analysis covered adults aged 20 and over who were enrolled in formal vocational education or participated in in-service training between 2019 and 2024.

The study supports the state in planning vocational education reform, as a substantial number of young learners are expected to enter formal education. As a result, fewer state budget resources will remain available to fund tuition-free study places for adult learners.

The analysis identified three main risk groups:

- **Russian-speaking residents of Ida-Viru County,** whose previous education may no longer meet current labour market needs;
- **individuals with experience of unemployment,** who may lack the financial means to participate in fee-based training and may recently have completed studies in another field;
- **older learners** who would prefer to focus on their studies rather than combine them with work, but for whom too little time has passed since their previous studies to enrol in a new programme.

EXAMPLE 2. Annual analysis of the economic impact of international students

At the request of the Education and Youth Board, Statistics Estonia has conducted six analyses of the revenue generated for the state by international students studying and working in Estonia.[6] The most recent study showed that in the 2023/2024 academic year, nearly half of the 4,336 international students were employed. Together, they paid 5.4 million euros in income tax and 10.3 million euros in social tax. Their average monthly salary was similar to that of employed local students – slightly over 1,600 euros. In addition, many young people from abroad remain in Estonia after completing their studies and entering employment: half of graduates stayed to work in Estonia in the year following graduation. During their studies, international students most often work in engineering, manufacturing and construction, or in education. After graduation, those most likely to remain are graduates in information and communication technology, and in engineering, manufacturing and construction. This is likely supported by the large number of companies in these fields offering an international working environment in Estonia.

EXAMPLE 3. Where do young teachers go? Analysis for 2015–2022

In the context of the current teacher shortage, an analysis entitled 'The career trajectories of teachers in 2015–2022' was conducted in 2022.[7] The study examined the career paths of individuals who were working as teachers in 2019 and the subsequent changes in their employment. Particular attention was paid to those who had recently entered the profession.

The findings show that young teachers remained in their positions more consistently over both one and two years than young people in other occupations. After three years, 60% of teachers were still in the same job, whereas half of their same-age peers in other occupations had already moved on. Job mobility is common among young people in general, and teachers do not stand out negatively in this respect.

EXAMPLE 4. Analysis of target groups in adult education in Estonia

The analysis of priority target groups in adult education identifies which population groups participate more actively in adult education and how the main target groups are distributed across counties, as well as in Tallinn and Tartu. It provides an overview of the key target groups in adult education in Estonia. The study required the use of a large volume of data, including Statistics Estonia's Statistical Population Register, migration data, the Estonian Labour Force Survey, business demography statistics, data used for policy impact assessment, data from the Social Insurance Board, the Employment Register, and data from the Tax and Customs Board.

In addition to education-related topics, Statistics Estonia has supported policymaking in areas such as health, labour policy, tourism and entrepreneurship. The use of national administrative datasets has saved considerable time and resources that would otherwise have been required for survey research. Moreover, register data enable much more detailed analysis, because no sample-based survey can provide information as comprehensive as that available from administrative registers.

DATA FOR RESEARCH

In academic research, data are commonly accessed through Statistics Estonia's secure data laboratory. Subject to the necessary permissions from the Data Protection Inspectorate and an ethics committee, researchers are granted access to microdata, which they analyse in accordance with strict data protection requirements. The required datasets are prepared by Statistics Estonia's staff, and individuals cannot be directly identified, as the data are pseudonymised. External data can also be imported into the secure environment for joint analysis. Using this approach, researchers from Estonia and other countries have examined fertility trends, the gender pay gap, regional income inequality, the effectiveness of inclusive education policies and many other topics.

EXPECTATIONS FOR STATISTICS ESTONIA IN ENHANCING THE VALUE OF DATA

In recent years, both the government and stakeholders in Estonia have called for faster and more effective reuse of existing data to improve the availability of information for policymaking and reduce administrative burden. In the European Union and globally, data are increasingly viewed not as a by-product but as an asset that can contribute to economic development. The potential of the data economy is considered significant, but realising it requires high-quality data and the ability to use them effectively – in other words, data literacy.

Although the once-only principle in data collection has long been recognised in Estonia's public sector, the rise of artificial intelligence has further underlined its importance. High-quality data are the foundation for the effective use of artificial intelligence, which is already essential for maintaining global competitiveness from both a societal and an economic perspective.

As a result, expectations of statistical offices are rising in Europe and worldwide. Since data from multiple domains are brought together at Statistics Estonia for the production of official statistics, it is reasonable to expect that the office has the strongest expertise and capacity in data governance. Since 2019, Statistics Estonia has had a statutory mandate under the Official Statistics Act to coordinate data governance across the state. It has issued guidelines and provided advisory services to Estonian public authorities on improving data management and ensuring interoperability.

In Statistics Estonia's development plan for 2023–2030, promoting data literacy is identified as a key organisation-wide objective. The aim is to ensure that data are used correctly and effectively, and that Statistics Estonia serves as the primary and most trusted source of data on Estonia. To strengthen data competence, the office engages actively with its partners, provides guidance on interpreting and using data through its website, and offers data training on request. It also develops data stories and applications, such as dashboards[8] and the salary application,[9] in which data are presented in an accessible and engaging way. Statistics Estonia has thus already taken steps to meet these growing expectations.

SUMMARY

More effective data reuse requires strong data governance and data literacy across society. By linking data from different sources, Statistics Estonia, as the producer of official statistics, plays a central role in providing reliable knowledge and in embedding data use as a routine part of public governance. The example of the education sector demonstrates that integrating and analysing different types of data supports evidence-based policymaking, labour market planning and overall societal well-being.

REFLECTION

Dan Bogdanov

Oh, if only we had as many people asking questions as the Republic of Estonia has data to answer them.

Perhaps proper data governance would then be valued more highly, and the necessary services and capabilities would be developed. Estonia's e-state is older and more mature than that of many other countries, and as a result we have accumulated a substantial body of data. It is true that at least once a year someone complains about how complex and inconvenient access to data can be, or asks, 'Why can't we simply look it up?' In other words, there is a clear demand for secondary use of data. Estonia needs this.

Unfortunately, at least once a year – and regrettably more often – we also read in the press how an Estonian organisation has 'revolutionised' secondary use and, whether through negligence or with the help of cybercriminals, has allowed data to become public.

And what of it? Is privacy not dead anyway in the age of social media and artificial intelligence?

The problem is that society does not know – or does not fully grasp – how much power can be exercised over a person when everything about them is known. Social media users can be more easily persuaded to buy products or even to change their beliefs. Wider circulation of health data would undermine the very logic of health insurance and make the lives of leaders and politicians more precarious, exposing them to blackmail.

In one version of an Estonian folktale, the Devil had resolved to prevent the builder of St Olaf's Church in Tallinn from placing the cross on the roof. The builder's protection lay in keeping his name secret, as knowing a person's name was believed to confer power over them. The name was unwittingly revealed by his wife, who, while singing to their child one evening, promised that once the church was finished, Olev would return home with treats. Later, as Olev was setting the cross in place, someone shouted from below, 'Olev, Olev, the cross is crooked!' Startled, he fell from the tower and died. Our forebears – like many indigenous peoples around the world – understood the power that a name can hold over a person.

One of the most tragic contemporary examples of data reuse comes from Afghanistan after the withdrawal of the United States. A biometric database and related equipment created for the state fell into the hands of the Taliban, making it far easier to identify those they deemed undesirable.

Should we allow fear to hold back innovation?

No. Fear clouds judgement and stifles action.

We must ensure that our institutions are strong and adhere to their principles. At the same time, we must prepare for a future in which, for example, budget cuts or shifts in management culture weaken institutional memory and organisational safeguards. To mitigate this risk, privacy-enhancing technologies should be introduced to make unauthorised or unintended secondary use of data as difficult as possible, including within organisations themselves.

How can this be achieved? Public authorities in Estonia are currently facing budget reduction targets. Investments in data and artificial intelligence under Estonia's AI strategy are justified by the prospect of reducing future costs by streamlining the state – with technology replacing human labour. Should the aim be a smaller or a stronger Statistics Estonia?

The current Official Statistics Act both permits and restricts the processing of state data. Statistics Estonia may process data but is not allowed to share them. My wish is that Statistics Estonia should not have greater capacity to track individuals through location data than the Police and Border Guard Board. At the same time, I want more value to be created from data in Estonia. We do not have the resources to duplicate this function and expertise elsewhere.

By European standards, Statistics Estonia is highly innovative and forward-looking. Should it perhaps become a Data Agency instead?

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2.2

PISA blindness: Why is Estonia not using the full potential of its register data?

Eneli Kindsiko and Liis Roosaar

KEY MESSAGES

- **Educational inequality in Estonia has the face of a child who studies in an under-resourced school and comes from a disadvantaged socioeconomic background. School environments vary widely – some lack teachers, support specialists and learning** materials, while others are comparatively well resourced. This raises the question of whether shortages at school are increasingly pushing parents to compensate for these shortcomings with their own resources.

- **Tallinn is the region where educational stratification is deepening most rapidly.** In the capital, the association between pupils' mathematics results and the average income of their parents has consistently been nearly twice as strong as elsewhere in Estonia.

- **Although Estonia is known as an e-state, digital development has not been evenly reflected in the education sector.** Register data – whose use has been constrained by limited awareness and increasingly stringent data **protection requirements – could already some time ago have shown that educational inequality was deepe**ning. By contrast, PISA's socioeconomic status indicator, which rests on a weak scientific foundation, tends to soften or distort the actual picture.

INTRODUCTION

According to the OECD definition, educational equity does not mean that all pupils achieve the same outcomes, but that their success should not depend on factors beyond their control, such as socioeconomic background.[1] The influence of social background on learning outcomes varies

by age, gender and subject: it tends to be stronger where the impact of school is weaker – for example, in reading – whereas school quality plays a greater role in subjects such as mathematics and science. The deepening of educational inequality in Estonia calls for decisive action to improve the quality of schools that are in a weaker position. Data-driven education analytics have significant – yet largely underused – potential to support such efforts.

CRITIQUE OF PISA'S SOCIOECONOMIC STATUS INDICATOR

Until now, Estonia has relied on the PISA assessment to evaluate educational inequality. However, the 2022 results, which indicated increasing stratification – with 13% of the variance in mathematics performance explained by pupils' home background – raise the question of whether educational inequality in Estonia has genuinely intensified in recent years, or whether the change reflects differences in measurement rather than a new development.[2] It should be noted that PISA's background indicator has changed over time, most notably in the 2022 cycle, and direct comparisons with earlier results are not always appropriate, even though they are often made. We wish to emphasise that this article examines only the adequacy of PISA's socioeconomic background indicator and does not in any way question the quality of PISA's academic assessments.

International research cautions against drawing overly far-reaching conclusions from PISA's background indicator. It cannot therefore be claimed that pupils' socioeconomic background has begun to influence results only recently. In the academic literature, uncritical reliance on prestige and titles is described as prestige bias.[3] We tend to place greater trust in individuals and institutions that have already achieved success or recognition in a particular field. This so-called fast track of trust operates especially quickly in the case of international rankings such as PISA. However, the reliability of a study depends not on institutional authority, but above all on methodological rigour and relevance. Unfortunately, PISA's high prestige has overshadowed a more thorough examination of internal inequalities in Estonia.[4]

In the academic literature, the so-called golden trio for measuring educational inequality consists of parental income, occupation and education. In PISA, pupils' home background is measured using the index of economic, social and cultural status (ESCS), which combines social, economic and cultural factors into a single composite indicator. Researchers have argued that the ESCS lacks a clear scientific foundation: while it includes parental education and occupation from the classical socioeconomic trio, it substitutes family income with household possessions as a proxy.[5] The core problem of PISA's socioeconomic background indicator lies in how the data are collected. The measure is based on pupil questionnaires, and evidence from Germany suggests that children from poorer families are more likely not to respond.[6] We therefore examine in more detail the limitations of the three components used by PISA to assess pupils' socioeconomic background.

The economic component, 'home possessions and resources', measures material well-being on the basis of consumption patterns – specifically, items available in the homes of 15-year-olds.[7] Pupils indicate whether certain items are present at home, such as a desk for studying or their own room. The index also includes three country-specific items (see Table 2.2.1) that PISA considers indicative of family wealth in that particular country.

According to a 2025 survey by Kantar Emor, 56% of Estonia's population believe that small loans are granted too easily, and nearly one fifth have taken out a consumer loan in the past three years.[8] This raises doubts about the use of possessions as a proxy for wealth. For example, purchasing a PlayStation on instalments does not mean that a family can afford to hire a private mathematics tutor if the child develops learning gaps.

Traditionally, the number of books at home has been treated as an indicator of a strong intellectual environment associated with higher academic achievement. PISA includes a question on how many books pupils have at home, broken down by type, such as religious books, classical literature, scientific books and technical manuals, and by precise ranges of 1–5, 6–10 and more than 10 books. It is questionable whether even

Table 2.2.1 PISA indicators of family wealth (home possessions) in selected countries

	Estonia	Latvia	Lithuania
2022	Games console, own desk for studying	Bicycle, scooter, antiques	–
2018	Video camera, camera, dishwasher	Smartphone, bicycle, scooter	–
2012	Video camera, camera, dishwasher	MP3 player, bicycle, digital camera	Digital camera, newspaper subscription, video camera
	Finland	**Sweden**	**Norway**
2022	Home security system, garage	Home cinema	Own desk for studying, electric bicycle
2018	Laptop, home security system	Piano, domestic helper, espresso machine	Tablet computer, smartphone, e-reader
2012	Laptop, flat-screen television, home security system	Piano, hot tub, espresso machine	iPad, iPhone
	Germany	**France**	**Slovenia**
2022	Own desk for studying, quiet place to study	Paid TV package (e.g. Netflix), action camera (e.g. GoPro)	Multifunction printer, sports equipment (e.g. skis, bicycle), external hard drive
2018	One or more musical instruments, video camera, smartphone	Espresso machine, digital camera, home cinema	Laptop, paid leisure activities, holidays of at least one week abroad per year
2012	Games console (e.g. PlayStation), audiobooks, television in own room	Espresso machine, camera, home cinema	Personal laptop, paid leisure activities, holidays of at least one week abroad per year
	Japan	**South Korea**	**Switzerland**
2022	Games console (e.g. PlayStation)	Own desk for studying, air conditioner, air purifier, massage chair	Dishwasher, lawnmower
2018	Antique furniture, guest room, home security system	Air conditioner, dishwasher, separate screen and speakers for watching films	Musical instrument, smartphone, digital video camera
2012	Camera, plasma or LCD television, washing machine	Air conditioner, digital television, refrigerator or air purifier	Musical instrument, iPhone, digital video camera

SOURCE: OECD,[9] PISA[10]

the average adult could answer this with such precision.

In PISA, the background questionnaire is generally completed by pupils themselves, while parental questionnaires are voluntary and implemented only in some countries. In a limited number of countries, this has made it possible to compare pupils' and parents' responses to questions on socioeconomic background. For items such as books and digital devices, agreement between pupils' and parents' responses is below 50%.[11] The OECD itself acknowledges this limitation: 'Direct data collection from parents can be impractical in large-scale studies due to its associated costs. […] Proxy-reporting by pupils about their parents' occupations and educational attainments is a pragmatic solution, but concerns about the completeness and accuracy of the collected data can be raised.'[12]

The social component, 'parents' occupational status', is measured on the basis of parents' occupation and job position. In general, pupils underestimate their parents' occupational status almost as often as they overestimate it – by 20% and 21%, respectively.[13] PISA reports also note that the share of missing and inaccurate data has increased over time. Most frequently, pupils fail to report their parents' occupation – in the United Kingdom and Germany, this applies to more than 20% of pupils – and non-response is more common among those from weaker socioeconomic backgrounds.[14]

As for the cultural component, 'parents' level of education', almost one in three pupils provides information that differs from that reported by the parent. Underestimation (18%) is more common than overestimation (13%). Pupils whose parents in fact have a lower level of education tend to overestimate their parents' educational attainment.[15]

EDUCATIONAL INEQUALITY IS DEEPENING – REGISTER DATA WOULD HAVE SHOWN THIS SOME TIME AGO

Across Estonia, the association between parental income and schools' mathematics results has strengthened over time (Table 2.2.2). In 2017, the correlation with mothers' and fathers' income was moderate; by 2021, it had become strong. At the same time, the negative association between pupils' examination results and the share of social benefits in family income has intensified. The higher the proportion of benefits in household income, the lower the school's average mathematics examination results tend to be.

Table 2.2.2 Association between a school's average mathematics examination result and parental economic status, 2017–2021

	2017	2018	2020	2021
Mother's income	0.392***	0.447***	0.455***	0.494***
Father's income	0.362***	0.420***	0.471***	0.509***
Share of benefits in family income	–0.331***	–0.352***	–0.415***	–0.456***
Number of schools in the sample	327	336	342	349

SOURCE: Statistics Estonia data

NOTE. The table presents Pearson correlation coefficients. In interpreting their strength, $r < 0.3$ indicates a weak association, $0.3 \leq r < 0.5$ a moderate association and $r \geq 0.5$ a strong association. Correlations marked with (***) are statistically significant at the 0.05 level. The square of the Pearson correlation coefficient corresponds to the coefficient of determination in a regression model with one explanatory variable. The coefficient of determination shows the proportion of variance in the dependent variable that is explained by variation in the independent variable.

Data and methodology. Statistics Estonia's data on the income of parents (mother, father and total household income) of pupils in Estonian general education schools, as well as the share of social benefits in household income for 2017–2021, were combined with average lower secondary mathematics examination results obtained from the Ministry of Education and Research (EHIS data). The data were linked by Statistics Estonia; researchers received the results in aggregated form, that is, as school-level averages.

Time required: 1–2 months for consultations on data protection requirements and six working hours for data linkage (Statistics Estonia). Cost: 360 euros, covering the linkage of datasets from different registers by Statistics Estonia.

Sample: Using Estonian register data, it was possible to cover nearly 350 basic schools, where between 12,000 and 14,000 pupils per year sat the mathematics examination and completed Grade 9 in 2017–2021. In those years, approximately 126,000–133,000 pupils were enrolled in basic education, depending on the academic year (population used to calculate average parental income). By comparison, PISA 2022 covered 6,392 pupils in 196 schools.

After the initial analysis, the authors also applied to extend the income data series to 2024, but due to stricter data protection requirements this was no longer permitted.

In the capital city, Tallinn, educational stratification has deepened particularly markedly (see Table 2.2.3 and Figure 2.2.1). While the association between a school's average income of mothers and its average mathematics examination results has remained consistently strong in the capital, the same relationship elsewhere in Estonia has been almost twice as weak and has strengthened only gradually. In 2021, the average income of mothers explained 24% of the variance in lower secondary mathematics examination results across schools in Estonia as a whole; in Tallinn, the figure was 50%, compared with 15% in the rest of Estonia.

The influence of fathers' income is even more pronounced in Tallinn: over time, the association between mathematics results and fathers' income has become very strong in the capital, while elsewhere in Estonia it has remained moderate. This indicates that in Tallinn, school results increasingly reflect parental economic background. A similar pattern is observed in relation to the share of social benefits in household income.

Whereas in 2017 a school's average mathematics result was largely clustered between 30 and 40 points, by 2021 Tallinn in particular had seen growth at both ends of the distribution – more lower-performing schools (below 20 points) and more higher-performing schools (above 40 points). This points to widening inequality between schools in the capital (Figure 2.2.2). In Tallinn, children living only a few kilometres apart may face markedly different starting points in life: in one school the average mathematics result barely exceeds 20 points, while in another nearby it approaches the maximum.



Table 2.2.3 Association between a school's average mathematics examination result and parental economic status: Tallinn, the rest of Estonia excluding Tallinn, and the rest of Estonia excluding Tallinn and Tartu

Region	2017	2018	2020	2021
Mother's income (Tallinn)	0.677***	0.730***	0.716***	0.704***
Mother's income (excl. Tallinn)	0.284***	0.347***	0.351***	0.389***
Mother's income (excl. Tallinn and Tartu)	0.224***	0.295***	0.285***	0.330***
Father's income (Tallinn)	0.637***	0.728***	0.789***	0.775***
Father's income (excl. Tallinn)	0.248***	0.309***	0.355***	0.395***
Father's income (excl. Tallinn and Tartu)	0.179***	0.251***	0.289***	0.332***
Share of benefits in family income (Tallinn)	−0.643***	−0.693***	−0.743***	−0.708***
Share of benefits in family income (excl. Tallinn)	−0.267***	−0.288***	−0.369***	−0.406***
Share of benefits in family income (excl. Tallinn and Tartu)	−0.220***	−0.248***	−0.322***	−0.369***

SOURCE: Statistics Estonia data

NOTE. The table presents Pearson correlation coefficients. In interpreting their strength, $r < 0.3$ indicates a weak association, $0.3 \leq r < 0.5$ a moderate association and $r \geq 0.5$ a strong association. Correlations marked with (***) are statistically significant at the 0.05 level. The square of the Pearson correlation coefficient corresponds to the coefficient of determination in a regression model with one explanatory variable. The coefficient of determination shows the proportion of variance in the dependent variable explained by variation in the independent variable.

WHAT MATTERS MORE – PARENTS' EDUCATION, MONEY OR GENES?

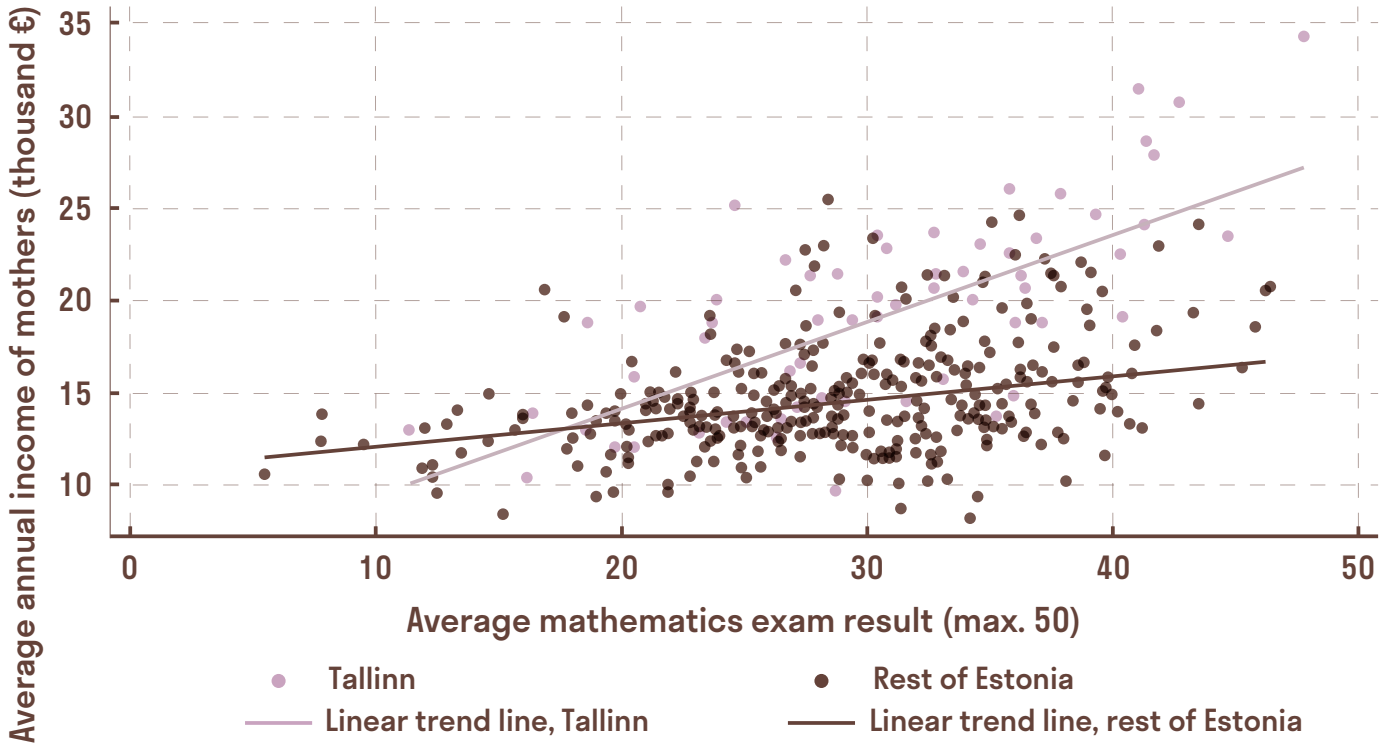
The general premise underlying socioeconomic status indices is that parental education, occupation and economic resources are directly associated with children's learning outcomes. This is often supplemented by the so-called genetic lottery argument – the assumption that higher-status families also possess more favourable genetic endowments. Let us consider whether the picture is really so clear-cut.

The influence of parental background, and especially educational attainment, on educational outcomes has been debated extensively since 1966, when James S. Coleman and colleagues published the report *Equality of Educational Opportunity*.[16] That study, along with subsequent research, found that alongside school resources, family background and parental education play a significant role in shaping children's academic achievement.

Should this be the end of the debate – the conclusion that children of more educated parents perform better academically?

It is nevertheless important to remain critically aware of context when invoking older studies – national and societal conditions have changed, particularly when comparing Estonia's education system with others. Arguments often draw on research conducted in the United States in the 1960s–1980s, which highlighted the decisive role of parental education.[17] Yet this effect depends heavily on interactions with other factors – family income, family structure and regional opportunities – which differ today. For example, a highly educated mother raising a child alone may not necessarily be able to offset learning gaps that arise in a low-performing school facing shortages of qualified teachers and support specialists. In short, parents may at times have to compensate

Figure 2.2.1 Association between school average mathematics examination results (2021) and mothers' average annual income (2020)



SOURCE: Statistics Estonia data

for differences in school quality. This does not imply that parental education is unimportant, but it does not explain the full picture, nor why children of less educated parents also reach higher education. What matters more is parental example – the extent to which parents engage with their children and encourage learning.[18] Although such support is more often associated with educated parents, it may equally characterise those with lower levels of education.

The genetic lottery argument has also been widely examined: do genes determine a child's academic success? Genes do play a significant role in explaining differences in mathematical ability and general cognitive capacity.[19] However, this does not mean that the environment lacks substantial influence. Nor can it be assumed that only talented or genetically advantaged children are born into wealthier and more educated families. The academic literature recognises the phenomenon of 'twice-exceptional' (2e) children – those who are both highly gifted, or have a high IQ, and have special educational needs, such as dyslexia, attention deficit hyperactivity disorder or autism. Research shows that pupils from weaker socioeconomic backgrounds are identified as gifted far less often, meaning that twice-exceptional children from poorer families frequently go unrecognised and unsupported. Giftedness and special educational needs may co-occur and often mask one another, making identification and appropriate support more complex. Studies in the United States indicate that pupils from the highest-income families are identified as gifted six times more often than those from the lowest-income families, which suggests that twice-exceptional children from poorer families face a particularly high risk of being overlooked.[20] By neglecting disadvantaged schools and children from weaker socioeconomic backgrounds, substantial talent may be lost in Estonia.

The expression of genetic potential depends to a large extent on the environment, and educational

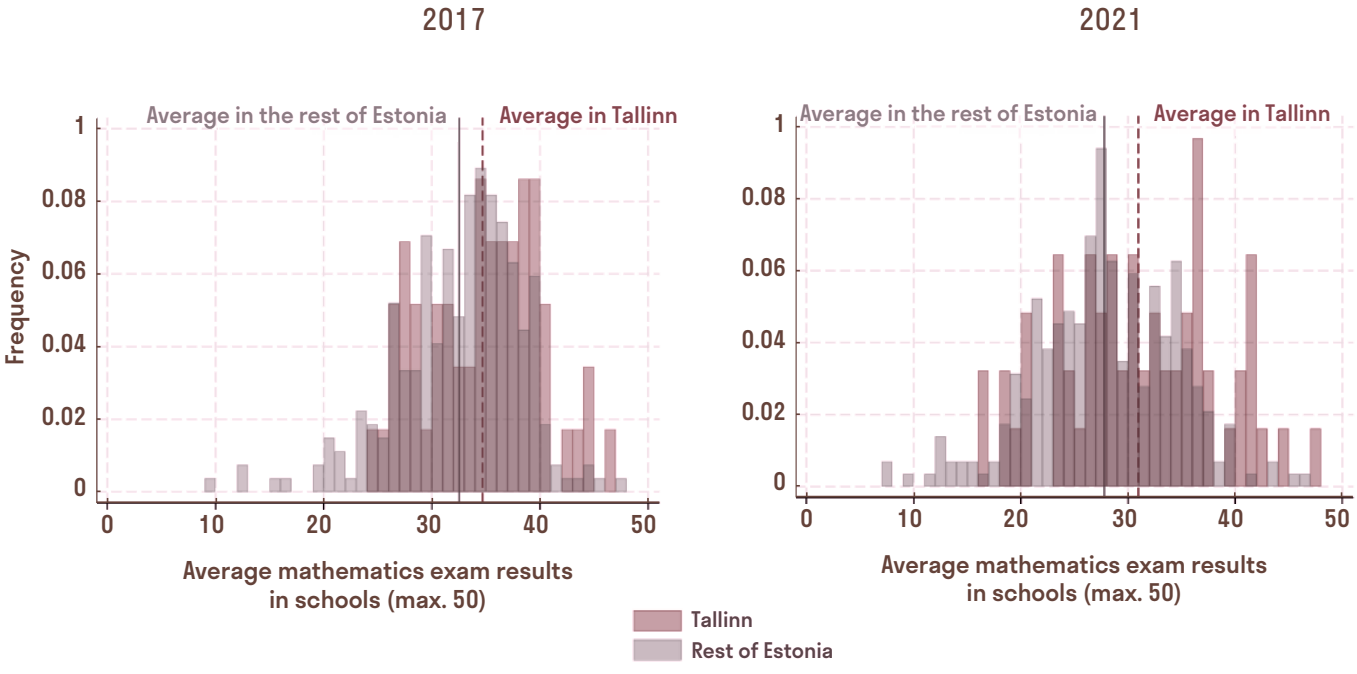
institutions play a central role in this process – schools may function either as a force that mitigates inequality or as a mechanism that reinforces it.[21] A school may reinforce inequality if a systemic shortage of qualified teachers and support specialists disproportionately affects schools serving pupils from weaker socioeconomic backgrounds. Relying on the genetic lottery argument effectively downplays the role of school as an environment shaping child development and overlooks children and young people born into poverty who attend schools lacking the skills and resources needed to compensate for their home background.

A higher socioeconomic background also gives families a compensatory advantage.[22] A cognitively less capable child born into a more advantaged family is more likely to obtain a good education than a gifted child from a weaker socioeconomic background. Parents may compensate for lower academic performance by providing additional support, such as preparatory schooling or private tutoring.[23] They may also help to mitigate obstacles linked to potential genetic risks, including learning or behavioural difficulties.[24]

A Dutch study involving more than 29,000 pairs of twins found that both family and school socioeconomic background shape the expression of genetic risks, placing children from weaker backgrounds at a double disadvantage.[25] Their home environment does not sufficiently offset these risks, and they often attend under-resourced schools. In such cases, a supportive school environment may be decisive. Meta-analyses confirm that a safe school climate, positive relationships with teachers, high expectations and the strengthening of self-confidence can reduce the negative effects of socioeconomic background.[26] Dutch data further indicate that when schools raise expectations and self-belief among pupils from weaker backgrounds, the impact is considerably greater than for children from wealthier families.[27]

Much has been written about pupils' socio-economic background as a feature of the home environment, but less attention has been paid to the socioeconomic environment of schools, that is, their resources. While pupils' socioeconomic background largely reflects parental background, two dimensions can be distinguished at school

Figure 2.2.2 Average mathematics examination results in schools in Tallinn and elsewhere in Estonia, 2017 and 2021



SOURCE: Statistics Estonia data

level: the school's socioeconomic profile (the aggregate of pupils' backgrounds) and its internal resources and quality indicators, including the quality of teaching and school leadership. Schools serving pupils from weaker socioeconomic backgrounds often operate with limited resources – shortages of teachers, support specialists and teaching materials are common.[28] These schools therefore face a double disadvantage. In Estonia, educational inequality has the face of a child who studies in an under-resourced school and comes from a disadvantaged socioeconomic background. For example, a systemic shortage of subject teachers in certain schools reduces pupils' opportunities to progress, giving an advantage to those whose parents can provide private tutoring or have relevant subject knowledge themselves. The expansion of so-called shadow education – the private tutoring market – is often an indicator of educational inequality.[29]

How, then, should we resolve the debate over what is decisive in a child's development – the mother's education, family wealth or genes? Education is a complex system in which no single factor determines success: if one link is weak, others must compensate. In Estonia, it is worth asking to what extent disparities in school resources – shortages of teachers and support specialists, limited opportunities to purchase high-quality textbooks or equip laboratories – intensify educational inequality, and whether this increasingly pushes parents to offset school shortcomings through their own spending or through educational mobility, that is, seeking a better school elsewhere.

SUMMARY: HOW DO WE MOVE FORWARD?

In Estonia, there is a clear need to differentiate teachers' salaries by subject, alongside a strategic focus on improving teaching quality in those subjects. Why is it important to consider subject teachers' alternative employment opportunities? Research from other countries shows that teachers earn on average 23.5% less than other professionals with the same level of education – a phenomenon known as the teacher pay penalty.[30] This gap is most pronounced for science and mathematics teachers, whose skills are in high demand and often better rewarded outside schools. At the same time, in some subjects teaching offers a relative pay advantage and may represent the most attractive career path.

Data on those trained as mathematics teachers in Estonia show that in 2024, a qualified mathematics teacher not working in a school earned approximately 1.6 times as much in Harju County (2,838 euros), 1.4 times as much in Tartu (2,573 euros) and 1.3 times as much elsewhere in Estonia (2,459 euros) compared with the minimum teacher salary (1,820 euros in 2024).[31] Research indicates that increasing the salaries of teachers in STEM subjects could reduce their rate of leaving the profession by 18–28%.[32] The Basic Schools and Upper Secondary Schools Act provides that knowledge in selected subjects – primarily mathematics, Estonian and a foreign language – is assessed at graduation. The state has therefore already assigned greater importance to certain subjects. These subjects play a decisive role in shaping young people's subsequent educational pathways.

Data-driven education policy. Estonia has excellent administrative registers for addressing educational inequality in a targeted way, yet for years – if not decades – we have largely relied on conclusions drawn from PISA background questionnaires. This has contributed to a form of PISA blindness in understanding inequality within the education system. Register-based data in Estonia should be used far more decisively to design targeted measures to reduce educational inequality. In analysing inequality, particular attention should be paid to schools' socioeconomic context – including teacher qualifications and availability, the quality of school leadership, the presence of support specialists and pupil–teacher ratios. However, the potential of Estonia's e-state in education is limited by insufficient awareness of existing data – we tend to commission new and time-consuming surveys rather than use administrative data – and, even more so, by increasingly stringent data protection requirements.

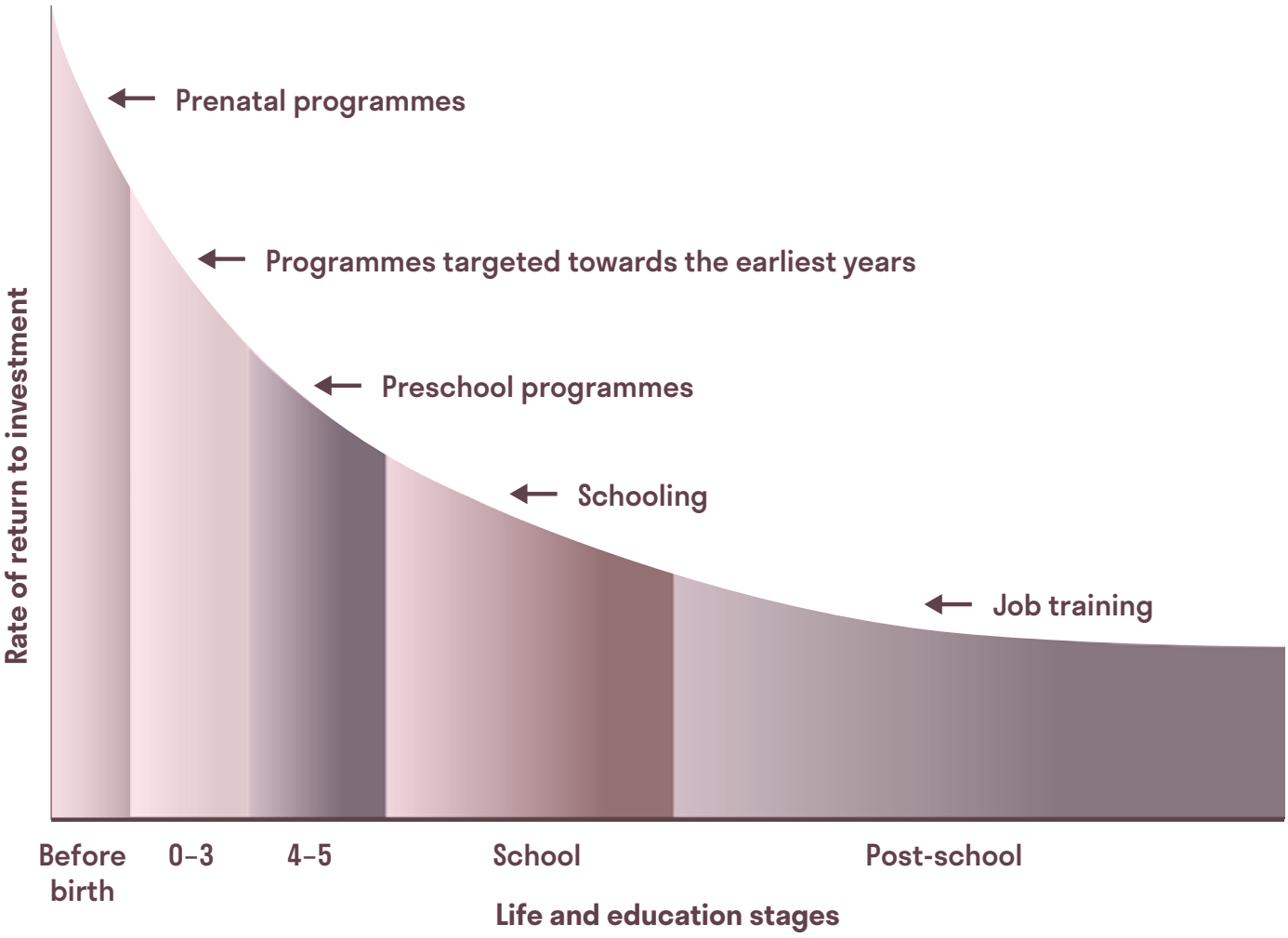
Systematic use of register data should form the foundation of education policy, both in monitoring developments and in planning reforms. For example, when designing teacher career and

salary models, decisions should be based on a comprehensive data-driven assessment rather than on formal qualifications alone. Otherwise, we may end up in a situation where mathematics is taught by a formally qualified history teacher without subject-specific competence, while an experienced engineer with strong teaching skills who wishes to change career is considered less suitable simply because they lack formal teacher certification.

It would also be worth considering linking PISA academic test results with Estonia's administrative register data in order to analyse the background characteristics of participating schools and pupils' socioeconomic background, and to track developments over time – for example, what has become of high-performing PISA pupils ten years later, whether school results have improved or declined, and what characterises the schools of top performers. The aim would not primarily be international comparison but a deeper understanding of Estonia's own education system.

Teacher quality is most decisive for pupils from weaker socioeconomic backgrounds. We must also have the courage to ask what impact a poor teacher or school has on a pupil's future. Nobel laureate James J. Heckman has emphasised that educational inequality is not only a social issue but also an economic one – supporting disadvantaged children increases societal productivity and reduces future costs, such as unemployment and crime.[33] Preventing educational inequality is therefore far less costly than addressing its consequences later. As Heckman's well-known curve on the rate of return to education

Figure 2.2.3 Rate of return to investment in education across the life course



SOURCE: Heckman[34]

investment illustrates (see Figure 2.2.3), public investment in the early development of children from low socioeconomic backgrounds yields the greatest returns.

Research also shows that the impact of pupils' social background on learning outcomes varies across countries: it depends on age, gender and even subject. In general, home background matters more where the influence of school is weaker (e.g. reading), whereas school quality plays a stronger role in subjects shaped directly by school practice (e.g. mathematics and science).[35] For this reason, in Estonia greater attention should be paid to the quality of teaching in STEM subjects – including learning materials, teacher competence and instructional quality, competitive salaries, and class sizes in these subjects. The quality of school leadership must also not be overlooked: even the most capable teachers cannot realise their potential if school management and working conditions are weak.[36]

REFLECTION

Liiri Oja

The Estonian Constitution states that everyone has the right to education. Protecting and promoting fundamental rights is a constitutional duty of the state. Safeguarding these rights must therefore remain a priority and must not be overshadowed by other objectives. In the case of the right to education, the state must understand and take into account how access to schools, safety, children's cultural and gender identity, and socioeconomic factors shape educational outcomes. Addressing educational inequality is thus a matter of protecting fundamental rights.

To safeguard fundamental rights, legislation and education policy must be evidence-based. Evidence-based policymaking, in turn, requires data-based decision-making. The methodology for measuring educational inequality is for education researchers and statisticians to determine. From a fundamental rights perspective, however, it must be recognised that the collection, analysis, publication and retention of data – even when aimed at improving the protection of fundamental rights – must itself always be grounded in those same rights. In each case, the benefits and risks of collecting personal data must be carefully weighed. Data protection is relevant to all fundamental rights, but in practice it most often concerns the protection of personal data, that is, the right to privacy.

With the rapid development of information technology in the second half of the 20th century, the collection, storage and processing of data concerning large numbers of individuals became possible. It soon became clear that if data could easily be copied on lawful grounds, they could just as easily be copied unlawfully – for example, by disseminating private information or infringing copyright.[37] In this context, the current European data protection framework and practice have evolved: we are more aware of the risks associated with digital information and its impact on private life.

The deployment of artificial intelligence presents new challenges for data protection. Both Estonian and European Union data protection law follow a case-by-case approach: each instance of data use must be assessed individually. Data dispersion, transparency of use, reliability and oversight must be ensured. The purpose of data protection law is not to obstruct the development of a data-driven society but to minimise the use of personal data wherever possible. Where objectives cannot be achieved without processing personal data, the associated risks must be assessed and mitigated in a proportionate manner. In a democratic society, risks cannot be eliminated entirely.

What constitutes a data-driven education policy that also safeguards fundamental rights?

The simple answer is that it must strike a balance between the collection of (personal) data and the protection of private life. Privacy is a value that

cannot be restored once infringed, for example, through data misuse or loss. Most people do not reflect daily on their right to privacy because they assume that aspects of their lives they do not wish to share are protected by the state and that they retain control over who knows what about them – whether this concerns their health, bank account or family relationships. Linking datasets (registers) may at times be necessary and justified. However, unconsidered or premature linkage – without first examining alternatives – can quickly lead to large-scale data processing that in some cases should be avoided altogether or requires particularly strong safeguards. In the use of register data, one practical way to strike a balance is through the application of privacy-enhancing technologies.

Privacy-enhancing technologies are information technology solutions that prevent or reduce the processing of identifiable personal data within an information system while preserving its functionality.[38] For example, they can reduce the risk of personal data leakage during statistical or machine learning analysis. They support three core privacy objectives: unlinkability (data cannot be linked to an identifiable individual during processing), transparency (if personal data are processed, the individual can know whether and how this has occurred – in identifiable or non-identifiable form) and intervenability (the individual can influence or halt the processing of their data).

It is possible to create secure data environments in which even system administrators cannot access raw data, while analyses can still be carried out and results made available only to authorised users. Privacy-enhancing technologies ensure that data are not transferred in unprotected form to a central server but are processed in encrypted form or through hardware-based security measures. For example, within a secure data environment, artificial intelligence should not make decisions autonomously but provide decision support.[39] If an algorithm is based on a simple formula, the system may generate only a draft decision. If a more complex model is used, the system should present both the decision and the underlying data to ensure algorithmic transparency.[40] Privacy-enhancing technologies safeguard privacy, but they do not resolve the substantive or ethical aspects of algorithmic decision-making. If a decision is unethical without privacy safeguards, it remains unethical even when such technologies are applied.[41]

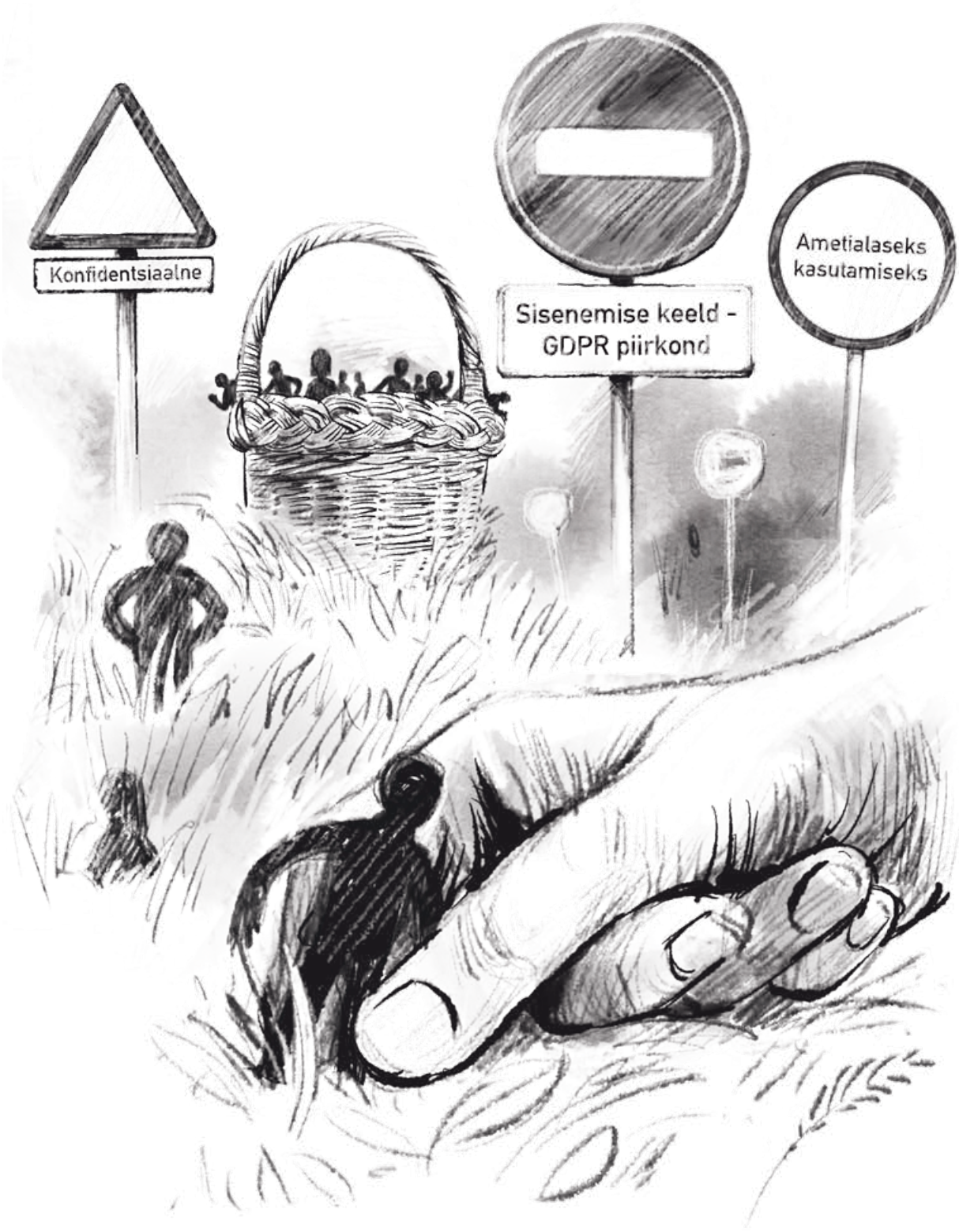
Privacy-enhancing technologies are not a universal solution. Their use requires resources, both financial and technical expertise. However, they may help to achieve the necessary balance between the protection of fundamental rights and the collection and use of data.[42]



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3.0 Introduction

Education as a means of generating income

Kaire Põder

KEY MESSAGES

- **Education is a source of personal fulfilment, a signal of labour quality and a means of generating income.** The consumption value of education is difficult to measure, but research suggests that in Estonia it largely functions as a positional good: education pays off when others are less educated. An exception is vocational upper secondary education (four years), whose graduates earn less than those with general upper secondary education (three years).

- **Education yields relatively low returns in Estonia, as an additional year of schooling generates a smaller wage increase than in other European countries.** On average, each additional year of education raises wages by about 6% in Estonia, compared with 8–10% elsewhere. As expected, the so-called 'winning generation' born in the 1970s enjoys higher returns. Somewhat unexpectedly, returns to education are higher for women than for men.

- **The teacher labour market, in terms of both wages and employment, offers grounds for cautious optimism.** Incomes are rising, unemployment is virtually absent and flexibility, including gig-type work, is increasing. The core of the workforce consists of 40–60-year-olds working above full-time load and benefiting from the current wage model. This model combines elements of a fixed and a career-stage system: age, education and experience bring salary increments, but performance is not always adequately rewarded.

INTRODUCTION

Learning is enjoyable, though in Estonia this is not universally acknowledged. Education functions largely as a signal to employers and society, indicating personal ability, discipline and social status. As a society, we tend to embrace a meritocratic ideal, viewing education as the foundation of innovation, competitiveness and social cohesion, while often overlooking the fact that access to education is shaped by place of residence, parental income and special educational needs. The meritocratic view – that outcomes depend solely on individual effort –

is rarely accurate and is most often endorsed by those who have themselves benefited from educational success.

As in other post-socialist countries, returns to education in Estonia are relatively low. This may be seen both as an opportunity and as a challenge. A systemic lack of demand for 'talent'[a] is problematic, as it can create a vicious circle: high achievers are not sufficiently supported because investment in them does not yield economic returns. At the same time, education is inherently selective and reproduces elites, and relatively low returns may also reflect broad accessibility.

At the centre of the education system is the teaching workforce. Teachers' average income has risen rapidly. However, pay does not increase sufficiently during the first years of teaching, even though this is when professional development is fastest and impact on learners is greatest. Furthermore, teachers who work in more demanding classrooms – for example, with pupils with special educational needs or lower socio-economic backgrounds – or who teach more demanding subjects do not receive higher pay. The current wage model is therefore rigid and not performance-based.

DISCUSSION

In 2025, education researchers began to receive indications from various channels that the European Commission had defined excellence in education as a policy priority. At the presentation of the 'PISA book',[1] criticism was voiced that current approaches risk suppressing top performers, and the Commission subsequently asked our research group to prepare an overview of evidence-based practices for achieving excellence.[2] Learning Lab – a platform established jointly by the European Commission's Directorate-General for Education and Culture (DG EAC) and the Joint Research Centre (JRC) to promote a culture of evaluation in education policy – increasingly began to address what has been termed the 'excellence problem'. The summary of the latest PISA study notes that although average mathematics scores fell by 15 points and reading scores by 10 points in 2022, the decline was greatest among high-performing pupils.[3] The excellence problem may therefore also be described as a shortage of high-achieving pupils.

Paradoxically, most education research projects over the past decade have focused, at least in part, on equality and inclusion. This does not change the data or analytical tools available, but it often leads to different research questions and policy recommendations, as few policy approaches are capable of simultaneously improving outcomes at the lower end of the distribution and strengthening performance at the upper end. Average results reflect the shape of the distribution: since educational outcomes generally follow a normal distribution, average PISA scores could in principle be raised either by reducing the lower tail or by thickening the upper tail of high achievers. Ideally, both strategies would be pursued.

The three articles in this chapter examine the relationship between education and the labour market, focusing on the wage premium associated with education and the productivity challenge in Estonia. In the first article, Jaanika Meriküll and Tairi Rõõm show that each additional year of education increases wages in Estonia by an average of 6%, below the international benchmark of 8–10%. Returns are highest among the so-called 'winning generation', those born in the 1970s, who were the first to receive education aligned with a market economy.

In the second article, Kaspar Oja shows that, in addition to the below-average return to an additional year of education, individuals with vocational education earn even less than those with general upper secondary education. This relationship is primarily descriptive and does not control for selection effects, as pupils with stronger academic performance are more likely to remain in general upper secondary education.

a The word 'talent' is placed in quotation marks because terminology in this field remains contested. In official discourse, including at the level of the European Commission, the term 'talented' has been discouraged on the grounds that it labels those who are not regarded as talented. It has also been argued that the concept is imprecise and that talent depends on effort or ambition.

In the third article, Kaire Põder and Andre Veski conclude, on the basis of data from the Register of Pedagogical Staff, that switching to a centralised teacher wage model – remunerating all teachers equally based on seniority and education level – is not justified. They also argue that concerns about teacher supply may be less acute than often assumed. Rapid wage growth, opportunities for additional earnings through short-term engagements and the anticipated easing of qualification requirements, which lowers barriers to entry, all point in this direction.

At a broader macro level, one might conclude that modest labour market outcomes are not necessarily linked to a relatively weak average level of education, a shortage of innovative high achievers or a large number of disengaged individuals. The underlying cause may lie in the labour market itself. In a small country, demand for 'talent' may be limited: universities may employ academics with relatively low citation counts and modest impact indices; individuals with doctoral degrees seldom move into business or politics; and a degree remains a signal whose value must be demonstrated over time. The system is complex: when demand for 'talent' declines, both the supply of talent – measured by the number of high achievers in employment – and wages decrease. This weakens incentives to invest in human capital and further reduces the supply of 'talent'.

We therefore asked how returns to education might be increased – how excellence could be supported without disadvantaging others.[4] We did not examine the macro-level labour market dynamics outlined above. Evidence-based research has identified certain best practices (although the promotion of 'excellence' has more often been associated with less democratic systems and the evidence base remains limited). These practices are presented below.

HOW DO WE MOVE FORWARD?

Drawing on our previous experience, we divided practices and policy measures into two groups. First, system-level choices, such as extending the school year or school day, raising teacher qualification requirements or introducing early tracking. Second, pedagogical practices implemented at school or classroom level, including individual learning paths, the use of digital technologies and parental involvement. We examined how these choices affect both high- and low-achieving pupils. We define good policy as one that raises performance at the top without holding back those at the lower end.

First, contrary to intuition, we found that teacher qualifications and salary levels do not affect top-performing pupils. There is only weak evidence that subject-specific qualifications among STEM teachers matter. In the reflection on the third article, Eve Eisenschmidt proposes a two-tier dynamic teacher pay fund for Estonia, combining individual teacher contribution with the complexity of the school environment. At its core is a school value-added index (generated by the ministry) for allocating per-pupil funding, which would make it possible to direct additional resources specifically to schools operating in more challenging contexts. School heads could then use a transparent and differentiated pay system to motivate teachers internally. However, if schools receive additional funding because they perform poorly, they may have less incentive to improve.[5] Preventing segregation between schools may therefore be more effective than trying to compensate for it through funding.

In vocational education, pupils must complete both upper secondary studies and a vocational qualification. Countries with early tracking recognise that vocational education is considerably more costly than general upper secondary education and is therefore given priority in resource allocation. This is not the case in Estonia, as vocational teachers' salaries clearly illustrate. In his reflection on the second article, Janno Järve calls for an accountability reform, arguing that the public should be informed about vocational schools' effectiveness and value added. Evaluation should consider entrants' prior attainment, teacher resources and labour market outcomes. Without renewal of both substance and reputation, vocational education risks stagnation. This is easier to recommend than to implement. In practice, our system-level recommendations largely end here.

We therefore turn to best practices. Although we are not education scholars, we suggest that these can be grouped into three categories.

- **Elite tracking after basic school**[b] (specialised streams). Rather than early selection between schools, the literature tends to favour later selection and flexible grouping, such as subject-based ability grouping. The key is not to assign pupils permanently to elite classes but to group them by level within individual subjects. Evidence on peer tutoring is limited but cautiously positive: stronger pupils mentor weaker or younger peers, and both benefit, with stronger pupils often gaining more.

- **Differentiated instruction** combined with self-regulated learning (SRL) and project-based learning (PBL) can enhance top achievement by promoting deep learning and cognitive self-regulation, for example through research-based or creative projects. Self-regulation and self-efficacy, understood as developable attitudes rather than fixed traits, strongly influence outcomes. However, differentiated instruction – especially when supported by technology – tends to benefit more self-regulated and effective learners, who are often already at the upper end of the achievement (and income) distribution.

- **Smart use of technology** enables individual pacing, real-time feedback and skill development. Applications that provide immediate feedback, guide learners along new learning paths and function as AI mentors are particularly promising, but only when integrated into teaching. Even then, technology integration tends to benefit pupils with higher achievement potential, especially when supported by competent teachers. Teachers' digital competence – a combination of attitudes (such as self-efficacy), knowledge and behaviour (the ability to integrate digital tools into lessons) – is complex. Developing it through training is challenging. Our recent experiments show that when teachers do not perceive how training builds on and extends their existing knowledge and skills, cognitive overload may result, leaving competence unchanged or even diminished.[6] Many technology-rich teacher training programmes may therefore have limited impact.

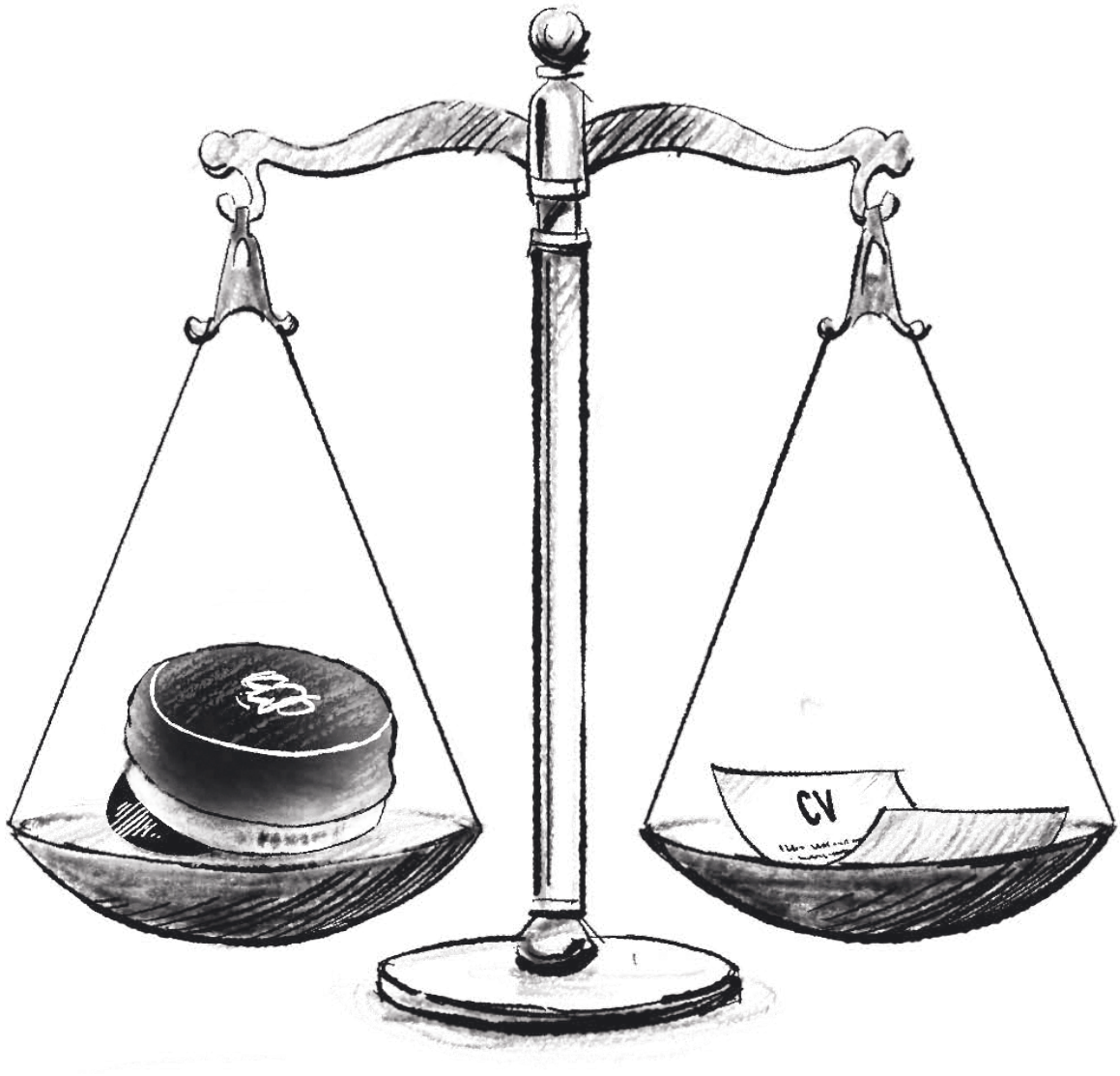
The role of education in the economy, viewed as a complex system, can be interpreted in different ways. The simplest view is that investment in education pays off by increasing productivity. In reality, the relationship is more nuanced. Education also has a consumption dimension: people may value learning for its own sake. In Estonia, however, this effect appears on average to be negative, suggesting that education is not widely experienced as inherently rewarding.[7] If education functions primarily as a signalling or positional mechanism – enabling individuals not necessarily to be more capable but to appear so – the system risks inefficiency. The picture is not entirely clear-cut, as noted in Janno Järve's reflection on the first article: low returns to education may reflect either a weak labour market or shortcomings in the quality of higher education.

It should also be borne in mind that education is subject to diminishing marginal returns: each additional course of study yields progressively smaller gains and may eventually produce no return or even a negative one. In practice, those who pursue further training are usually individuals with more to gain or better access to such opportunities – often more extroverted and flexible adult learners from middle-class backgrounds.

b In 2025, a case in Estonia sparked controversy when a school grouped pupils according to their average grades. At the same time, the widespread practice of selecting pupils into schools on the basis of prior grades has not attracted comparable public criticism.

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3.1

Returns to education

Jaanika Meriküll and Tairi Rõõm

KEY MESSAGES

- The economic returns to education in Estonia are below the international average. Within Estonia, however, they are higher for women than for men and higher for those born in the 1970s – the so-called 'generation of winners' – than for other cohorts.
- Returns to work experience are also lower than the international average; an additional year of education yields a higher return than an additional year of experience.
- The ethnic wage gap is reflected in both returns to experience and returns to education – members of minority ethnic groups in Estonia receive lower returns to both.
- Among older cohorts, returns to education are higher for ethnic Estonians, whereas among younger cohorts the opposite applies – minority groups receive higher returns than ethnic Estonians.
- The ethnic wage gap is smaller among younger cohorts and amounts to only 3% for those born in the 1990s.

INTRODUCTION

In this article, we use Estonian register data to estimate the wage increase associated with each additional year of schooling and with each additional year of work experience, referred to in economics as the *return to education* and the *return to experience*, respectively. Here, 'return' denotes the wage growth associated with an additional year of schooling or experience, without distinguishing whether the wage premium arises from education and labour market participation themselves or from more able individuals pursuing longer education and more continuous working careers. We estimate returns to education and experience for all individuals who received official wage income in Estonia between 2006 and 2024, and estimate returns to education separately by socio-demographic characteristics such as gender, ethnicity and birth cohort. The estimates are based on the Mincer methodology, described in more detail in the text box at the end of the article.

AN ADDITIONAL YEAR OF EDUCATION IS ASSOCIATED WITH AN 8–10% WAGE PREMIUM IN INTERNATIONAL STUDIES

One of the central questions in labour economics is why workers are paid differently, both across and within countries. Human capital theory explains these differences by arguing that investments in education and work experience increase individual productivity and, in turn, wages.[1] Human capital comprises three main components: knowledge and social skills acquired in early childhood; formal education; and skills developed through work experience. Studies suggest that at least one-third of wage differences within a country can be attributed to differences in human capital.[2]

Nobel laureate James Heckman has examined the role of knowledge and skills acquired in early childhood and argues that this component makes the largest contribution to earnings among the three.[3] Based on genetic studies and experimental evidence from the United States, he concludes that environmental factors play a greater role in the formation of human capital than genetics. Supporting child development at an early age improves both academic ability and other skills required in working life, such as communication and concentration. Early interventions, such as providing an enriching and secure environment in early childhood, help reduce income disparities later in life.

There are several methods for estimating returns to education. The most widely used is regression analysis based on the Mincer wage equation, which measures how years of schooling are associated with wages. These estimates also control for work experience, meaning that individuals with similar levels of experience are compared. International studies covering a large number of countries show that each additional year of education is associated with wages that are 8–10% higher on average.[4] The level of returns to education is not systematically related to a country's income level and is similar, on average, in both developing and developed economies.[5]

The positive association between education and wages does not necessarily imply that wages always increase with each additional year of schooling. The relationship reflects both the effect of education in raising human capital and the tendency of more academically able individuals to choose longer educational paths. However, studies using methods designed to identify the causal effect of education on wages likewise find that an additional year of schooling raises wages by around 10% on average – a result close to estimates based on the Mincer wage equation.[6]

Returns to education vary considerably across population groups. International evidence shows that they are not uniform across levels of education: individuals who attain tertiary education usually enjoy higher returns to education than those with lower levels of educational attainment. An analysis of 145 countries by Jedwab et al. finds that the difference is nearly twofold – average returns are around 13% for workers with higher education, compared with about 7% for those with lower levels of education.[7] The same study shows that in former socialist countries, returns to education and work experience are relatively low, as qualifications and experience acquired under central planning became partly obsolete during the transition to a market economy.

IN ESTONIA, AN ADDITIONAL YEAR OF EDUCATION IS ASSOCIATED WITH A 6% WAGE PREMIUM, AND RETURNS ARE HIGHER FOR WOMEN THAN FOR MEN

In Estonia, as in other post-socialist countries, returns to education are below the international average. Over the period 2006–2024, each additional year of education was associated with an average wage premium of 6%. As noted above, international estimates based on data covering most countries place returns to education in the range of 8–10%.

Internationally, returns to education are generally higher for women than for men. A recent study covering 165 countries reports average returns of 11% for women and 9% for men.[8] A similar pattern is observed in Estonia: returns to education are estimated at 8% for women and 6% for men.

We also estimated returns to education by ethnicity (ethnic Estonians and individuals of other ethnic backgrounds). Figure 3.1.1 shows that returns to education are higher for ethnic Estonians than for other ethnic groups in Estonia. A substantial share of non-Estonians consists of individuals who migrated to Estonia from other parts of the Soviet Union before the transition to a market economy. The results suggest that the loss of human capital associated with this transition was greater for them than for ethnic Estonians. Limited proficiency in Estonian likely further constrained the transferability of previously acquired skills. Earlier studies indicate, however, that language proficiency alone does not fully account for wage differences.[9]

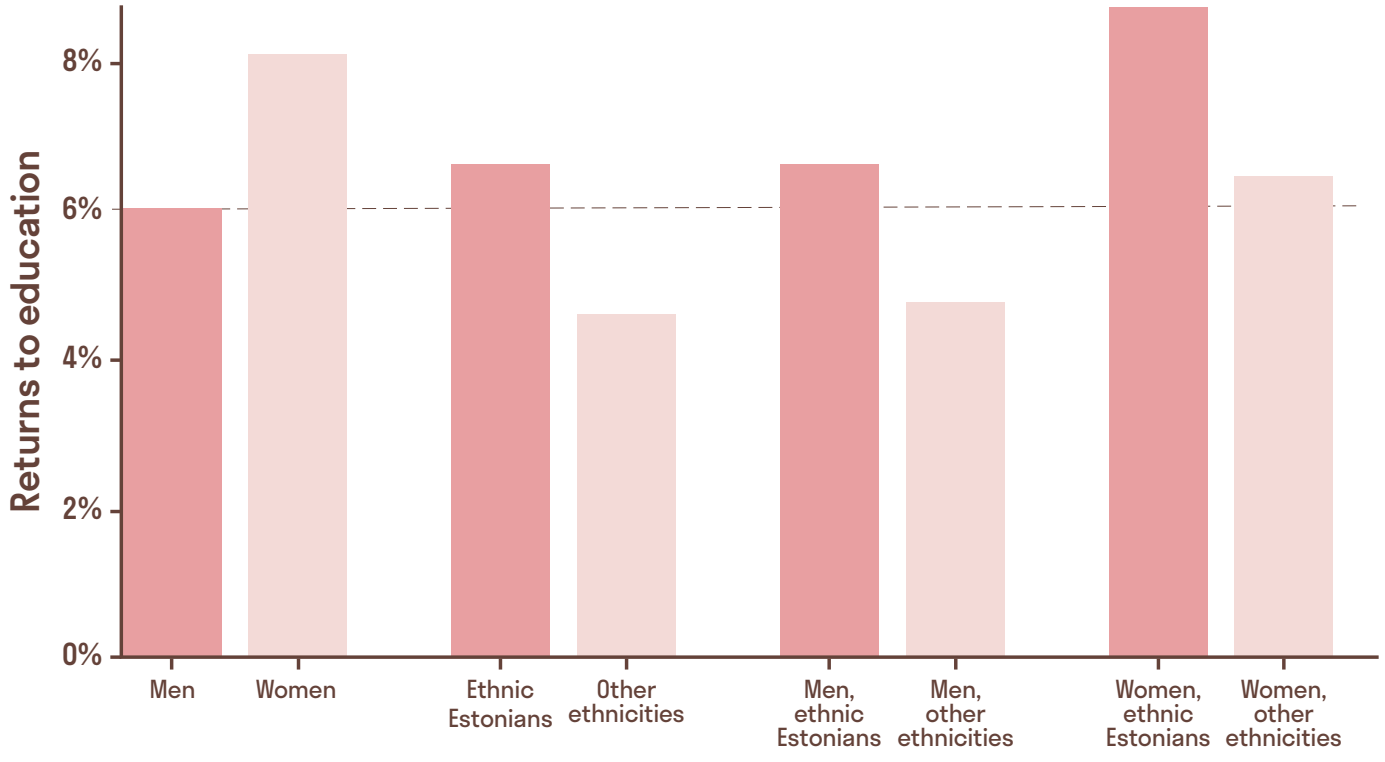
In Estonia, returns to education are higher for women than for men across ethnic groups. Among the groups shown in Figure 3.1.1, returns are lowest for non-Estonian men and highest for ethnic Estonian women.

AN ADDITIONAL YEAR OF WORK EXPERIENCE AFFECTS WAGES LESS THAN AN ADDITIONAL YEAR OF EDUCATION

As with education, wages rise with additional work experience, but the effect of an extra year of experience is smaller than that of an extra year of education. Estimates based on the Mincer wage equation show that, internationally, each additional year of work experience is associated with an average wage increase of 2%, with lower returns in developing countries (1.7%) than in developed countries (3.2%).[10] The marginal effect of experience declines over the life cycle: it is strongest in the early years of employment, but weakens later and may eventually turn negative.[11]

As with returns to education, returns to work experience in Estonia are below the international average and are closer to those observed in developing than in developed countries. In the

Figure 3.1.1 Returns to education in Estonia by gender and ethnicity, 2006–2024



SOURCE: figure by the authors

NOTE. The horizontal dotted line indicates the overall average for all employees.

period 2006–2024, an additional year of work experience in Estonia was associated with an average wage increase of 1.6%.

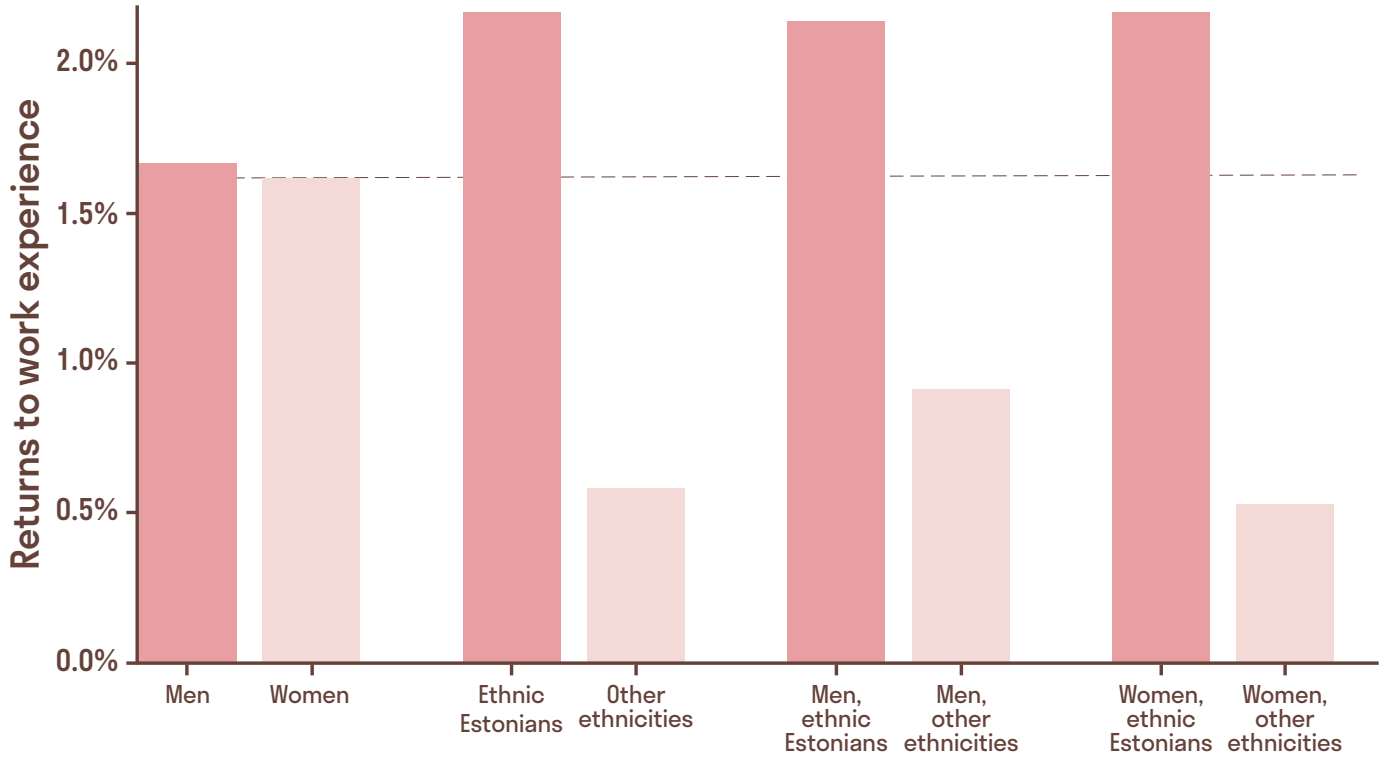
We also estimated returns to work experience in Estonia for four groups, defined by gender (women and men) and ethnicity (ethnic Estonians and others). The results are presented in Figure 3.1.2. For the population as a whole, returns to work experience are similar for women and men. The same pattern holds among ethnic Estonians. Among other ethnicities, however, returns are lower for women than for men.

Although gender differences in returns to an additional year of experience are small, differences by ethnicity are pronounced. For ethnic Estonians, an additional year of work experience is associated with an average wage premium of 2.2%, compared with 0.6% for individuals of other ethnicities – a difference of nearly three times.

RETURNS TO EDUCATION ARE HIGHEST FOR THE SO-CALLED 'GENERATION OF WINNERS'

We next estimated returns to education by age group, distinguishing six birth cohorts (1949 or earlier, 1950–59, 1960–69, 1970–79, 1980–89 and 1990–99). Controls for work experience were excluded from this analysis, as the experience variable is derived from the employee's age. Figure 3.1.3 shows that returns to education are highest among those born in the 1970s – the so-called 'generation of winners'. When analysed separately by gender, this cohort effect is particularly pronounced among men: returns to education are clearly highest for men born in the 1970s compared with other cohorts. Among women, returns are consistently high for those born in the 1960s, 1970s and 1980s.

Figure 3.1.2 Returns to work experience in Estonia by gender and ethnicity, 2006–2024



SOURCE: figure by the authors

NOTE. The horizontal dotted line indicates the overall average for all employees.

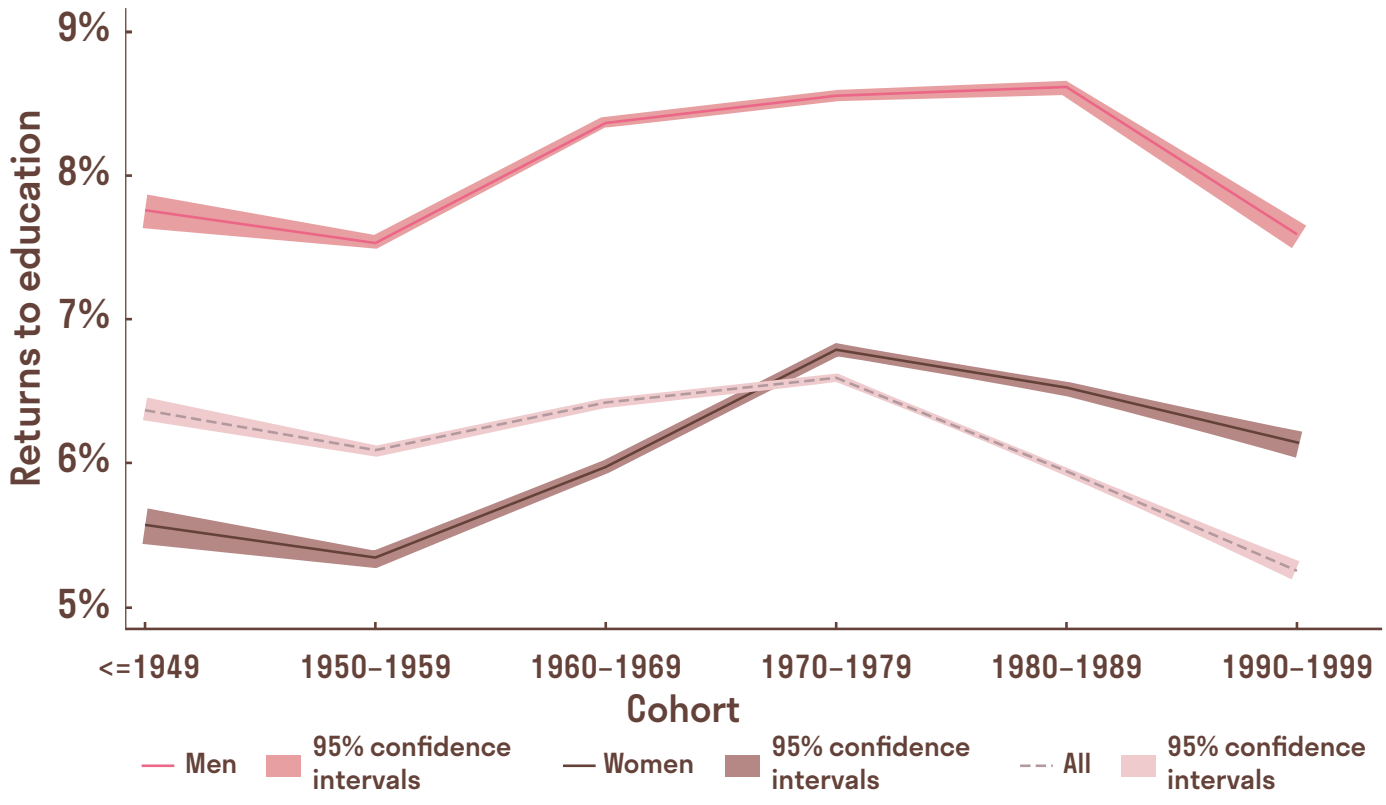
What distinguishes those born in the 1970s from other cohorts? They attained tertiary education – higher education or vocational education – during the economic transition of the 1990s and were therefore the first to receive a Western-oriented education. This provided an advantage both in accessing jobs and in applying newly acquired knowledge. For younger age groups, however, this education-related advantage no longer yielded equally high returns in the labour market. Over time, the relative advantage of the 'winner generation' has diminished, and among those born in the 1990s, returns to education are even lower than among those born in the 1950s and 1960s, when considering the population as a whole.

RETURNS TO EDUCATION ARE LOWER AMONG ESTONIANS BORN SINCE THE 1980S THAN AMONG OTHER ETHNIC GROUPS

While education has generally yielded higher returns for Estonians than for individuals of other ethnic groups, the age-cohort profile of returns differs markedly across groups. Among ethnic Estonians, returns to education decline in younger cohorts, whereas among minority groups they increase (Figure 3.1.4). In the two youngest cohorts, returns are higher for minority groups than for ethnic Estonians, and the gap is widening. This suggests that younger individuals from minority backgrounds gain more from additional education than their ethnic Estonian peers.

By contrast, the loss of human capital associated with the transition to a market economy is more evident among older non-Estonians. The largest ethnic gap in returns to education, in favour

Figure 3.1.3 Returns to education in Estonia by decade of birth and gender, 2006–2024



SOURCE: figure by the authors

of ethnic Estonians, is observed among those born in the 1960s – the cohort that completed its education immediately before the transition period of the 1990s.

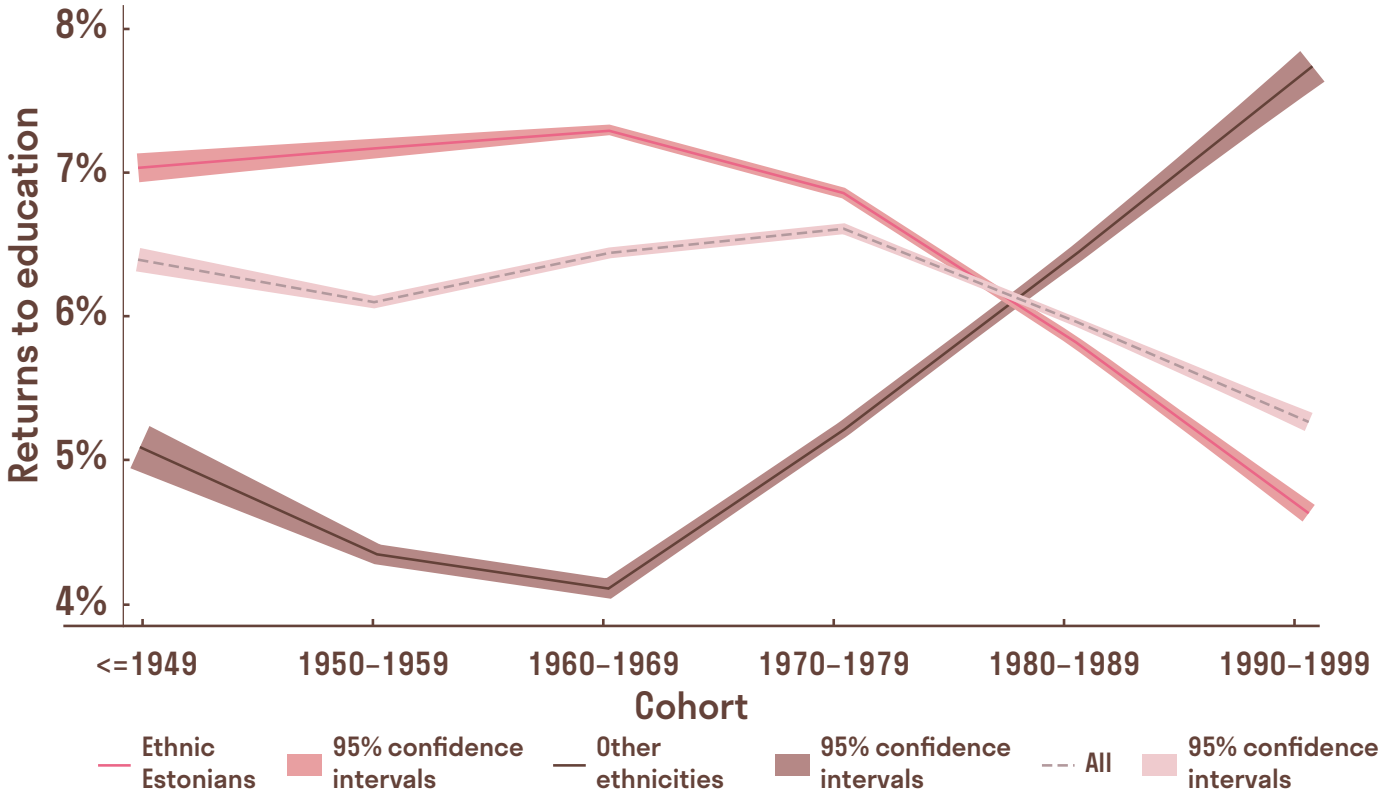
GENDER AND ETHNIC WAGE GAPS DECLINE AS MORE EQUAL COHORTS ENTER THE LABOUR MARKET

The preceding analysis showed that returns to education differ by gender and ethnicity, and that cohort trends move in opposite directions across ethnic groups. Among ethnic Estonians, returns to education decline in younger cohorts, whereas among minority groups they increase. In the two youngest cohorts, returns for non-Estonians exceed those for ethnic Estonians, suggesting improved career prospects and employment opportunities for younger non-Estonians. Does this translate into narrower wage gaps? To examine this, we calculated cohort-based wage levels by gender (women and men) and ethnicity (ethnic Estonians and minority groups). We estimated log real wages, grouped individuals by decade of birth, and calculated average wage levels for each cohort across different ages. The results are presented in Figures 3.1.5 and 3.1.6.

The figures show that both gender and ethnic wage gaps are persistent within cohorts over time: where the gap is large at the beginning of the observation period in 2006, it remains large throughout. The gender wage gap narrows somewhat within cohorts as experience accumulates, but the ethnic wage gap remains highly persistent.

The overall decline in wage gaps is therefore driven mainly by the entry of younger cohorts, among whom the gaps are smaller. The gender wage gap decreases slowly across successive cohorts, whereas the decline by ethnicity is more pronounced. Among those born in the 1980s, the ethnic wage gap is already substantially smaller

Figure 3.1.4 Returns to education in Estonia by decade of birth and ethnicity, 2006–2024



SOURCE: figure by the authors

than in earlier cohorts, and among those born in the 1990s it has almost disappeared: the average wage gap across all observed years for this group is only 3%.

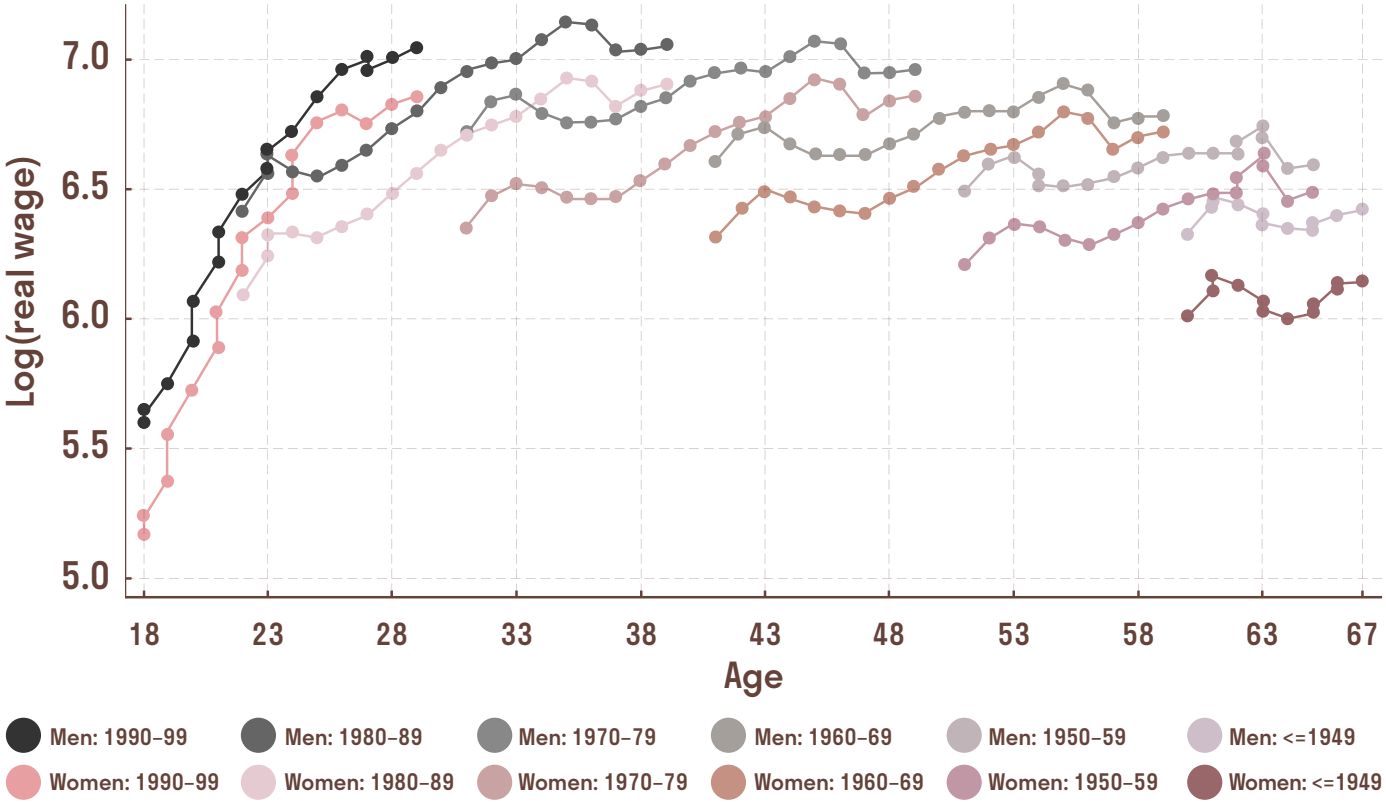
SUMMARY

The loss of human capital during the transition period affected ethnic minority groups in Estonia particularly strongly. Over time, however, this effect has diminished, and for the generation born in the 1990s labour market opportunities are now similarly favourable regardless of ethnicity. Higher returns to education for women also help explain their greater representation among those with higher education.

Returns to education and work experience in Estonia are below the international average. Similar patterns have been observed in other post-socialist countries, reflecting the legacy of the socialist system and the transition from a planned to a market economy, which rendered part of the pre-1990 stock of knowledge and skills obsolete. This loss of human capital disproportionately affected minority groups, whose returns to both education and work experience remain lower than those of ethnic Estonians.

At the same time, the ethnic gap in returns to education narrows across cohorts. It is largest among those born before the 1960s, decreases in younger cohorts, and from the cohorts born in the 1980s onwards returns to education are higher for minority groups than for ethnic Estonians. This suggests gradual but consistent economic integration. While older ethnic Estonians tend to have better employment prospects and higher wages on average than non-Estonians, younger ethnic minorities are just as successful in the labour market as their Estonian peers. Cohort-based estimates further show that the

Figure 3.1.5 Real wages by age group, men and women, 2006–2024



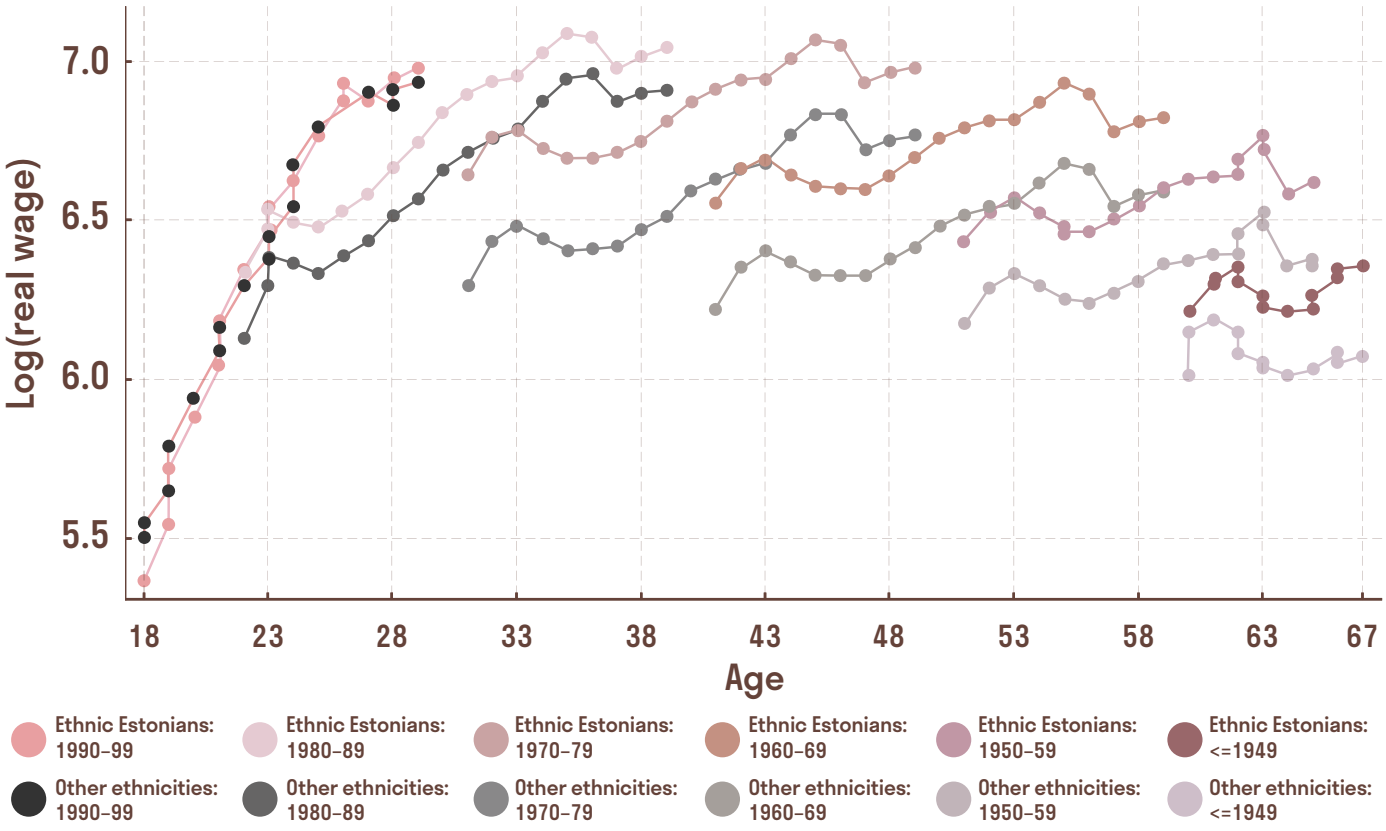
SOURCE: figure by the authors

NOTE. Age indicates the average age of each birth cohort in each sample year between 2006 and 2024; real wages are expressed in 2015 prices.

ethnic wage gap narrows over time and, among those born in the 1990s, has fallen to only a few percentage points.

Returns to education are higher for women than for men. This difference has been highly persistent over time and is consistent with findings from other countries. Given that Estonia's gender wage gap is among the largest in Europe, higher levels of educational attainment play an important role in reducing women's risk of in-work poverty and inequality. In this sense, women's investment in education represents a rational economic choice. Between 2006 and 2024, two-thirds of university graduates in Estonia were women.[12] Lower returns to education for men make additional years of study less financially rewarding, and shorter educational trajectories may partly reflect the smaller gains men obtain from further education compared with women. At the same time, the large gender gap in educational attainment is a major challenge for Estonian society. As the share of women among higher education graduates has remained consistently high for several decades, a rapid narrowing of the education gap is unlikely without systematic and targeted measures to increase the proportion of men completing higher education.

Figure 3.1.6 Real wages by age group, ethnic Estonians and other ethnic groups, 2006–2024



SOURCE: figure by the authors

NOTE. Age indicates the average age of each birth cohort in each sample year between 2006 and 2024; real wages are expressed in 2015 prices.

Data and methodology. The Mincer wage equation measures the relationship between wages and years of schooling and work experience. The dependent variable is the logarithm of wages, and the explanatory variables are years of schooling, work experience and its square, and year dummy variables. This approach is widely used in economics to estimate returns to education.[13] The Mincer wage equation is specified as follows:

$$lnW_{it} = \alpha + \beta\, Edu_{it} + \gamma\, Exp_{it} + \delta\, Exp^2_{it} + \tau_t + \varepsilon_{it}$$

The dependent variable, lnW_{it}, is the logarithm of monthly gross wage. We focus on labour income, which includes remuneration of management board members. Education, Edu_{it}, measured in years of schooling, is derived from the education level reported in the population census. The education variable is taken from the 2021 census; if a worker's education is not recorded there, earlier census data are used. Work experience, Exp_{it}, is calculated based on age and years of schooling. In our estimates for Estonia, as in international studies, data on actual work experience are unavailable, so potential work experience is used instead. We assume that individuals with higher education enter the labour market after completing their studies, and that those with upper secondary or lower education enter at age 18. For workers with higher education, schooling is assumed to begin at age seven. These assumptions follow standard practice in similar studies.[14]

In presenting the results, we report the effect of work experience as $\gamma + \delta \times (median\ experience)$. As is standard in the literature, returns to work experience are estimated as a quadratic function.[15] The effect of work experience on wages is non-linear and depends on the amount of experience already accumulated. Year dummy variables (τ_t) are included to control for cyclical economic effects and other macro-level influences. Estimation is carried out using ordinary least squares (OLS) regression.

We use register data on wage income (TSD) from the Estonian Tax and Customs Board for 2006–2024 and population census data for 2000, 2011 and 2021. The TSD data do not contain information on hours worked, so labour income reflects monthly earnings rather than hourly wages. For each year, we use October wage data, as this month typically excludes holiday and bonus payments and is commonly used in empirical research. To ensure comparability across years, wages are converted into real terms using the consumer price index, with 2015 as the base year.

Table 3.1.1 Descriptive statistics of variables used in estimating returns to education, 2006–2024

	All	Men	Women	Estonians	Other ethnic groups
Years of schooling	12.8	12.2	13.4	12.8	12.8
Years of work experience	22.3	21.6	22.9	21.6	23.8
Age in years	42.7	41.6	43.7	42.1	44.1
Real wage in 2015 prices	€1,046.1	€1,193.1	€913.7	€1,110.6	€891.4

SOURCE: table by the authors

REFLECTION

Janno Järve

Gender and ethnic wage gaps have characterised Estonia's labour market since the restoration of independence. It is therefore encouraging that wage differences among younger generations are less pronounced than among older cohorts. This trend is most evident in the case of the ethnic wage gap, but a clear decline has also occurred in gender-based wage differences. It is to be hoped that Estonian society will gradually outgrow these problems.

In Estonia, the value of education is rarely questioned. Despite comparatively lower returns to education by international standards, general upper secondary education – and the more secure pathway it offers to higher education – remains a very widespread choice among young people. Efforts to promote vocational education and to encourage practical skills acquisition instead of general upper secondary schooling have so far had limited impact. Judging by educational choices, the time invested in schooling is perceived as worthwhile. Although lower returns to education compared with other countries could eventually reduce incentives to pursue higher education, there is currently no sign of such a shift.

The fact that returns to education tend to be higher for women than for men in Estonia carries both positive and negative implications. Higher returns may suggest that the labour market values education – that well-paid jobs are sufficiently complex to require appropriate qualifications. In this sense, the labour market rewards women for attaining higher education. However, there is also a more sobering interpretation. High-paying jobs may be accessible to men even with lower levels of education, whereas women must make a greater effort and attain higher qualifications to gain access to them. Despite higher returns to education for women, they still earn less on average than men.

Low returns to education have two possible explanations.

- **Low returns may reflect the relatively simple nature of work performed in Estonia.** If many jobs can be carried out without (higher) education, an additional year of study will have a smaller impact on wages than in countries where advanced skills are essential for well-paid positions. If Estonia seeks to grow its economy and raise living standards, firms must increasingly engage in more complex activities that demand higher-level skills.
- **The knowledge and skills provided by the education system are not as well aligned with labour market needs as in other countries.** If the knowledge acquired in higher or vocational education does not match rapidly changing labour demand, firms have little incentive to reward higher educational attainment with higher wages.

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3.2

Does vocational education pay off?

Kaspar Oja

KEY MESSAGES

- In Estonia, individuals with vocational education earn on average less than those with general upper secondary education.
- In certain occupations, particularly in blue-collar trades, wages exceed those of individuals with general upper secondary education.
- Political pressure to steer more pupils into vocational education is misplaced if the labour market does not sufficiently reward vocational school graduates.

INTRODUCTION

This article compares the wages of individuals with vocational education and those who have completed general upper secondary education. In Estonia, vocational graduates tend to earn less than their peers with general upper secondary education. We seek to account for the influence of personal characteristics such as ethnicity, gender, place of residence and family background in order to assess whether these factors explain the lower earnings of vocational graduates. To this end, we estimate the relationship between income and a set of explanatory variables and then assess the effect of vocational education on income. Although we control for the mother's level of education, we cannot fully account for unobserved characteristics such as communication skills or individual academic ability. As a result, part of the wage gap may reflect educational self-selection. Income data are drawn from 2023 income tax declarations, and the explanatory variables are obtained from administrative registers.

A meta-analysis published in 2023[1] found that vocational education increases earnings by an average of 2.1% compared with general upper secondary education, based on a synthesis of multiple studies, and that this effect declines over time. An analysis of Danish data showed that vocational education had a positive effect on earnings at age 28, but that this effect diminished over time.[2] The Danish study concluded that for marginal cases choosing between vocational and general education, the decision had no significant impact on wages for women or for men with weak mathematics skills, whereas men with strong mathematics skills experienced a wage loss by opting for vocational education. In contrast, research from Finland found that vocational education increases wages by 6%, and that this effect does not diminish over time.[3] International studies also suggest that participation in further training later in working life may influence the

subsequent career prospects of vocational graduates.[4]

Graduates of vocational education often enter the labour market with strong job-specific skills. However, if participation in further training is limited, these skills may become outdated, increasing the risk that they lose value as technology advances.[5] Adequate in-service training would help mitigate such skill obsolescence. At the same time, general upper secondary education may provide stronger general skills that better support lifelong learning and further professional development than vocational education.

GRADUATES OF VOCATIONAL SCHOOLS DO NOT EARN MORE ON AVERAGE THAN GRADUATES OF GENERAL EDUCATION SCHOOLS

Figure 3.2.1 presents the median annual incomes of individuals with general upper secondary and those with vocational education by birth cohort. The figure shows that, in the observed cohorts, the wage effect of vocational education is modest compared with general upper secondary education. Characteristics such as gender and mother tongue account for larger wage differences. Men with ISCED 3 vocational education – that is, below the level of vocational upper secondary education – earn significantly less than men with general upper secondary education or higher-level vocational education. It is also evident that among Russian-speaking individuals, ISCED 5 vocational education (post-secondary vocational education) is associated with a significant income premium.

EMPLOYEES WITH VOCATIONAL EDUCATION EARN MORE IN BLUE-COLLAR OCCUPATIONS

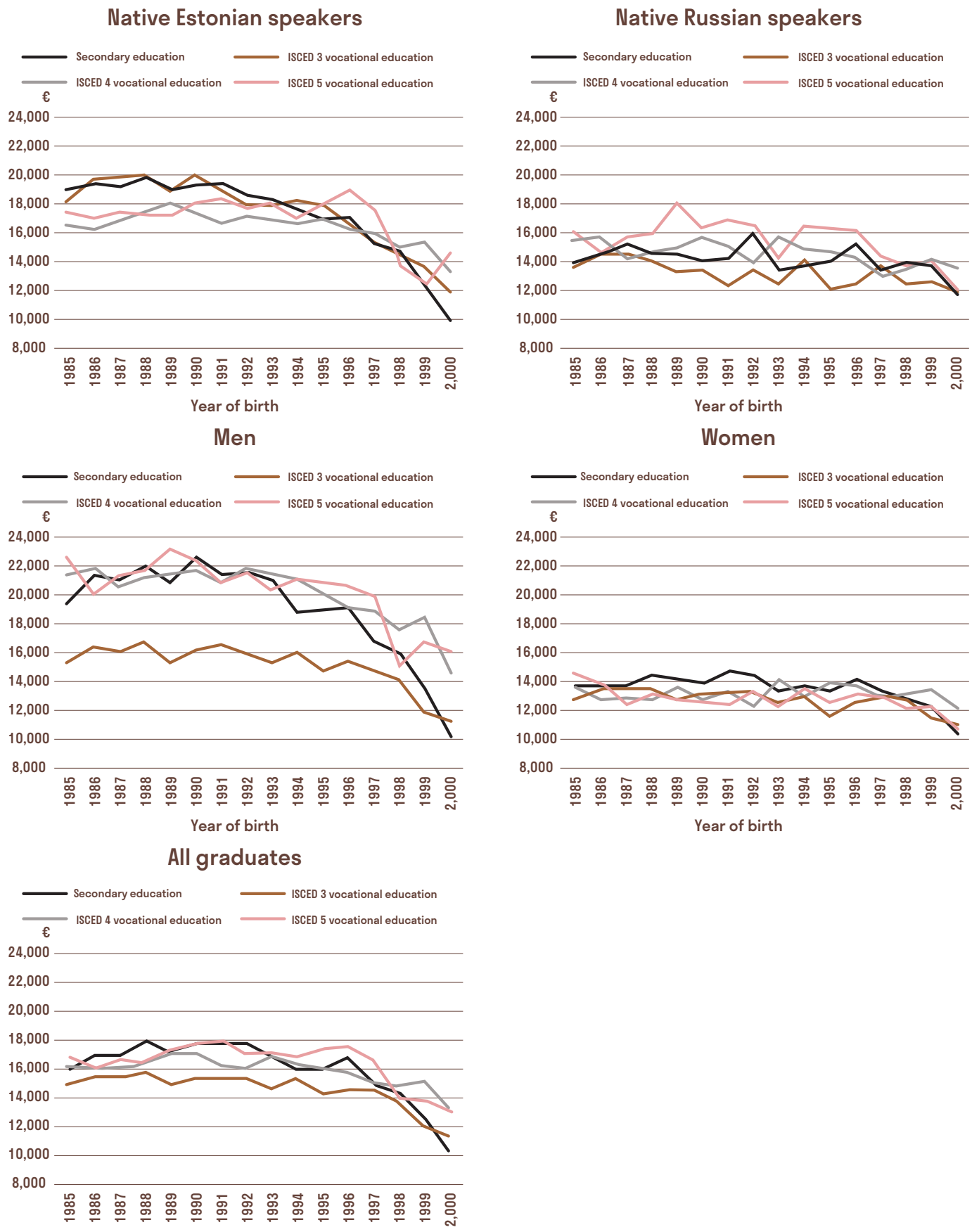
The wages of employees with vocational education are strongly shaped by occupation. In higher-paid white-collar roles, young people with only general upper secondary education often earn more than those with vocational qualifications. By contrast, in blue-collar occupations – for which vocational schools typically provide training – vocational graduates earn more than their peers with general upper secondary education. However, these wages remain below those of vocational graduates employed in higher-paid white-collar positions.

Vocational education thus offers a wage advantage mainly within relatively lower-paid

Data and methodology. We analyse income by level of education using 2023 income tax declaration data. Information on educational attainment refers to 2023 and is drawn from the Population Register, which also provides data on language proficiency, gender, cohort, place of residence and the individual's and mother's educational attainment according to the ISCED classification. Data on completion of vocational education are obtained from the Estonian Education Information System (EHIS). Income data are based on individual income tax declarations and include labour income, excluding capital gains, rental income and similar sources. The regression analysis also uses data from the Employment Register on occupation, defined as the first occupation recorded for the individual in 2023.

The sample includes individuals born from 1985 onwards. It is restricted by year of birth to capture those who completed their education within the past 20 years, allowing a clearer assessment of the impact of the current education system on wages. Graduates of general upper secondary education are defined as individuals whose highest level of education in the Population Register corresponds to ISCED 3 and who have not completed vocational education. Graduates of vocational education are defined as individuals with ISCED 3, ISCED 4 or ISCED 5 education who, according to EHIS data, have completed a vocational programme. The analysis is based on the most recently completed vocational qualification.

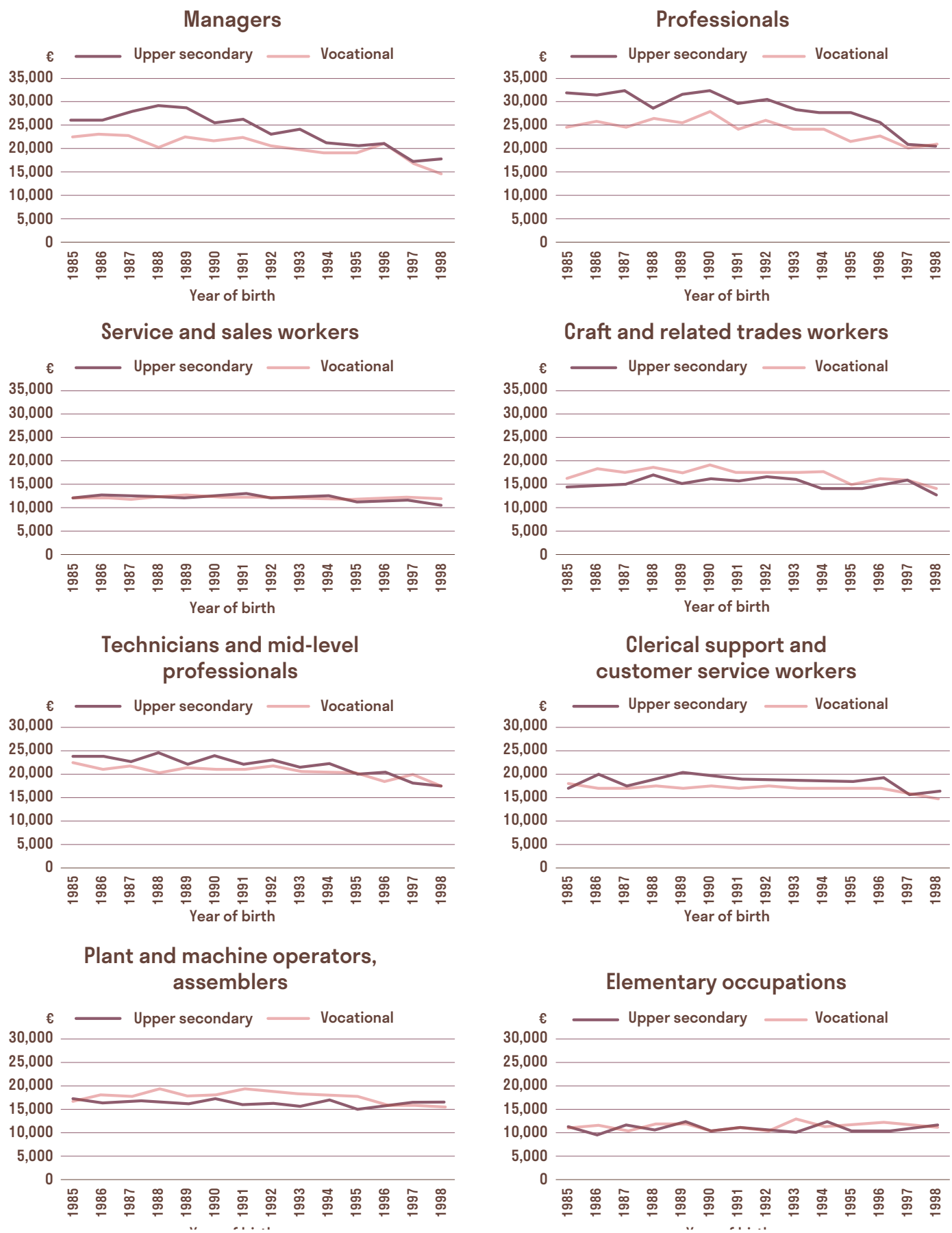
Figure 3.2.1 Median annual income by year of birth and level of education



SOURCE: figure by the author

NOTE. ISCED 3 – vocational upper secondary education based on lower secondary education; ISCED 4 – vocational upper secondary education based on upper secondary education; ISCED 5 – post-secondary vocational education entered after upper secondary education.

Figure 3.2.2 Median annual income by occupation and level of education



SOURCE: figure by the author

occupations (see Figure 3.2.2). The largest share of individuals with vocational or general upper secondary education is employed in service and sales occupations, where wages are significantly below the overall average. According to the 2022 structure of earnings survey, wages in this field in Estonia amounted to 47% of those of professionals, compared with an EU average of 55%.[6] At the same time, the relative wages of craft and related trades workers and plant and machine operators, compared with professionals, were higher in Estonia than the EU average.

The figure also shows that older workers tend to earn more in white-collar occupations, and that among older workers the income gap between those with general upper secondary and vocational education is wider than among younger workers. This is consistent with international evidence suggesting less frequent participation in further training among vocational graduates and a decline in their relative wage advantage over time. It is also evident that younger service and sales workers with general upper secondary education earn less than their vocationally educated counterparts, whereas among older workers this difference is no longer apparent.

In more specialised occupations that require specific skills, such as craft and related trades, the income gap between vocational and general upper secondary graduates appears to persist across age groups.

CONTROLLING FOR PERSONAL CHARACTERISTICS REDUCES THE NEGATIVE EFFECT OF VOCATIONAL EDUCATION ON INCOME

For the regression analysis, we excluded individuals born after 1999, as their time in the labour market has been relatively short. The model includes 67,121 observations. When data on mother's education and occupation are added, the number of individuals available for analysis decreases. Some information is likely missing from the registers because it has been further suppressed to prevent identification of individuals. By occupation, there appears to be a notable absence of individuals employed in security-related fields. As the data cover the full population, the regression coefficients reflect actual population differences. In other words, there is no need to rely on statistical significance to generalise the results to the population.

Based on 2023 income tax declaration data, graduates of vocational schools do not earn substantially more on average than graduates of general upper secondary schools. This suggests either that the skills acquired in vocational education add little value in the labour market compared with general upper secondary education without specialisation, or that the choice of vocational education is associated with characteristics that make labour market success more difficult. Controlling for gender, year of birth, county of residence, mother tongue and socio-economic background (proxied by mother's education) does not materially alter the estimated income differences between graduates of general upper secondary and vocational education.

Table 3.2.1 shows that individuals with ISCED 3 vocational education earn less in the labour market than those with general upper secondary education; those with ISCED 4 education earn approximately the same as general upper secondary graduates; and ISCED 5 education is associated with a modest income premium. Controlling for gender, mother tongue and cohort does not materially alter these estimates.

When county of residence is included, the coefficient for vocational upper secondary education based on general upper secondary education (ISCED 4) becomes positive but statistically insignificant. This likely reflects regional differences in opportunities and wage levels. In other words, individuals with ISCED 4 vocational education earn less than general upper secondary graduates because they are more likely to reside in lower-wage regions.

Including mother's level of education does not materially affect the coefficients associated with vocational education. In the observed data, the relationship between mother's education and children's income is not linear. The effect increases with higher maternal education but declines when mothers have tertiary education. This may reflect the fact that highly educated mothers are more likely to steer their children

towards higher education, and those who do not pursue it may have lower academic ability.

Controlling for occupation makes the coefficient for ISCED 4 vocational education statistically significant and renders the coefficient for ISCED 3 vocational education statistically insignificant. This suggests that the choice between general upper secondary and vocational education is also, in part, a choice between different occupations.

Vocational education is associated with higher average wages within occupations that have relatively low overall wage levels.

With regard to occupation, it should be noted that employees without recorded occupational data are excluded from the model. These are likely to include workers in higher wage-potential fields within the security sector. This may partly explain why the coefficient for ISCED 5 vocational education in model M7 is smaller than in the other models.

Although many characteristics are controlled for, the estimated models explain only a limited share of wage dispersion. This reflects two key factors. First, the models focus on a relatively narrow segment of the workforce, meaning that much of the income variation associated with education across the labour market as a whole is not captured. Second, the low explanatory power suggests that unobserved characteristics, such as communication skills or general cognitive ability, play an important role in wage formation. If such characteristics influence field-of-study choices or available opportunities, vocational education is likely to be most beneficial for those intending to enter blue-collar occupations.

The importance of field of study is also reflected in wage differences among vocational school

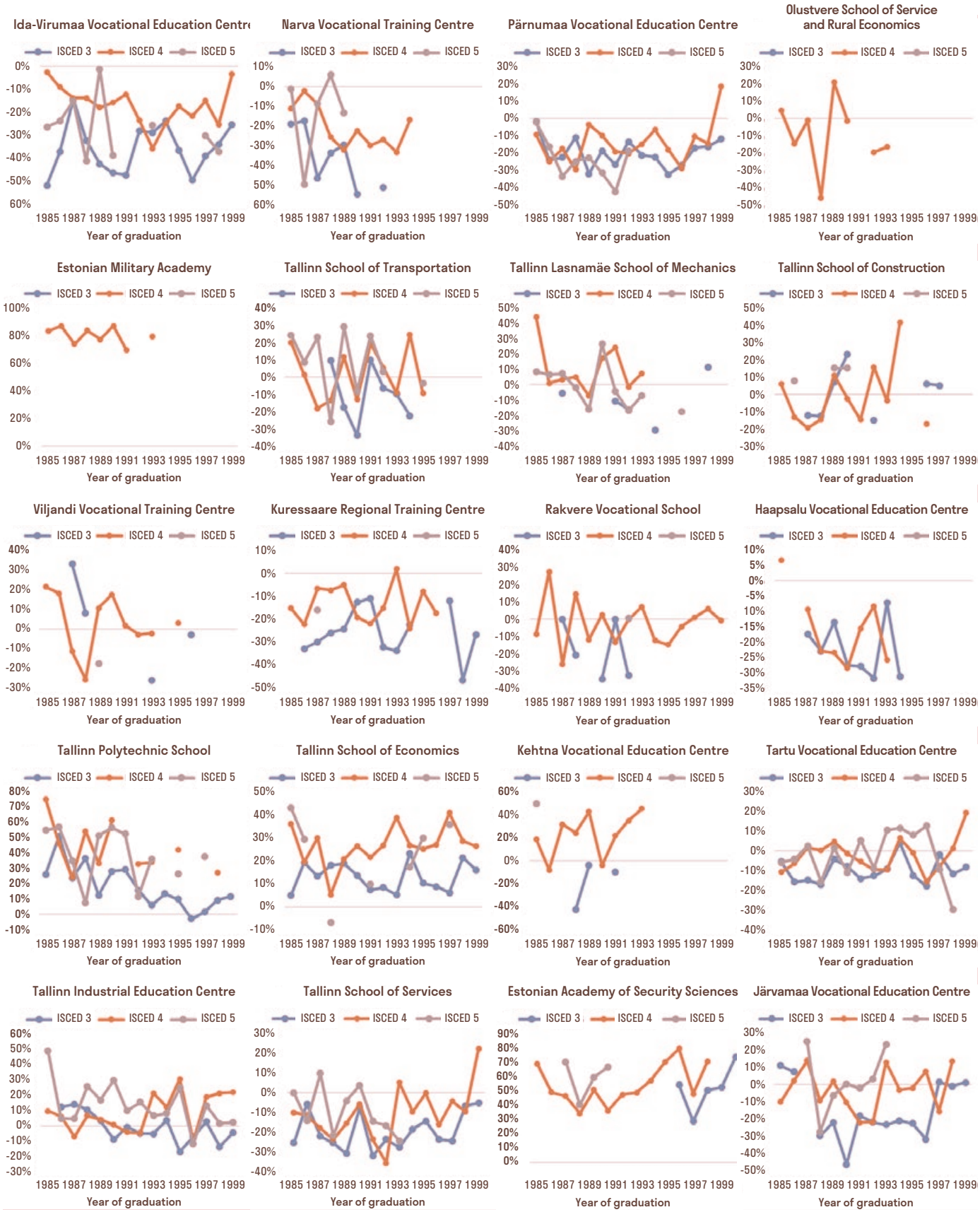
Table 3.2.1 Income regression models (dependent variable: logarithm of income)

	M1	M2	M3	M4	M5	M6	M7
ISCED 3 vocational education	-0.139***	-0.119***	-0.124***	-0.128***	-0.094***	-0.085***	-0.021
ISCED 4 vocational education	-0.022	-0.006	-0.011	-0.036**	0.022	0.011	0.047***
ISCED 5 vocational education	0.065***	0.039*	0.043*	0.015	0.048**	0.051**	0.029*
Sex		+	+	+	+	+	+
Estonian as native language			+	+	+	+	+
Cohort				+	+	+	+
County					+	+	+
Mother's education level						+	+
Occupation							+
Number of observations	67,121	67,121	67,121	67,121	67,121	55,476	50,170

SOURCE: table by the author

NOTE. Stars indicate significance levels: *** 0.001; ** 0.05; * 0.1. ISCED 3 – vocational upper secondary education based on lower secondary education; ISCED 4 – vocational upper secondary education based on upper secondary education; ISCED 5 – post-secondary vocational education entered after upper secondary education. A plus sign indicates that the corresponding variables are included in the model.

Figure 3.2.3 Median income of vocational school graduates compared with the median income of general upper secondary graduates, 2023



SOURCE: figure by the author

NOTE. ISCED 3 – vocational upper secondary education based on lower secondary education; ISCED 4 – vocational upper secondary education based on upper secondary education; ISCED 5 – post-secondary vocational education entered after upper secondary education. The zero line in the figure represents the wage level of employees with general upper secondary education.

graduates. The incomes of graduates from some vocational schools exceed those of general upper secondary graduates, indicating that the skills provided by those institutions are more highly valued in the labour market. For example, young people with vocational qualifications in internal security and national defence earn more than general upper secondary graduates, as do some graduates of technically oriented vocational schools.

Administrative registers also allow us to examine the wages of vocational school graduates by institution. However, confidentiality requirements apply. Accordingly, only examples are presented in which each data point is based on at least 20 observations.

By institution, the Estonian Military Academy and the Estonian Academy of Security Sciences stand out (see Figure 3.2.3), as their graduates earn significantly more than individuals with general upper secondary education. These institutions train for public sector professions in which wages are not determined by market forces, making direct comparisons with regular vocational schools difficult. Nevertheless, the incomes of graduates from many vocational schools remain below those of individuals with only general upper secondary education, regardless of whether ISCED 3, ISCED 4 or ISCED 5 education is considered. Positive exceptions include the Tallinn School of Economics, Tallinn Polytechnic School and the Tallinn Industrial Education Centre, whose graduates earn more than general upper secondary graduates of the same age.

SUMMARY

The limited wage effect of vocational education compared with general upper secondary education gives rise to several hypotheses that require further analysis.

First, labour market outcomes may reflect selection into vocational education. The regression analysis sought to account for these effects. At the same time, the results show that controlling for county of residence and occupation alters the estimated impact of vocational education on income. This suggests that vocational education has a more positive effect in lower-paid occupations and regions. However, choosing a different position in the labour market would enable individuals to earn higher wages.

Second, in Estonia's relatively flexible labour market, where employment relationships are short by international standards, general skills such as language proficiency, learning habits and communication skills – developed in general upper secondary education but to which vocational education may add less – may be more highly valued. At the same time, vocational skills may also be acquired in the workplace or through further training.

Third, the issue may lie in weak alignment between vocational education and labour market needs. This is particularly evident in the results by institution. While graduates of most vocational schools earn less than individuals with general upper secondary education without specialisation, graduates of some vocational schools earn significantly more than general upper secondary graduates of the same age. This indicates that the skills provided in those institutions are better aligned with labour market demand.

In the case of vocational education, it is important to examine how to improve alignment between what is taught and what is valued in the labour market. Although weaker labour market outcomes among vocational graduates may partly reflect personal characteristics that also limited their access to general upper secondary education, this should not be used to justify modest outcomes among vocational school graduates. If vocational schools do not provide the skills required in the labour market, directing less academically able young people into them creates a double disadvantage. First, they may lack characteristics needed to succeed both in the education system and in the labour market. Second, they may receive an education that does not sufficiently support their future prospects.

International studies also indicate that the relative wage level of individuals with vocational education may decline over time as skills become outdated and are not renewed. Alongside the provision of vocational education, it is therefore essential to ensure that employers continue to invest in further training and the updating of employees' skills.

REFLECTION

Janno Järve

Vocational education generally does not provide significant labour market advantages compared with general upper secondary education. In principle, vocational graduates' skills tailored to labour market needs should lead to higher earnings than those of general upper secondary graduates. In practice, however, the wage premium is small and tends to diminish over time. Two main factors are likely at play: selection and instructional quality.

Estonia's culture of prioritising higher education channels most of the more able young people into general upper secondary school and from there to university. Vocational schools often enrol those for whom upper secondary or university studies are less attainable. It is therefore reasonable to assume that general upper secondary graduates are, on average, somewhat more academically capable, which may offset the lack of vocationally acquired skills in the labour market. In other words, above-average pupils tend to select into general upper secondary education, while somewhat less academically strong pupils enter vocational schools.

Paradoxically, vocational pupils are expected to complete both general upper secondary education and vocational training within roughly the same timeframe as general upper secondary pupils complete their studies. This is demanding even for motivated and capable pupils, let alone for those who struggle with general education. Inevitably, vocational curricula involve compromises, and requirements are likely to be aligned more closely with the abilities of less academically strong learners. This implies that more capable vocational pupils could probably acquire more knowledge if vocational schools were able to expand the general education component of their curricula. However, this is difficult, as dropout rates are already high.

If the aim is to improve both the substance and the reputation of vocational education, selection must be taken more fully into account in curriculum design and in evaluating the performance of vocational schools.

- The effectiveness of vocational schools should be assessed regularly, taking into account pupils' initial levels of knowledge and skills, the extent to which these improve by graduation and their subsequent labour market outcomes. This would provide a clearer picture of the value added by vocational schools and indicate which pupils benefit more and which less. For many young people, general upper secondary education is not a realistic option, and vocational schools likely perform valuable work in preparing them for the labour market. However, comparing the average outcomes of general upper secondary and vocational graduates without accounting for differences in pupil ability obscures this contribution.

- Vocational education must become more diverse. It faces both substantive and reputational challenges. Addressing these requires making vocational education attractive also to academically stronger pupils, which in turn means offering programmes that do not appear to lead to a dead end. One option would be to consolidate institutions providing vocational upper secondary and applied higher education into integrated education centres offering both pathways. The duration of study should also be reconsidered – if pupils are to receive high-quality general upper secondary education, vocational upper secondary programmes should extend beyond three years. Providing secondary and higher education within the same institution would make it possible to design general education modules that better support further study and potentially increase their appeal. Strong general education is essential for adaptability. Vocational education must find ways to provide it at a high standard to as many pupils as possible. Achieving this would also help mitigate the selection problem.

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3.3

Teachers' wage models

Kaire Põder and Andre Veski

KEY MESSAGES

- Teachers' average monthly payments have increased faster than the average wage, and since 2023 teachers' incomes have exceeded the Estonian average wage.
- Teachers have both the motivation and the time to work more than full-time: half of them work under more than one employment contract, earning on average an additional EUR 175 per month from short-term work. It is not known whether this additional work is done out of preference or necessity.
- The education-level component in the teacher wage model, which gives Estonian basic school teachers a 5% wage premium for a master's degree and a 35% premium for a doctoral degree, is questionable, because a higher level of education does not necessarily make someone a better teacher. However, teachers working with children with special educational needs, pupils from lower socio-economic backgrounds, more complex subjects, and higher school levels should be paid more.
- The teachers' labour market is growing: the teaching profession has become more popular, teacher wages are increasing, employment relationships are becoming more flexible, including short-term work and gig-type arrangements.

INTRODUCTION

Teachers' wage models vary across countries and education systems. Three main principles of remuneration are commonly used. First, there is the fixed wage model, where in addition to an agreed minimum wage, seniority and qualification may determine the wage scale. A similar approach is the career-stage model, where specific criteria, such as seniority, professional certification, or completion of continuing education, enable movement along the career and wage ladder. Very different from these two is the performance-based wage model, where pay is determined by results, such as feedback, pupils' progress in the subject, or peer evaluations. An alternative is the full decentralisation of wages, where the school head independently determines teachers' wages based on the information available to them.

In Estonia, the official system is a mixture of a fixed and performance-based wage model, which sets the minimum salary for a full-time teacher. However, school heads may differentiate wages. A full-time workload is defined as 35 hours per week, of which 21–24 hours are contact hours,

meaning hours spent teaching in front of a class. From 1 January 2025, the minimum monthly salary has been set at EUR 1,820 gross. However, school leaders have a 20% variable reserve within the wage fund, which allows them to reward performance.

According to the Ministry of Finance, as of 10 November 2024, the actual estimated average teacher salary was EUR 2,184 per month [1]. We show that as of May 2024, the actual average monthly amount of payments was higher. The question is whether this is due to teachers working above the standard workload or earning additional income outside school.

Over four years, comparing October 2019 and October 2023, payments to teachers working in basic and upper-secondary education increased by 37%, and somewhat more in vocational education. Although Estonia's official wage model, until 2025, did not include wage grades based on teachers' seniority, competence, or effectiveness in improving learning outcomes, school heads had the autonomy to establish such wage models. We therefore ask whether school heads paid for seniority and education, and whether the wage return to seniority increased rapidly during the first five years of teaching. Unfortunately, our data do not allow us to ask whether teachers of certain subjects, such as science and mathematics, or teachers of pupils from lower socio-economic backgrounds or with special educational needs, including highly gifted pupils, are paid more generously.

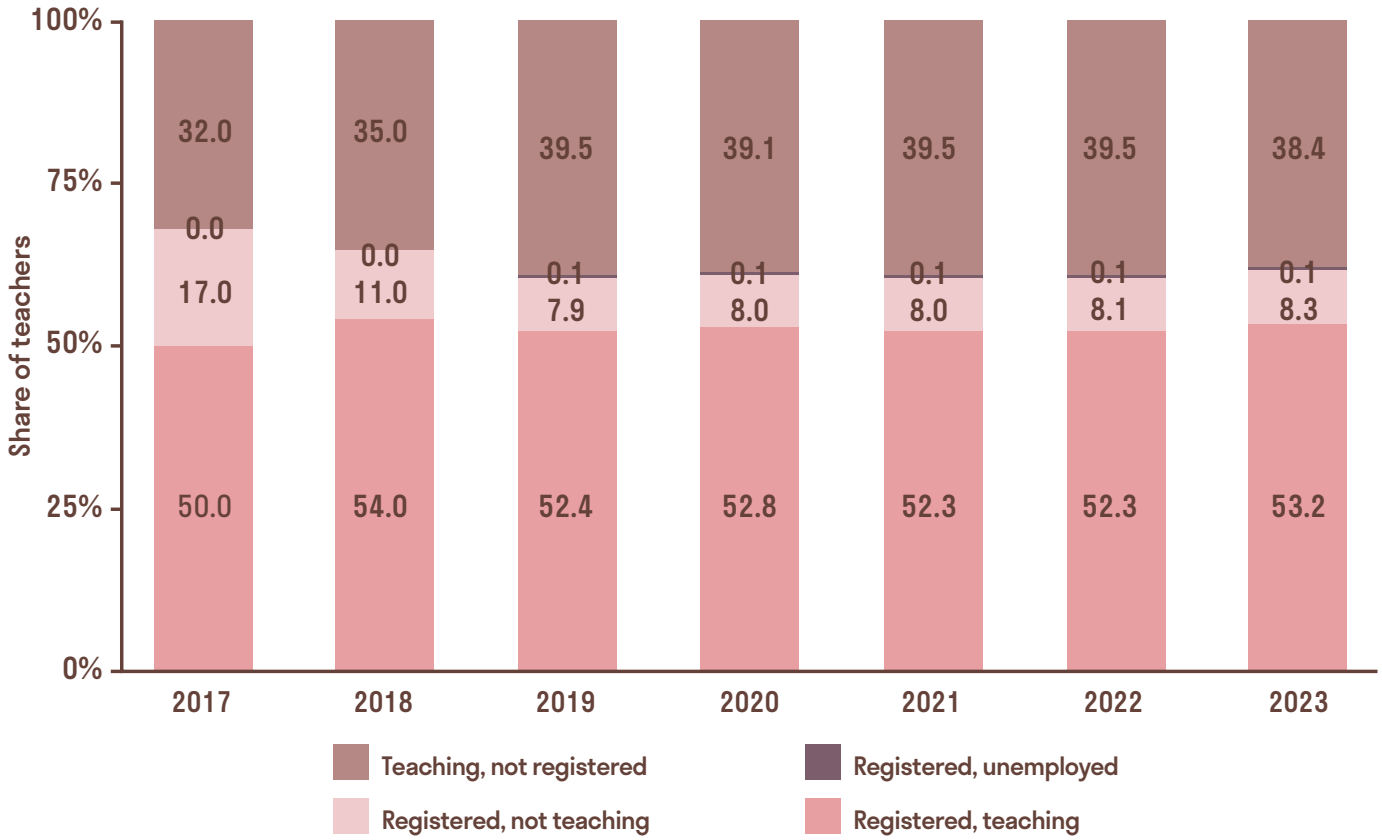
THE TEACHER LABOUR MARKET: ONE EMPLOYER VERSUS SHORT-TERM WORK

The main advantages of a fixed wage model are considered to be transparency[2] and so-called decommodification[3]: teaching as a profession is not treated as a market commodity. Research suggests that, especially compared with a performance-based model, fixed wages may increase cooperation between teachers.[4] The disadvantage of fixed wages is that they may create inappropriate incentives; for example, under conditions of rapid wage growth, they may not motivate teachers to remain in schools for a long time. However, the basic premise is that a performance-based model improves teaching quality.[5] Still, combining fixed pay with performance-based elements may create incentives to earn more through short-term work, or the gig economy. The pattern suggests a possible dualisation of the teacher labour market, with one segment consisting of full-time career teachers and another consisting of flexible, contract-based or gig-type teaching work. Is this also happening in Estonia?

The number of teachers increased substantially between 2017 and 2023, although the growth rate slowed over time. The largest contribution to this growth came from people without pedagogical education, who make up around 40% of all teachers. Nevertheless, the number of qualified teachers (with a master's degree) has also increased, although their share among all teachers has not. Only a small share, 8%, work in

Data and methodology. We rely on register data: all individuals associated with teaching positions in schools and higher education were selected from the register of educators. From the employment register (TÖR), we obtained all their registered employments for the period 1 September 2019 to 1 September 2024, together with background data. Statistics Estonia linked these data with income and social tax declarations (TSD) and the Estonian Education Information System (EHIS). As analytical methods, we used regression analysis techniques. The standard practice is to estimate wage equations based on the Mincer approach, where the dependent variable is log monthly earnings, which in our analysis are explained by education, work experience, level of teaching (basic school, upper-secondary school, vocational school), and gender. The effect of time is captured by monthly and annual time fixed effects, and school-specific characteristics by school fixed effects. For other regression techniques, we present the results only graphically.

Figure 3.3.1 Individuals working and not working as teachers, by status



SOURCE: figure by the authors

positions other than direct teaching positions (see Figure 3.3.1).

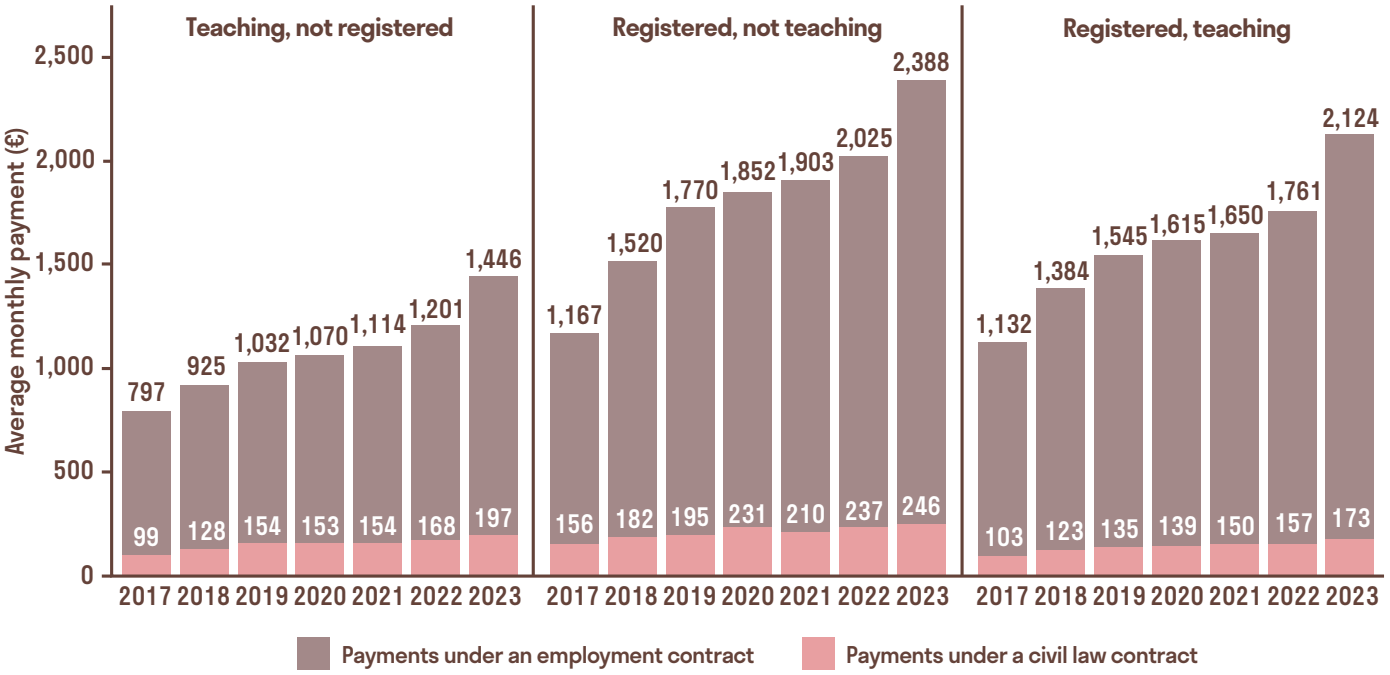
Nearly two-thirds of teachers work in only one main job, and most of them work full-time. In principle, there are no unemployed teachers. In 2023, the average teacher workload was 0.9, which reflects part-time work among both young and older teachers. Part-time work is nevertheless mainly concentrated among very young teachers, aged 20–25, who presumably do not yet have teacher qualifications. Only a very small share of teachers, less than 10%, work more than full-time.

Only one-third of teachers have civil-law contracts, such as authorisation agreements, and on average they earn little from these contracts – about EUR 175 per month in additional income (Figure 3.3.2). There are also teachers who have more than two contracts (see Figures 3.3.7–3.3.9 in the appendix at the end of the article).

Although Figure 3.3.2 does not account for workload, it shows that teachers' alternative wage-earning opportunity, shown in the middle panel, has nevertheless remained higher than teachers' salaries. Teachers who are registered as teachers but do not work as teachers also earn additional income through civil-law contracts.

Overall, reduced workload appears to be driven primarily by individual circumstances, such as supplementing pension income or working in a school prior to completing pedagogical qualifications. Gig-type engagements have remained relatively stable over the past seven years, with no marked increase following the Covid-19 pandemic. Contrary to common perceptions, teachers do not earn substantial additional income through civil-law contracts, which account for around 10% of total income.

Figure 3.3.2 Remuneration of individuals working as teachers or registered in the Register of Pedagogical Staff



SOURCE: figure by the authors

HOW DO SENIORITY, EDUCATION, GENDER AND TEACHING COMPLEXITY AFFECT TEACHERS' PAY?

The research literature has long found that higher levels of education spending do not consistently correlate with better study outcomes.[6] However, this does not imply that financial resources are irrelevant for learning outcomes. Rather, existing funding principles may have failed to convert higher expenditure into improved education, suggesting inefficiencies in allocation. Although hundreds of studies address this issue, a 2000 study on teachers' pay has been particularly influential, showing that remuneration systems affect pupils' performance and well-being only under certain conditions.[7] Unlike the formal Estonian pay model described above, the 2000 study cited here notes that pay structures are typically step-based, with career progression (including years of experience) and educational attainment determining salary grades. However, the same study finds that career ladder models are not effective.[8] Instead, it argues that pay systems should provide rapid salary growth during the first five years, when teachers' skills develop quickly and their effectiveness improves. The model should not include an increment solely for educational attainment, as higher qualifications do not necessarily make a teacher more effective. Higher pay should instead be directed towards teachers working with pupils with special educational needs or from lower socio-economic backgrounds, as well as those teaching more demanding subjects and at higher levels.

Estonian statistics show that the most recent non-seasonal monthly payment to teachers (total across all institutions, May 2024) exceeded the estimate reported by the Ministry of Finance, which is based solely on teachers' salaries (Table 3.3.1). Payments are highest, as expected, for upper secondary school teachers. Holding a master's degree has a statistically significant positive effect on total remuneration compared with a bachelor's degree, although we cannot control for whether subject or level complexity carries a wage premium. In vocational schools, the coefficient for a master's degree is negative: holding such a degree slightly reduces pay, although the effect is very small (less than 1%). For

Table 3.3.1 Effects of seniority, gender, age and educational attainment on total remuneration (%), basic schools, upper secondary schools and vocational schools, 2019–2024

	Basic	Upper secondary	Vocational
Seniority: each additional year of work	0.2***	0.3***	0.4***
Sex: female	-12.8***	-16.5***	-10.5***
Age: each additional year	0.3***	0.5***	-0.1*
Education: master's degree	5.5***	4.5***	-1.7***
Education: doctoral degree	37.6***	6.8***	32.7***
Average total remuneration in May 2024	€2,269	€2,690	€2,391
Number of observations (months of teaching)	130,151	66,511	7,266
Number of teachers (unique observations)	21,027	7,621	3,188

SOURCE: table by the authors

NOTE. Monthly gross wage payments are log-transformed, and the coefficients are subsequently converted into percentage terms. Seniority is calculated from the year of obtaining the teaching qualification, not from the actual start of employment in a school. Age is controlled for. Stars *** indicate statistical significance at the 99% confidence level (1% probability of error) and * at the 90% confidence level. The Register of Pedagogical Staff includes 31,836 unique individuals with higher education; total remuneration refers to the sum of all wage payments.

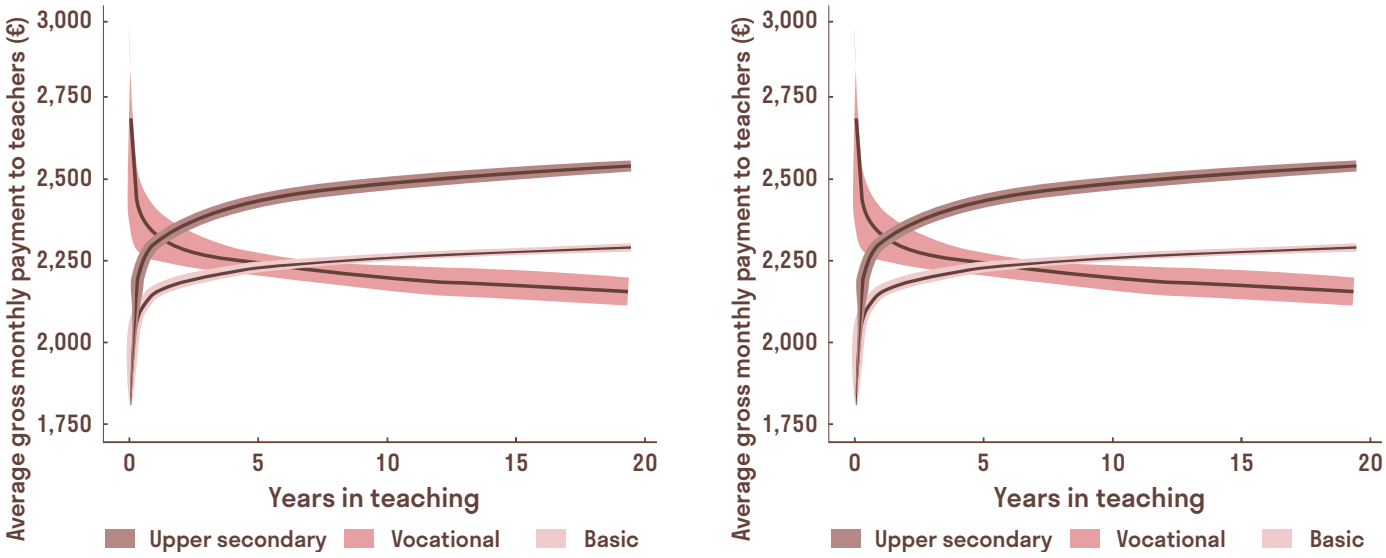
doctoral degrees, the difference in remuneration compared with a bachelor's degree is substantial; somewhat unexpectedly, the largest effect is observed in basic and vocational schools and the smallest in upper secondary schools.

Lower wage levels for women, including in education, have been documented in several studies and have multiple explanations. The most common is the opportunity cost argument: highly educated men generally earn more in alternative occupations. In OECD countries, male teachers earn on average 77% of the earnings of similarly educated men, whereas female teachers earn more relative to women in alternative occupations.[9] This creates gender-differentiated wage pressure.

Teachers' monthly wage payments are seasonal: holiday pay is disbursed in June (see the appendices at the end of the article). There are also indications of Christmas bonuses or payments related to formalised Christmas leave. Table 3.3.1 shows that seniority increments are paid across all types of educational institutions and generally to a similar extent, although part of this effect may overlap with the age coefficient. This is, however, a generalisation, as the data indicate that a fixed percentage is not paid for each additional year of seniority. Figure 3.3.3 presents the dynamics of remuneration by years of seniority (0–20 years) under two different functional specifications. Longer periods cannot be shown due to the temporal limitations of the registers.

Panel a) shows rapid wage growth at the beginning of teachers' careers in both basic and upper secondary schools, followed by minimal growth after the first few years. In vocational schools, additional years of seniority have a negative effect. Panel b) shows that in basic schools wages follow a pattern similar to the recommended effective model, with rapid growth at the start of the career and again after 15 years of seniority. In upper secondary schools, growth is concentrated between the fifth and tenth years of

Figure 3.3.3 Relationship between seniority and wages among teachers



a) Logarithmic model

b) Generalised additive model (GAM)

SOURCE: figure by the authors

seniority and after 15 years. In vocational schools, however, wages begin to decline after the sixth year of seniority and increase again only after the thirteenth year.

FUTURE CHALLENGES

A centralised or a decentralised pay model?

Teachers' pay models serve several purposes: ensuring teacher supply[10] and providing fair, contribution-based remuneration.[11] A meta-analysis of 119 studies by Hanushek shows that in 20% of cases there is a positive association between teachers' pay and pupils' outcomes, in 7% a negative association, and in the remaining cases the relationship is statistically insignificant.[12] Perceptions of fairness and motivation vary. From our education economics perspective, contribution and remuneration should move in tandem and be grounded in evidence.[13] Accordingly, wage growth should be concentrated in the first five years of teaching. Higher pay should be directed towards more demanding classroom contexts and subjects, particularly where pupils have special educational needs or lower socio-economic backgrounds, and towards higher grade levels. We recommend a pay model differentiated by level of teaching or subject area. In an ideal setting, effective pay design would fall within the remit of a capable school leader.

Will gig work enter school education?

Estonia has been a relatively generous funder of education. Compared with other European countries, investment at each level of education exceeds the average. At the same time, teachers have expressed concerns about low pay and excessive workload. The latter may reflect both necessity and opportunity, as many other professions also involve multiple jobs and long hours, yet their reported average wages are not calculated against a defined standard workload. Our analysis indicates that those working more than full-time are predominantly teachers aged 40–60, which we interpret as reflecting opportunity rather than compulsion.

In higher education, short-term contracts and gig-type arrangements have become widespread, including in elite institutions.[14] Since the Covid-19 pandemic, the teaching

market has expanded particularly through paid private tutoring, accessed via platforms or personal recommendations. Business-oriented solutions have also entered schools, such as substitute teacher development programmes that recruit replacement teachers through civil-law contracts.[15] Our analysis does not indicate explosive growth in such contracts. Nevertheless, around one-third of teachers hold civil-law contracts, and as the total number of teachers has increased, so too has the number of these contracts. The average additional monthly income remains below 200 euros.

Greater autonomy for school leaders in salary and personnel matters has been associated with increased competition and market-type behaviour among schools. Competition may manifest in selective admissions, investment in school reputation and competition for teachers. These practices may be framed as promoting educational quality[16] but may also be viewed as contributing to the commodification of education, reduced collaboration among teachers and greater inequality and segregation between schools.[17] This issue is discussed in greater detail in Chapter 4 of this report.

Given that the average age of teachers exceeds 50 (see Figures 3.3.10 and 3.3.11 in the appendix), and that school leaders are on average even older, there appears to be limited inclination to adopt platform-based work, gig arrangements or short-term, transaction-intensive employment relationships. Civil-law contracts are more common among younger teachers registered in the Register of Pedagogical Staff, and this trend is likely to continue.

Is there a teacher supply problem in Estonia?

Recent studies[18] have reinforced a widespread perception of an acute and large-scale teacher shortage.[19] However, interest in teacher education remains strong,[20] a substantial number of qualified teachers are not currently working in schools,[21] and planned legislative amendments[22] aim to lower barriers to entry into the profession. The growth in teachers' pay described in this article should further encourage individuals to pursue teacher education and enter the profession. It has even been suggested that school teachers' salaries now exceed those of academic staff in higher education (see Figures 3.3.5 and 3.3.6 in the appendix). This may reflect the high barriers to entry into the teaching profession – it is possible to work as a member of academic staff without being eligible to work as a school teacher – or limited competition between universities, which may allow them to act as monopsonistic employers, whereas schools compete more actively for teachers. We also show that since 2019 approximately 2,600 individuals with teaching qualifications who are not currently employed as teachers have remained available to enter the profession (around 8% of teachers).

Table 3.3.2 Teachers' wages and background characteristics (mean values), September 2019 – August 2024

	All	Basic	Upper secondary	Vocational
Monthly payment	€2,064.69	€2,023.81	€2,286.49	€1,940.02
Workload	0.94	0.95	0.93	0.90
Seniority in years	7.25	7.15	7.58	8.68
Age in years	48.72	48.93	49.9	50.37
Sex (share of women)	81.67%	88.27%	81.76%	58.52%

SOURCE: table by the authors

In our assessment, the teacher labour market is therefore moving in a positive direction.

APPENDICES

Appendix 1. Monthly and annual dynamics of payments to upper secondary, basic school and vocational school teachers over the past five years

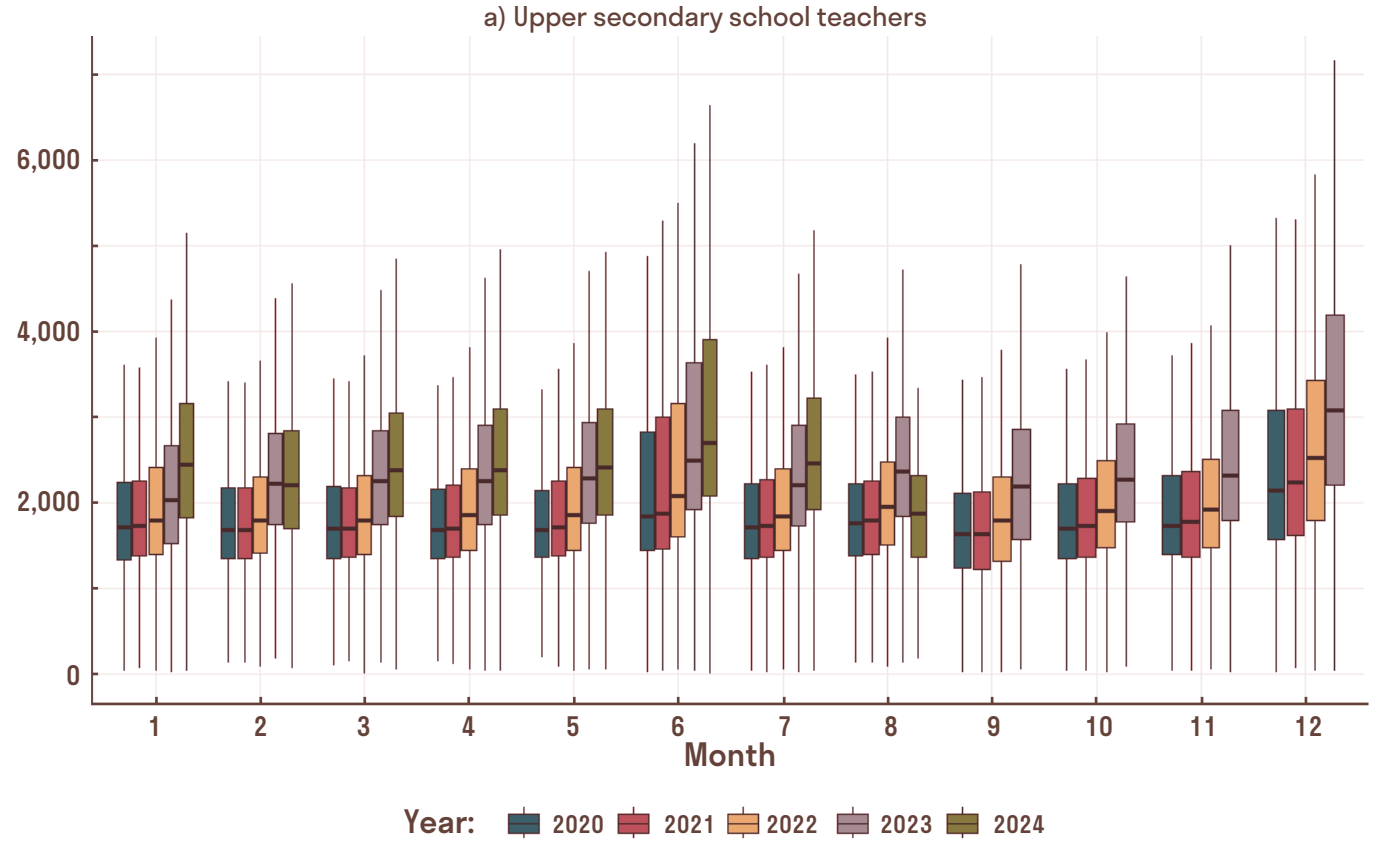
Table 3.3.2 presents register-based data in which all individuals registered in teaching positions are linked to Employment Register (TÖR) records for the period 1 September 2019 – 1 September 2024 and combined with background information (gender, education and age). These data are further linked to income and social tax declarations (TSD) and the Estonian Education Information System (EHIS).

The data show that while teachers' incomes remained virtually unchanged between 2020 and 2021, substantial increases occurred in recent years, particularly in 2023 and 2024, both in median pay (the lines inside the boxes in Figure 3.3.4) and in wage dispersion (the 'whiskers', which roughly represent two-thirds of observations). In box-and-whisker plots, the box represents 50% of observations, meaning that its size reflects wage variation among half of teachers (a longer box indicates greater variation). For example, wages of vocational school teachers vary more than those of upper secondary or basic school teachers. At the same time, they are more evenly distributed, so the median lies relatively centrally within the box. All three graphs in Figure 3.3.4 display clear seasonality, with additional payments or holiday pay disbursed in June and December.

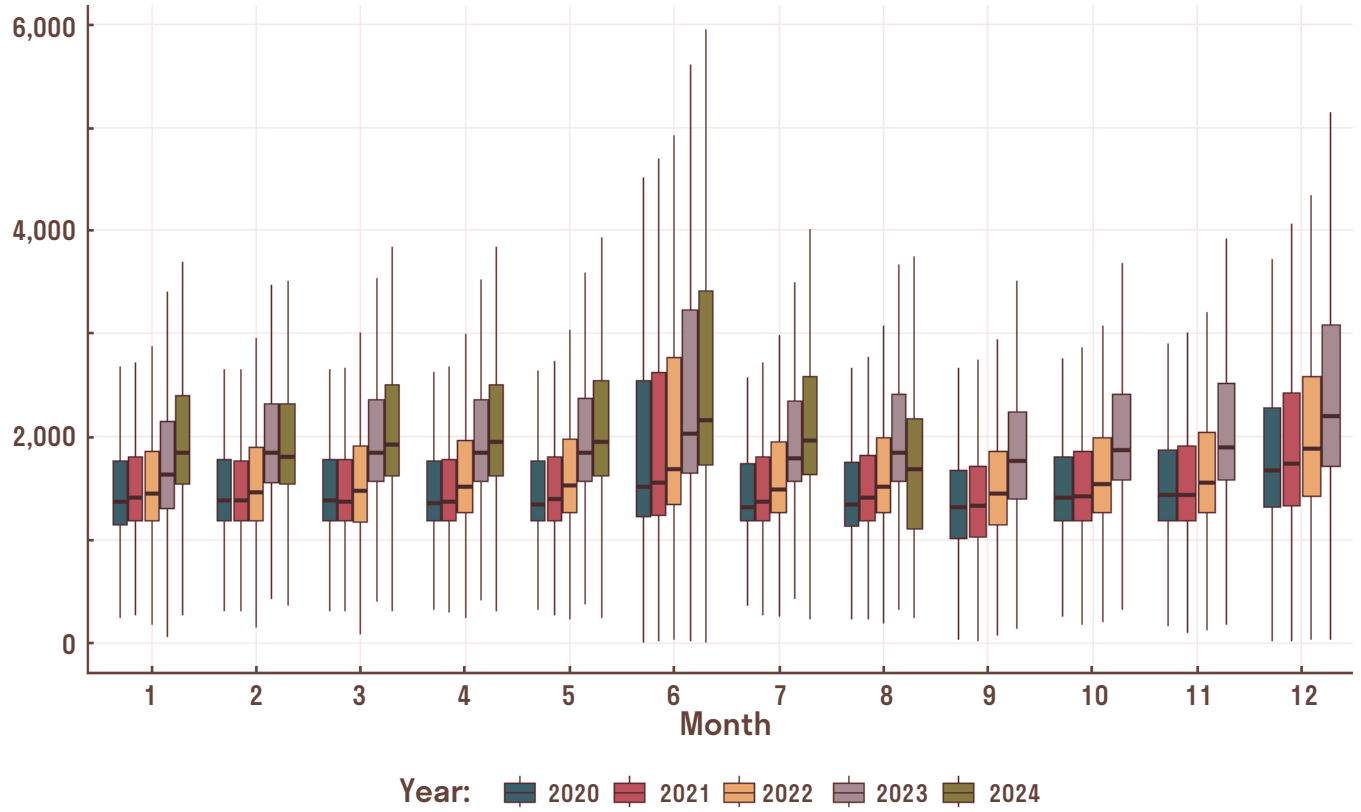
Appendix 2. Comparison of salaries of school teachers and academic staff

Universities have argued that academic staff contribute more to societal welfare than institutional budgets allow them to be compensated for, resulting in their salaries being lower than those of school teachers due to public underfunding.[23]

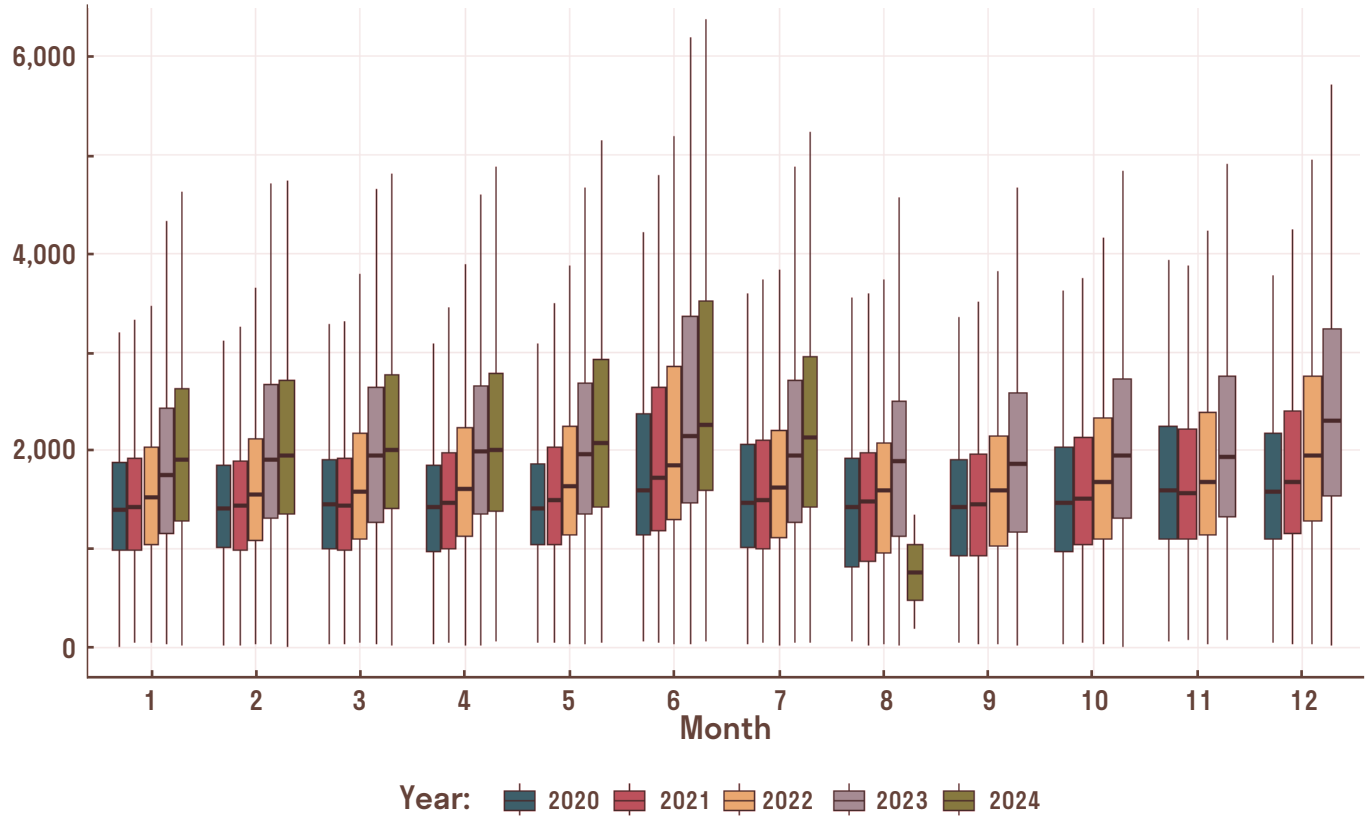
Figure 3.3.4 Average monthly gross payments to teachers over five years



b) Basic school teachers



c) Vocational school teachers



SOURCE: figure by the authors

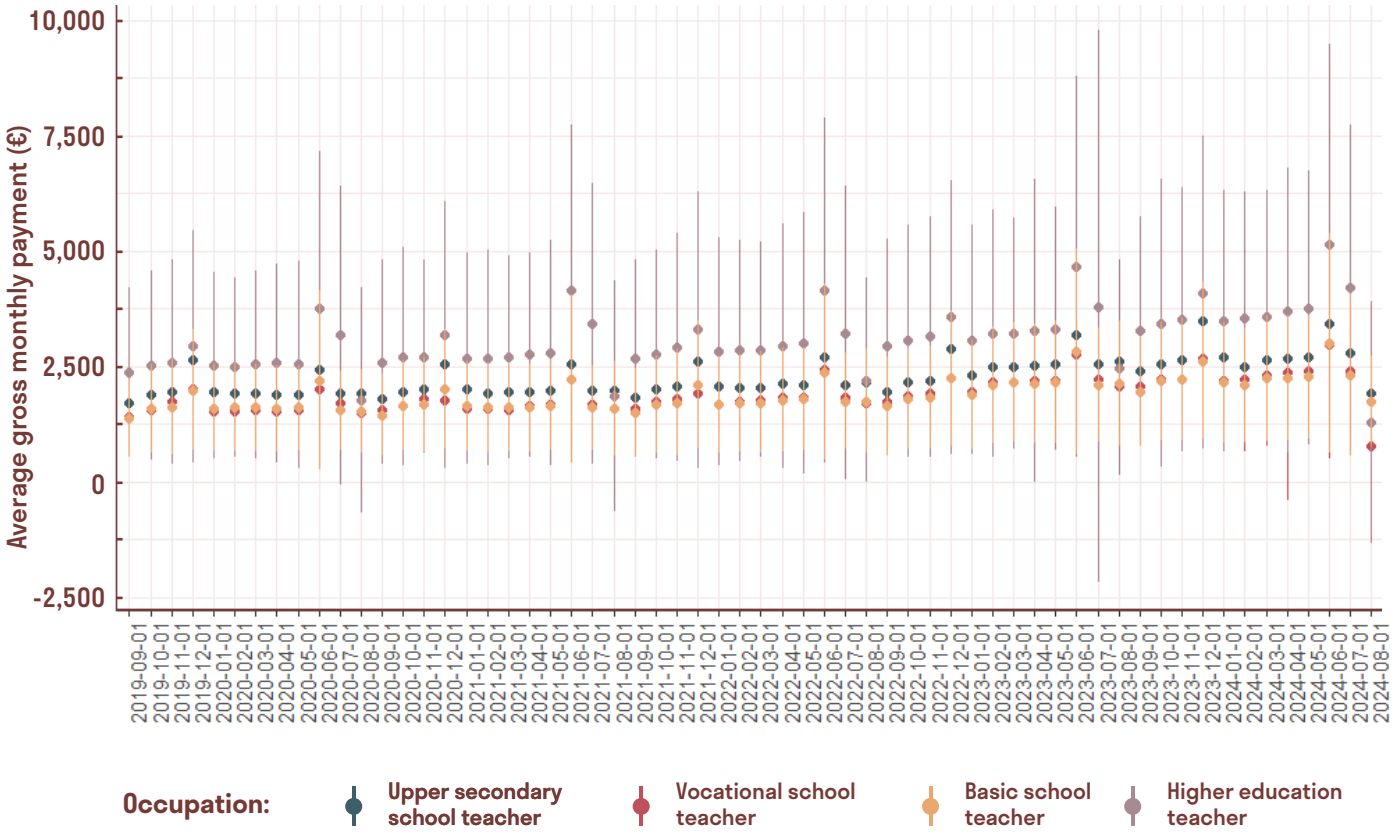
However, the data indicate that teachers earn on average less than academic staff. In October 2023, academic staff in higher education institutions (regardless of academic rank) earned 41% or 971 euros more than school teachers. Nevertheless, a considerable number of academic staff earn less than school teachers (see Figure 3.3.5).

Average monthly payments differ across levels of teaching, with the lowest salaries in vocational education and the highest among upper secondary school teachers. However, these differences are not statistically significant, and it is therefore incorrect to claim that university academic staff earn less on average than school teachers. This comparison is based on group averages and includes highly paid professors and research group leaders. Figure 3.3.6 compares university academic staff salaries with those of upper secondary school teachers, focusing primarily on academic staff whose main responsibility is classroom teaching, presented on an annual basis for clarity. It shows that the average salary of school teachers may indeed be higher, but not significantly higher, than that of several categories of university staff, such as assistants, fixed-term academic staff (category 0) and academic staff with a master's degree (category 5 teacher).

Appendix 3. Teachers' additional earnings

Approximately one-third of registered teachers hold a civil-law contract (Figure 3.3.7). Teachers may have multiple contracts, some of which are civil-law contracts. In 2023, teachers' total remuneration increased significantly, by 20%, while remuneration from civil-law contracts increased

Figure 3.3.5 Comparison of remuneration and monthly pay dynamics among school teachers and academic staff, September 2019 – August 2024



SOURCE: figure by the authors

NOTE. Points represent average monthly payments, and the lines around the points show 95% confidence intervals, indicating the range within which monthly payments fall in 95% of cases.

by less, on average around 10% (Figure 3.3.2). The share of teachers with civil-law contracts has remained unchanged, although their number has exceeded 10,000. It is not known whether such contracts represent additional work or primary employment. Income from civil-law contracts has remained at around 9% of total pay.

Appendix 4. Teachers' workload

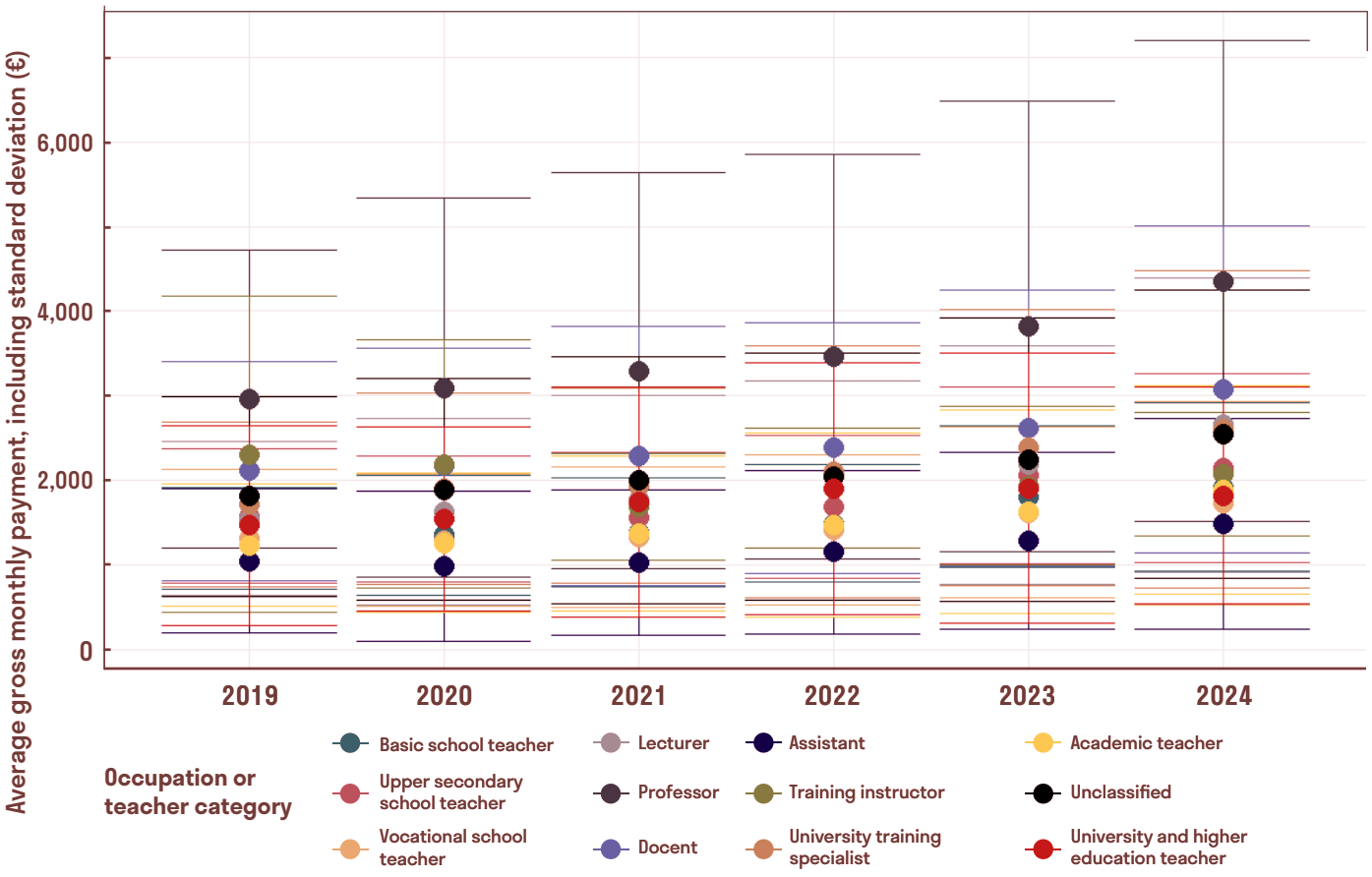
Less than half of teachers (48% in 2023) have only one employment contract (Figure 3.3.8). Approximately 35% undertake additional work at least once during the year under either an employment or a civil-law contract. Although the total number of teachers has increased over time, the proportion with multiple contracts has remained stable.

Most teachers (55–58%) work close to a full-time load (0.95–1.05 full-time equivalent) (Figure 3.3.9). Around 30% work below 0.8 of a full-time equivalent and 8–9% between 0.8 and 0.95. Some of these teachers may have additional duties not recorded in the Register of Pedagogical Staff. We measure only declared workload, which may differ from actual working time.

Appendix 5. Teachers' age

The number of individuals registered in the Register of Pedagogical Staff and working as teachers increased significantly between 2017 and 2023 (Figure 3.3.10). Figure 3.3.11 shows that the share of teachers aged over 50 has grown more rapidly, while the proportion of teachers under 40 remained almost unchanged between 2020 and 2023. The share of teachers aged over 70 has also increased, while graduates of teacher education programmes are increasingly entering

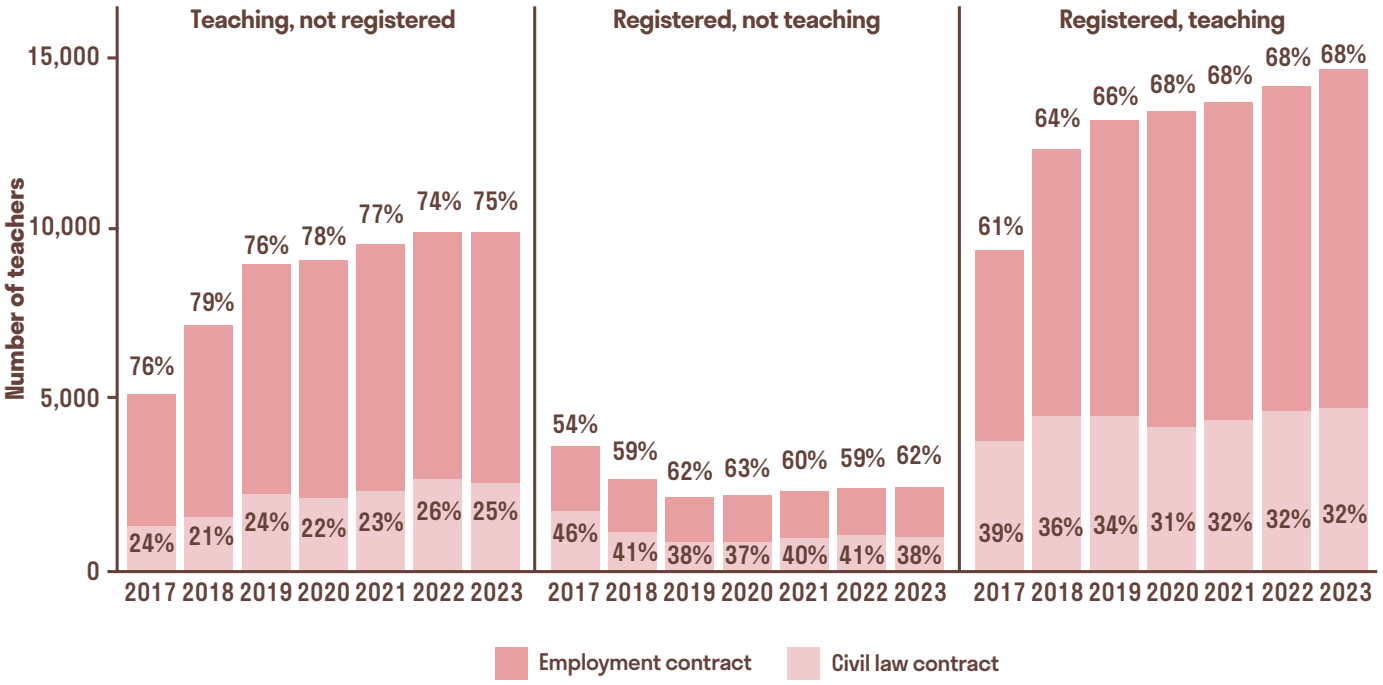
Figure 3.3.6 Comparison of teachers' average annual payments by university academic position



SOURCE: figure by the authors

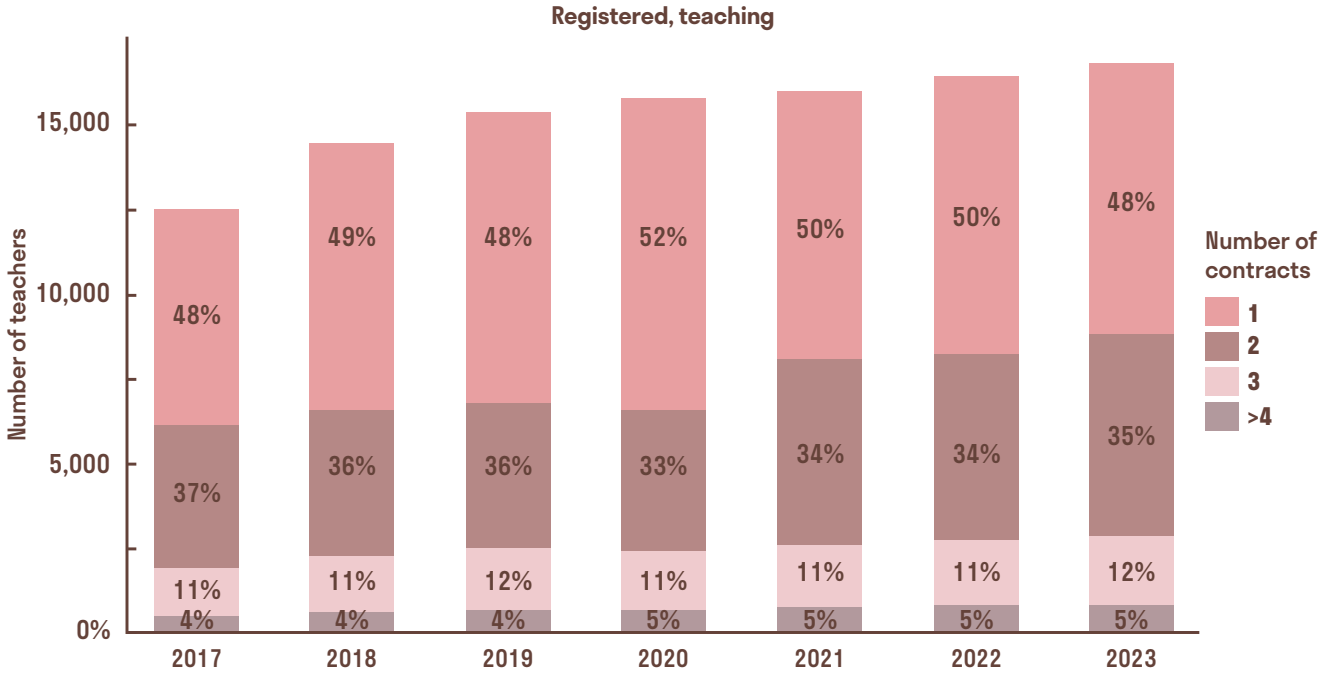
NOTE. Points represent the average monthly payment in a given year, and the lines around the points show standard deviations, indicating the range within which monthly payments fall in 68% of cases among school or university employees.

Figure 3.3.7 Types of contracts among individuals working as teachers or registered in the Register of Pedagogical Staff



SOURCE: figure by the authors

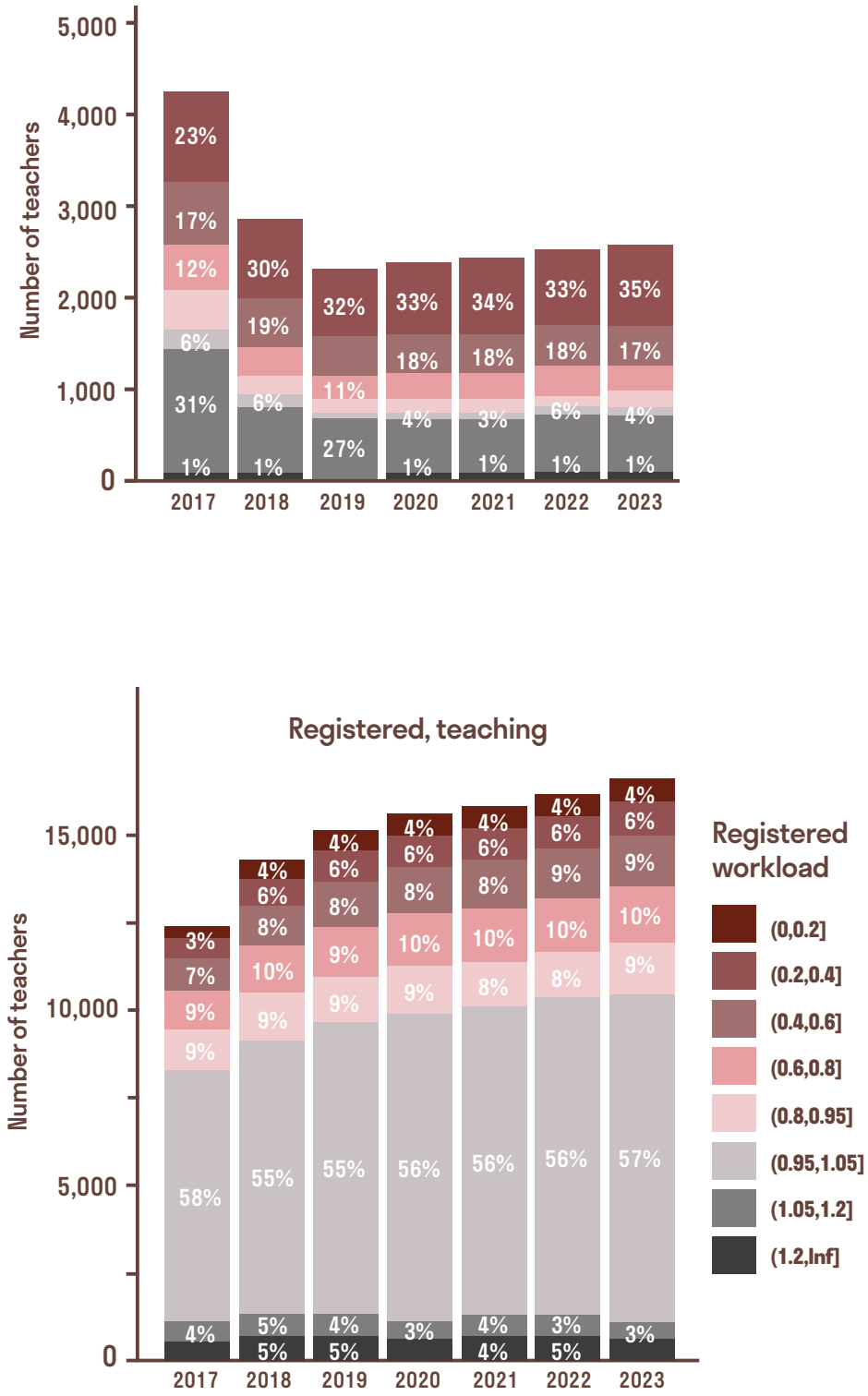
Figure 3.3.8 Number of contracts among individuals working as teachers or registered in the Register of Pedagogical Staff



SOURCE: figure by the authors

NOTE. The number of contracts reflects the annual average, rounded up.

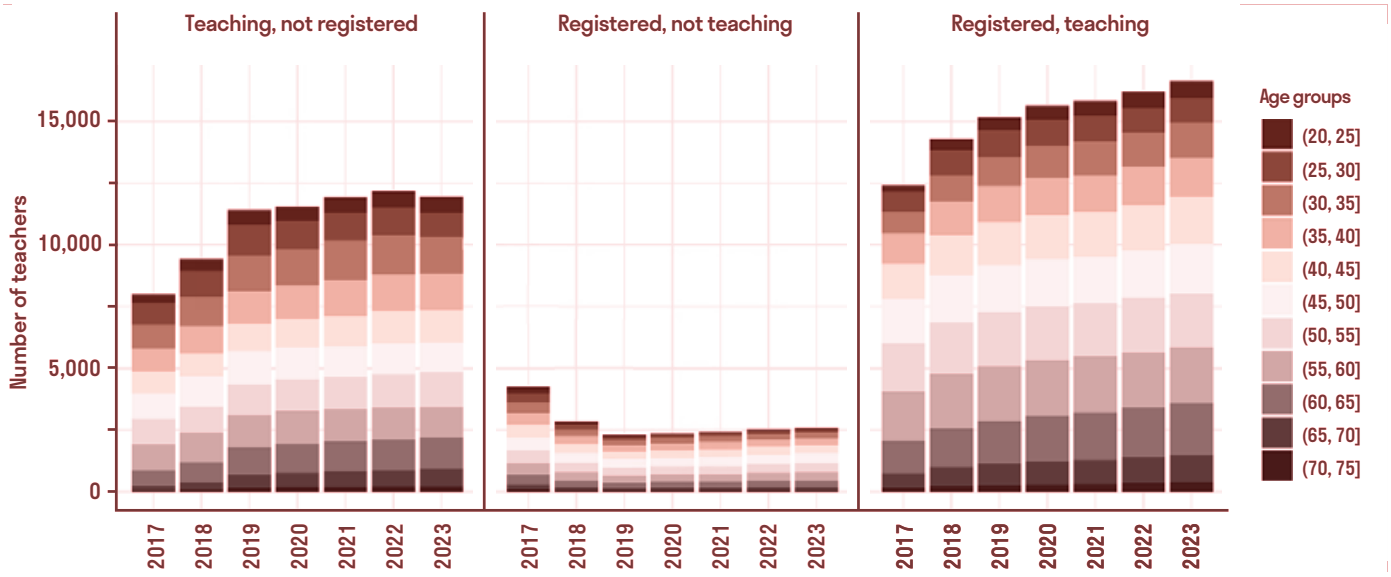
Figure 3.3.9 Workload of individuals working as teachers or registered in the Register of Pedagogical Staff



SOURCE: figure by the authors

NOTE. The figure is based on workload recorded in the Register of Pedagogical Staff, which may differ from workload recorded in the Employment Register. Not all individuals working as teachers are necessarily registered in the Register of Pedagogical Staff. The intervals in the legend do not overlap. The lower bound is excluded, and the upper bound included (e.g. (0, 0.2] means more than 0 and up to and including 0.2).

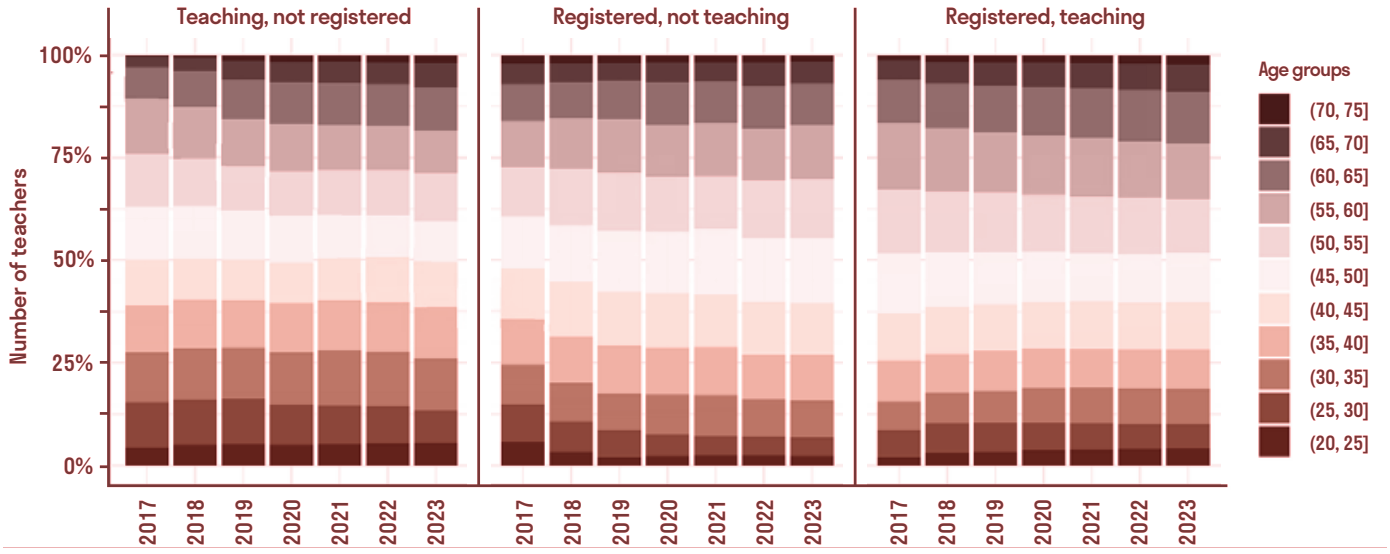
Figure 3.3.10 Age distribution of individuals working as teachers or registered in the Register of Pedagogical Staff



SOURCE: figure by the authors

NOTE. The intervals in the legend do not overlap. The lower bound is excluded, and the upper bound included (e.g. (70, 75] means more than 70 and up to and including 75).

Figure 3.3.11 Proportional age distribution of individuals working as teachers or registered in the Register of Pedagogical Staff



SOURCE: figure by the authors

NOTE. The intervals in the legend do not overlap. The lower bound is excluded, and the upper bound included (e.g. (70, 75] means more than 70 and up to and including 75).

REFLECTION

Eve Eisenschmidt

Pay growth is an important component of improving teachers' working conditions. It is also common to assume that teacher supply depends primarily on salary levels. However, focusing solely on pay growth obscures the need to address working conditions more broadly.

There are differing views on pay models. Some favour a centralised model, others a decentralised one. A centralised model could reduce inequality between teachers and schools but would not allow differentiation based on individual contribution. A decentralised or school-based pay system would make it possible to recognise teachers' effort but could increase competition between schools.

An increase in gig-type work may begin to affect the quality of teaching. Schools need flexibility, but the age structure of the teaching workforce must be taken into account: older teachers tend to prefer stability, while younger teachers are more open to flexible forms of work.

The situation is further complicated by insufficient or low-quality data for analysing teachers' workload, recruitment needs and pay. As a result, public communication and reform efforts may be ineffective or even counterproductive.

Focusing solely on pay growth obscures the need to address teachers' working conditions as a whole.

To make the teaching profession more attractive, a comprehensive approach is needed: fair pay, flexible working conditions, a supportive environment and high-quality data on the teaching workforce to enable national-level forecasting and governance. This requires action in three areas.

1. **A two-tier dynamic pay fund: teachers' contribution combined with a context index.** A nationally designed but school-level contribution index should be developed. The index would account for teachers' effort within each school, including the complexity of teaching and the difficulty of the working environment. At the national level, schools would receive additional funding if they operate in more challenging contexts and take responsibility for generating added value – for example, by achieving developmental progress or piloting and implementing new initiatives. School leaders could then design transparent internal pay systems that differentiate teachers' contribution within the school, based on nationally agreed indicators.

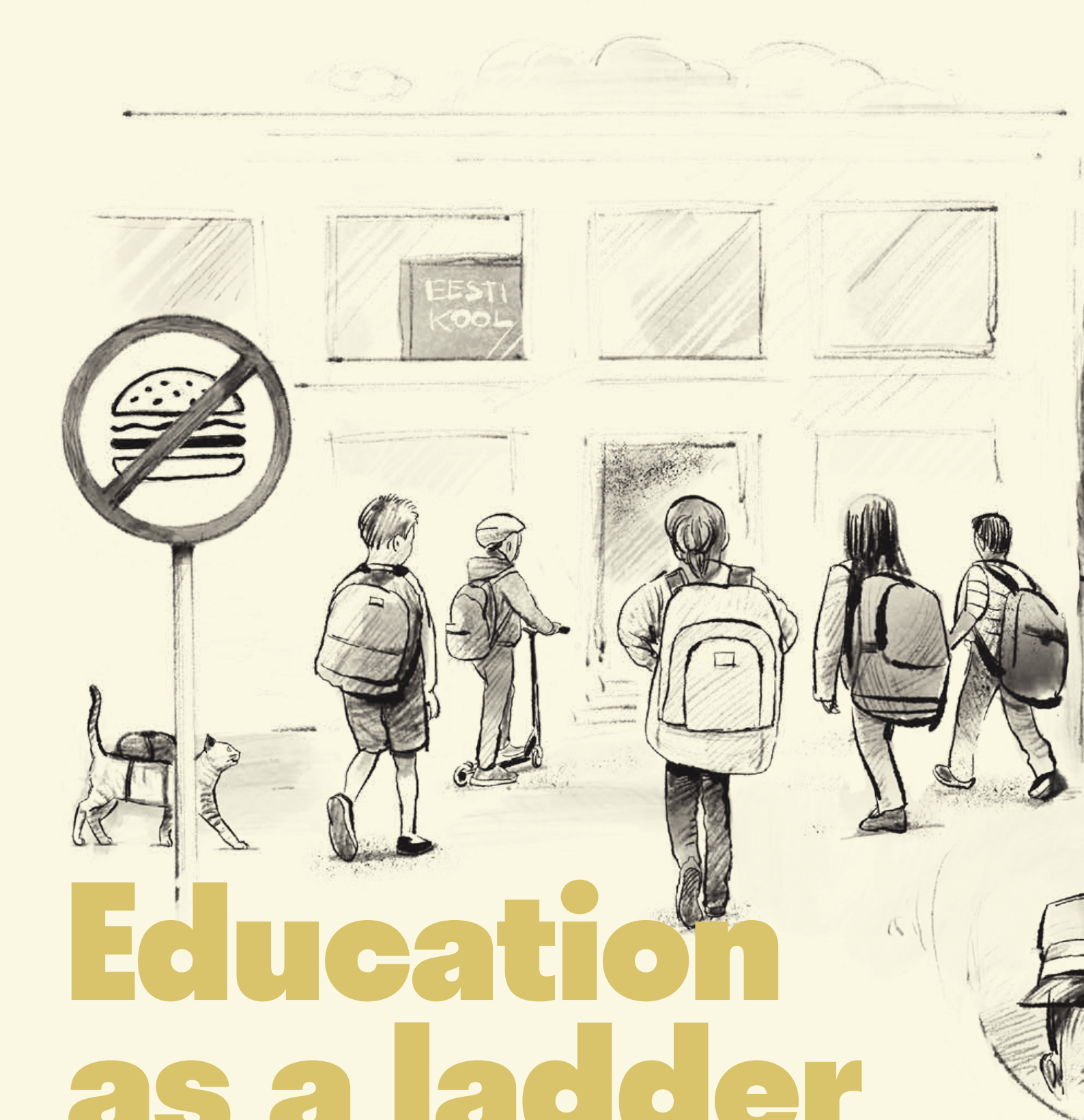
2. **A comprehensive view of the teaching profession.** A balance should be struck between stability and flexibility. Supportive working conditions should be promoted, including teamwork and flexible working time. The system should enable teachers to make informed career choices and take development breaks, during which they may work in other sectors and later bring fresh perspectives back to schools. Such an approach would enhance the attractiveness of the profession, retain experienced teachers and offer a positive image to new entrants.

3. **A teacher register.** A public register should be established for graduates of teacher education, those on career breaks and individuals undergoing retraining, enabling schools to contact and make direct offers to qualified teachers. Flexible return programmes should be developed to allow qualified teachers currently working elsewhere to re-enter the profession, including part-time and with mentoring support.

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Education as a ladder of social mobility


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4.0 Introduction

Education as a ladder of social mobility

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KEY MESSAGES

- **Education is far more than just academic achievement – it also concerns how schools support young people's personal growth and their development as members of society.** Grades are no more important than less visible outcomes such as cooperation and communication skills, values, sense of belonging and self-confidence. These shape young people's capacity to cope with life's changes and challenges. School is an environment in which long-term aspirations take shape, differences are recognised and problems are addressed collaboratively. Education functions as a social elevator when schools support not only the acquisition of knowledge but also personal growth and civic development. The analyses in this chapter show that differences across schools and municipalities in these broader dimensions are smaller than differences in academic outcomes. Recognising this may help reduce stress related to school choice in the first stages of education.

- **Up to the end of basic education, it is essential to uphold the comprehensive school principle across Estonia.** According to this principle, children begin their educational journey under broadly similar conditions, regardless of place of residence or family resources. Strong neighbourhood schools are central to this model. Outside major urban regions, population decline, disparities in teacher qualifications and limited educational opportunities create the need for flexible, region-based solutions – such as the governance model of 'one municipality – one school'. The relatively similar average educational outcomes across municipalities support maintaining a comprehensive school system nationwide and provide a solid foundation for further educational pathways that increasingly focus on individual interests, shared societal challenges and the development of individual abilities.

- **Studying in an Estonian-medium school helps break the vicious cycle of segregation.** Learning together in Estonian-medium schools reduces the linguistic and socio-economic barriers created by parallel education systems, improves the Estonian language skills of pupils with other mother tongues, fosters social networks based on

shared interests rather than language, and broadens opportunities for educational and labour market success. The current transition to a unified Estonian-medium education system is the first major step and must be followed by genuine joint learning among children with different mother tongues. Although this has raised questions, doubts and at times open resistance among both Estonian- and Russian-speaking families, it is necessary to interrupt the intergenerational transmission of segregation. The rapid decline in pupil numbers due to falling birth rates makes the development of each young person's potential – regardless of place of residence or mother tongue – even more important for the future of Estonia's schools.

POINTS OF DEPARTURE

Education is one of the most important determinants of life chances – a social elevator – and schools are the primary arena in which society creates opportunities but may also reproduce or deepen inequalities. School is not only a place for transmitting knowledge; it is also a space for personal growth and social integration, shaping young people's futures in a broad sense, from values and career choices to lifestyle decisions affecting health. In Estonia, as in many other countries, the education system seeks to provide equal opportunities for all children, regardless of their parents' socio-economic status, cultural background, language, place of residence or other factors. This ideal rests on the assumption that education can act as an equalising force enabling every child to realise their potential irrespective of circumstances beyond their control.

Educational pathways include several turning points, and this chapter focuses on two of them. The first is the transition from basic school to upper secondary education, where interest-based choice becomes more important and proximity to home becomes less decisive. Tiit Tammaru, Kadi Kalm, David Leonard Knapp, Anneli Kährik and Kadri Leetmaa examine the relationship between education and integration by analysing where graduates of Estonian- and Russian-medium basic schools and upper secondary schools in Tallinn choose to live in adulthood. Margus Pedaste, Triin Lauri, Kadi Kalm, Äli Leijen, Anto Aasa and Tiit Tammaru discuss the future of the basic-school network, focusing on changes in the number of children living outside major urban regions and their school choices. The second turning point concerns the length of educational pathways – how far young people progress in education. Taavi Tillmann, Mall Leinsalu and Rainer Reile analyse the links between educational attainment, lifestyle choices, and health and life expectancy, proposing concrete measures to reduce health inequalities between people with different levels of education. Mare Ainsaar and Andu Rämmer examine the impact of educational attainment on value orientations, analysing themes such as appreciation of nature, solidarity, security and innovation, and their development over time.

ACADEMIC OUTCOMES ALONE ARE NOT SUFFICIENT FOR EVALUATING SCHOOLS

In Estonia, as in many other countries, the quality of education is assessed primarily through academic outcomes – examination results, performance in standardised tests and rankings in international comparisons such as PISA. This is understandable, as the development of knowledge and skills is a central aim of education and academic results provide policymakers and parents with a clear point of reference. However, schools also fulfil two additional roles that are less visible but equally important: fostering independent and responsible individuals who value their communities, and functioning as a social elevator that broadens young people's opportunities regardless of place of residence or background.

School is an environment in which key experiences of collective life take shape – pupils learn to interact with different people, resolve conflicts,

cooperate and develop value orientations. Up to the end of basic education, the presence of a strong neighbourhood school is particularly important for ensuring equal opportunities. It enables children to begin and complete their educational journey under broadly similar conditions, irrespective of their family's distance from urban centres or economic situation, thereby reinforcing education's equalising role. The values, experiences and friendships formed at school influence the entire life course. This social and value-based dimension is essential both for personal growth and for integration into society. A key turning point in the educational pathway occurs at the transition from basic school to upper secondary education, when interest-based considerations and curriculum suitability become more important and proximity to home becomes less decisive.

The positive impact of education on life chances increases significantly with the length of the educational pathway. Equally important are outcomes that are not directly captured by tests – communication and cooperation skills, value orientations, sense of belonging and self-confidence – in other words, personal growth and the development of a full member of society. A long and continuous educational trajectory strengthens an individual's position in the labour market, helps break the intergenerational transmission of inequality, and enhances the capacity to cope with inevitable changes and challenges over the life course. Educational attainment is also associated with longer and healthier lives, as more educated individuals tend to make more informed choices that support health, well-being and active participation in society.

THE COMPREHENSIVE SCHOOL PRINCIPLE SHOULD BE UPHELD UNTIL THE END OF BASIC EDUCATION

For the education system to fulfil its equalising role and provide children with genuinely equal opportunities, the basic-school network must be consistently strong and accessible across the country. Its sustainability is affected by regional demographic change. People, jobs and educational institutions are increasingly concentrated in Tallinn and its surrounding areas, while the number of children is declining outside major urban regions. This places pressure on smaller schools and often forces families to choose between relocating to a city or sending their children to an urban school. Population projections indicate that by 2050 the number of basic-school-age children outside major urban regions will decline substantially, raising concerns about the long-term sustainability of the current school network.

Despite population decline, most children living outside major urban regions attend their neighbourhood school where one exists. At the same time, the presence of a neighbourhood school does not eliminate school-choice-driven mobility to urban schools. Parents' decisions between a local and a city school are shaped primarily by teacher qualifications, school reputation and family socio-economic background. The higher the qualifications of teachers in the neighbourhood school, the lower the likelihood that a child will move to an urban school. Conversely, higher parental socio-economic status – both at the level of the individual family and the wider school community – increases the likelihood of such mobility.

Although differences between schools are more pronounced in larger cities, such as Tallinn and Tartu, average educational outcomes across municipalities – both academic results and broader measures of personal growth and civic development – vary only slightly. High-quality education can be obtained in towns and rural municipalities across Estonia. One way to uphold a strong comprehensive school principle nationwide until the end of basic education would therefore be to apply the governance model of 'one municipality – one school' in municipalities outside major urban regions. This would help reduce disparities within municipalities while allowing schooling to continue across multiple sites within a single municipality. It could also ease tensions associated with restructuring the school network.

UNIFIED ESTONIAN-LANGUAGE EDUCATION SUPPORTS INTEGRATION

For many years, the Estonian education system has operated parallel educational tracks, with a large share of Russian-speaking children attending Russian-language kindergartens and schools. This has limited everyday exposure to the Estonian language and culture and reduced opportunities to form early connections with Estonian-speaking peers. As a result, successive cohorts of predominantly Russian-speaking young people have grown up in a linguistically and socially separate environment, which has constrained their opportunities in the Estonian labour market and increased the likelihood that they envisage their future outside Estonia. This is not only a linguistic issue. The parallel education system is often intertwined with socio-economic differences, as residence in predominantly Russian-speaking neighbourhoods, lower incomes and more limited employment opportunities reproduce these patterns across generations.

Studying in Estonian-medium schools helps break this cycle. Russian-speaking young people who study in Estonian acquire stronger language skills, form more friendships with Estonian-speaking peers, are more likely to attain higher education, perform better in the labour market and, in adulthood, are more likely to live in neighbourhoods shared with Estonian-speakers. This reduces the intergenerational transmission of inequality. By contrast, young people educated in Russian-language schools face greater difficulty in moving beyond these patterns.

The current transition to a unified Estonian-language education system is therefore an important step that broadens social mobility opportunities for all young people, regardless of nationality or mother tongue, and supports integration. However, changing the language of instruction alone is not sufficient. The next challenge is to promote meaningful joint learning among children with different mother tongues in ways that encourage genuine interaction and cooperation. This is complex, as integration depends on the willingness and engagement of all parties. Former Russian-language schools have, on average, had weaker academic outcomes, and some Estonian families are reluctant to enrol their children in these schools. Demand remains higher for schools that have previously provided instruction in Estonian. Consequently, some Estonian parents perceive that the burden of integration falls disproportionately on their children. If joint learning is introduced without careful preparation, it may deepen resistance. Progress will depend both on narrowing performance gaps between schools and on reducing residential segregation, which would help distribute Russian-speaking young people more evenly across neighbourhoods and schools.

HOW DO WE MOVE FORWARD?

Education functions as a social elevator for as many young people as possible when, alongside imparting knowledge, it supports personal growth and integration into society, provides genuinely equal opportunities at least until the end of basic education across Estonia, and encourages young people to continue their studies for as long as possible.

First, school is more than a provider of good education – it shapes values, social relationships and worldviews. For decades, Estonia has operated parallel educational tracks, with Estonian- and Russian-language schools functioning separately. Studying in an Estonian-medium school helps break this cycle by strengthening language skills, broadening social networks and expanding life opportunities.

Second, it is essential to uphold the comprehensive school principle across Estonia at least until the end of basic education. This requires a well-qualified teaching workforce and flexible solutions that also ensure high-quality education outside major cities. Greater cooperation between small schools in less populated areas and improved governance models can support coherence.

Third, a longer educational pathway benefits both individuals and society – people with higher levels of education are healthier, live longer and make more informed choices.

4.1

Studying in Estonian-medium schools supports the integration of ethnic minorities

Tiit Tammaru, Kadi Kalm, David Leonard Knapp, Anneli Kährik and Kadri Leetmaa

KEY MESSAGES

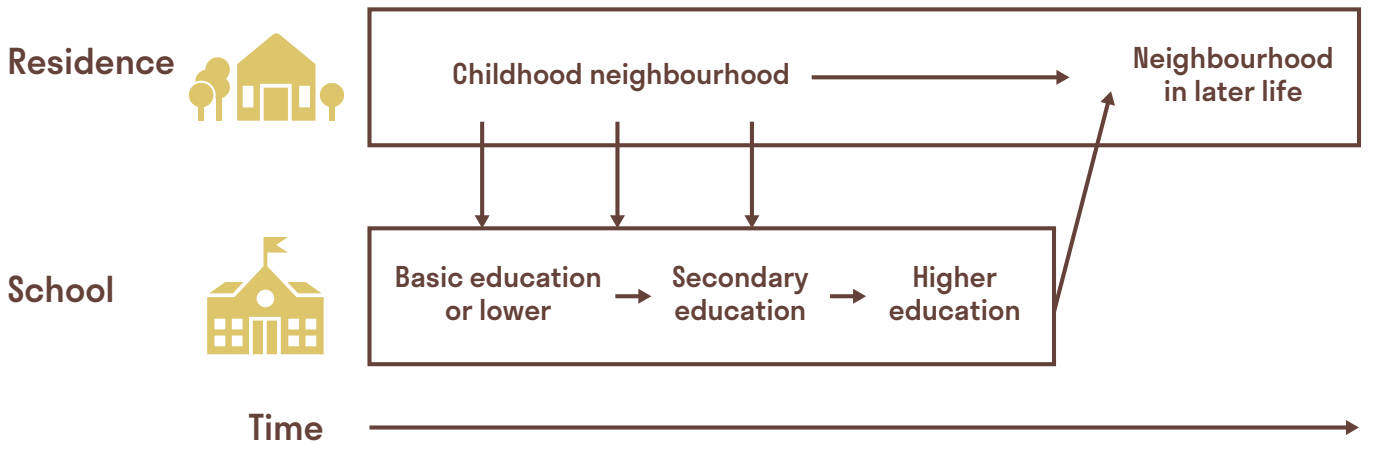
- Ethnic residential segregation has stopped increasing, but significant differences in residential patterns between ethnic groups remain.
- The share of pupils studying in Russian-medium schools has long remained stable.
- Studying in Estonian-medium schools helps young people from minority backgrounds break out of the cycle of segregation.

INTRODUCTION

Schools play a dual role in shaping spatial segregation and integration. On the one hand, parents' residential choices directly determine which schools their children attend. This reflects the allocation effect, whereby parents' residential and school choices shape their children's educational pathways and future life trajectories. On the other hand, schools transmit knowledge and shape children's values, skills and social networks, influencing them throughout their lives. This reflects the effect of schools themselves, where institutions play a decisive role. At school, pupils develop alongside their classmates, often forming friendships that last a lifetime and developing values and attitudes that shape their later educational pathways, career choices and other life decisions.

The 2016/2017 Estonian Human Development Report employed the concept of a vicious circle of segregation.[1] Ethnic segregation – or spatial separation based on ethnicity – involves living in different neighbourhoods, studying in different schools and working in different workplaces. Separation across these life domains tends to reproduce and accumulate in a self-reinforcing

Figure 4.1.1 The relationship between residential location and school choice



SOURCE: figure by the authors

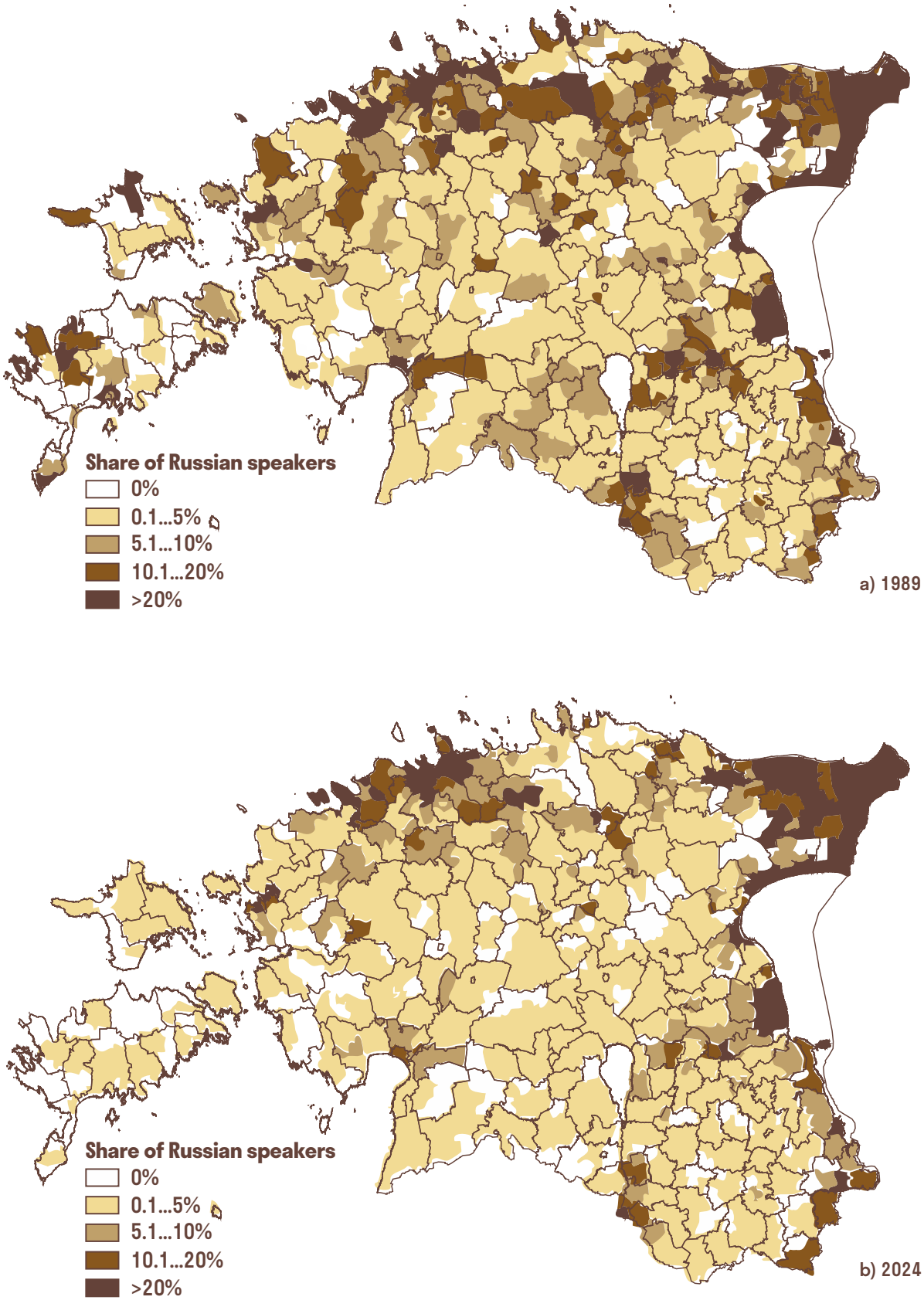
cycle. Parents' residential locations and their choice of school for their children are closely connected, while educational attainment shapes employment and income and, in turn, residential choices in adulthood, potentially triggering a new cycle of inequality and segregation (Figure 4.1.1).

The development of inequality in society depends on the extent to which children from minority groups reproduce their parents' patterns of segregation or, conversely, whether their life trajectories converge with those of the majority population, thereby strengthening integration between ethnic groups.

In this article, we analyse the residential choices of a cohort of young people whose mother tongue is Russian, using these as an indicator of broader societal integration. Living in similar areas requires two key preconditions directly related to integration: a willingness to live in similar neighbourhoods and comparable opportunities (income) to realise this preference. In the housing market, individual differences are often amplified, as people with similar levels of education are more likely than average to form families together. In other words, while education and labour market success are linked to individual opportunities and choices, housing decisions typically reflect the combined opportunities and choices of two partners.

To better understand the relationship between a school's language of instruction and pupils' later residential choices – that is, the link between school segregation and residential segregation – we focus on one generation of young people with Russian as their mother tongue who grew up in a Russian-speaking environment. Some of them studied mainly in Estonian-medium schools, others mainly in Russian-medium schools. We examine the extent to which their residential choices in adulthood differed according to the language of instruction in the school they attended. Our analysis covers one cohort: young people with Russian as their mother tongue who completed basic education or upper secondary education in the Tallinn urban region in 2005 and 2006. These are the earliest general-education graduates for whom the dataset allows us to observe outcomes over a longer life course. At that time, the implementation of Estonian immersion programmes in Russian-medium schools was still at an early stage, and general education schools operated largely either in Estonian or in Russian. The life trajectories of this cohort can be followed up to the age of 30, by which point most have completed their education, left the parental home and acquired or rented their own dwelling. We focus on the Tallinn urban region because, unlike other parts of Estonia, it has a broadly comparable number of Russian- and Estonian-speaking residents, as well as the widest range

Figure 4.1.2 Share of people with Russian as their mother tongue, 1989 and 2024



SOURCE: Infotechnological Mobility Observatory (IMO)[2]

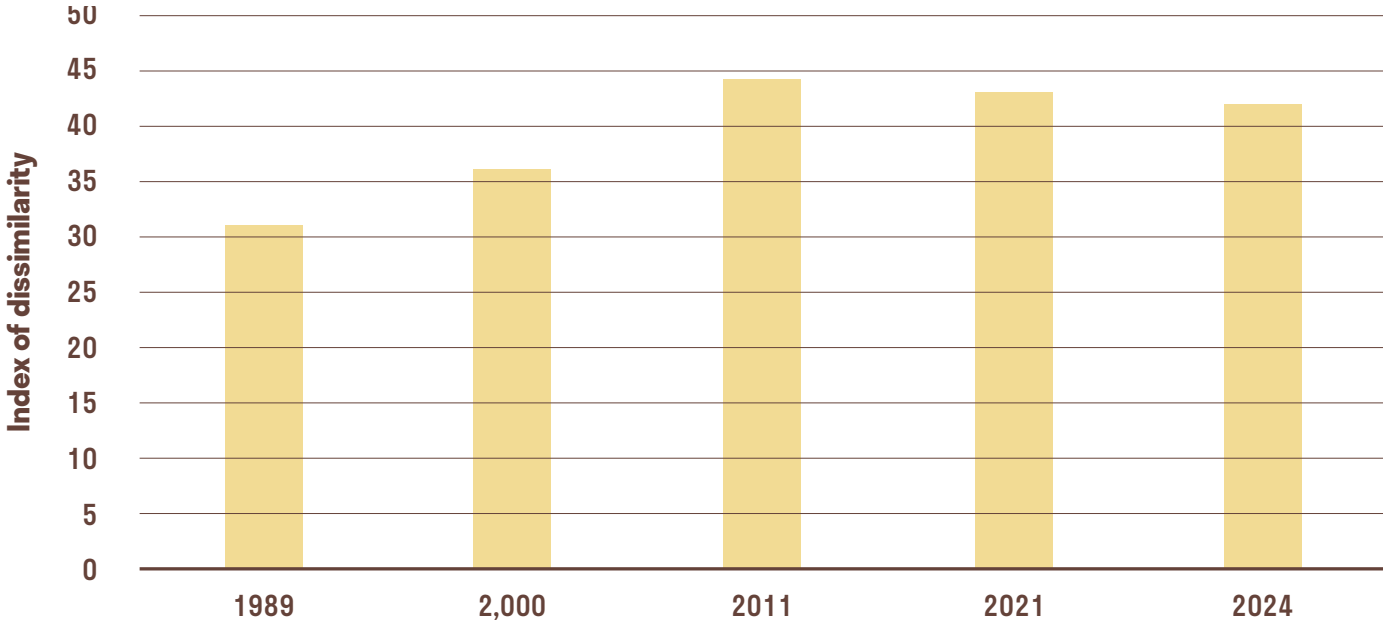
of options for both residential location and school choice.

ETHNIC RESIDENTIAL SEGREGATION HAS STABILISED, BUT SIGNIFICANT DISPARITIES REMAIN

Over the past three decades, the share of people with Russian as their mother tongue has increased in Tallinn and Ida-Virumaa, while declining in all other regions (Figure 4.1.2). The most substantial changes occurred in the 1990s and were primarily linked to emigration from Estonia. Within the country, however, Tallinn has been the main destination for Russian-speaking internal migrants. Notably, there has been sustained migration from Ida-Virumaa to the capital. As a result, the proportion of Estonia's Russian-speaking population living in Tallinn has steadily grown: from 41% in 1989 to 45% in 2011 and 50% in 2021. In other words, half of Estonia's Russian-speaking population now resides in Tallinn.

A similar pattern of ethnic concentration is visible in specific areas of Tallinn. In most cases, Russian-speaking residents have moved to neighbourhoods with more affordable housing. Residential segregation is commonly measured using the index of dissimilarity. This index indicates the percentage of members of a specific ethnic group who would theoretically need to relocate for each neighbourhood to reflect the city's overall ethnic composition. An index value above 40 is interpreted as a high level of spatial separation between ethnic groups. In Tallinn, the index exceeds this threshold (Figure 4.1.3). The separation of Estonian- and Russian-speaking populations into different neighbourhoods occurred mainly in the 1990s and 2000s. Since then, residential differences within Tallinn have neither deepened nor significantly diminished. In other words, the marked disparity in residential patterns between language groups has stabilised. Over the past 10–15 years, the existing pattern of segregation has largely reproduced itself: Estonians are clearly overrepresented in older districts such as Kesklinn and Põhja-Tallinn and in areas of detached housing, while Russian-

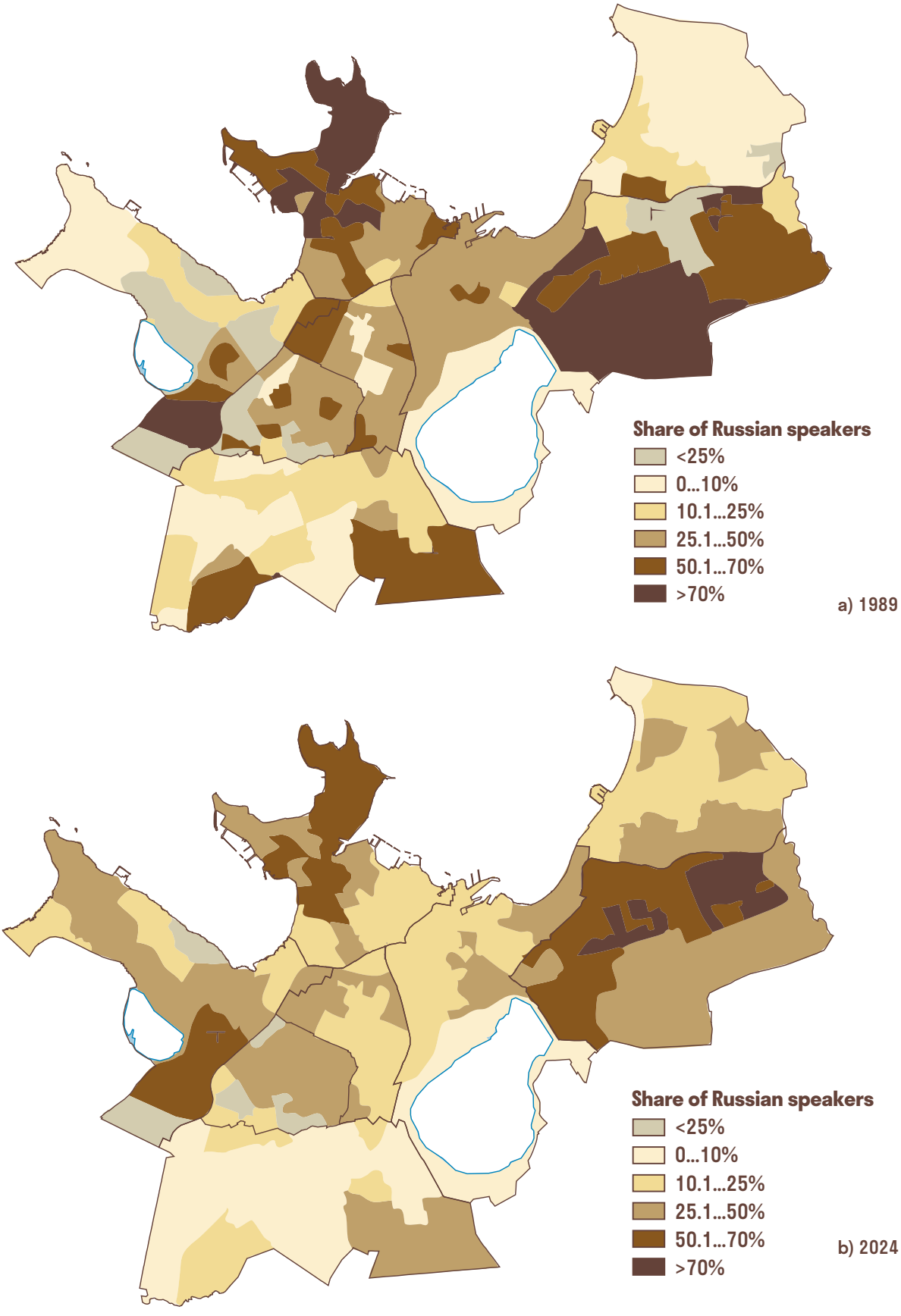
Figure 4.1.3 Change in the index of dissimilarity between language groups in Tallinn based on census data



SOURCE: Infotechnological Mobility Observatory (IMO)[3]

NOTE. When the index value exceeds 40, this is interpreted as a high level of spatial separation between ethnic groups.

Figure 4.1.4 Share of people with Russian as their mother tongue in Tallinn neighbourhoods, 1989 and 2024



SOURCE: Infotechnological Mobility Observatory (IMO)[4]

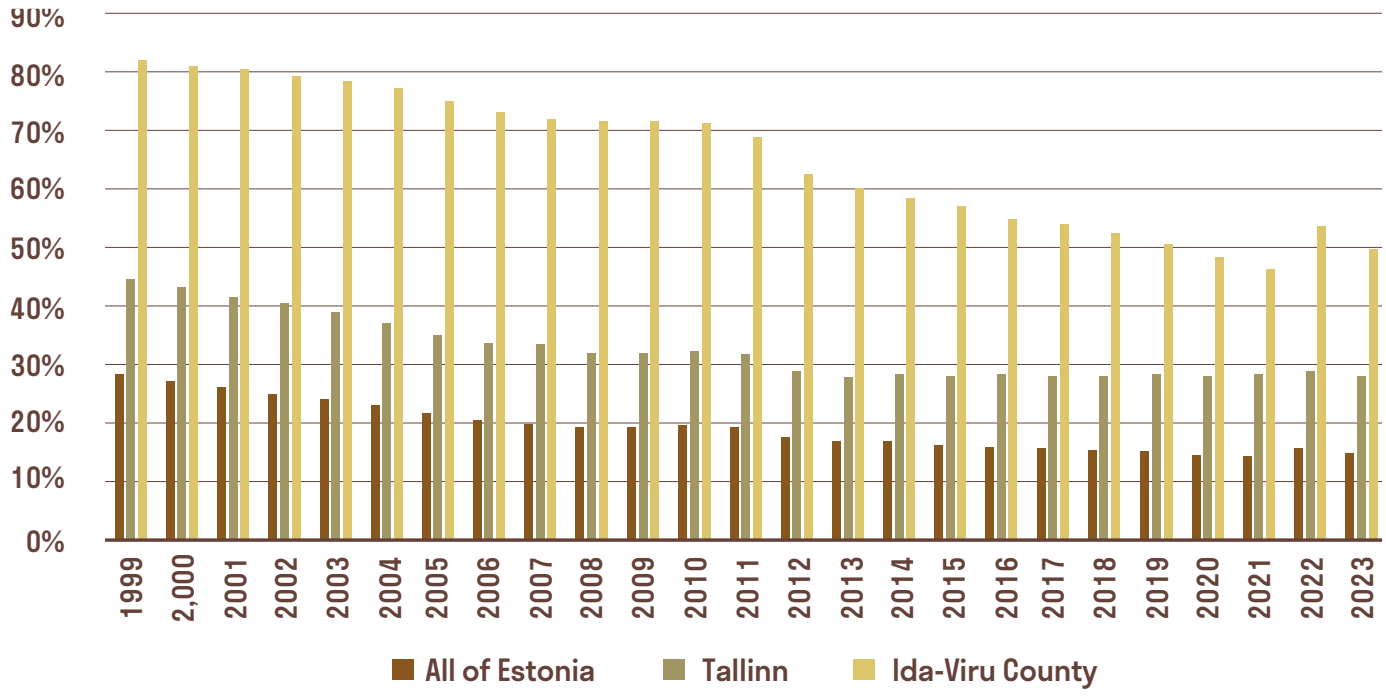
speaking residents are concentrated in large housing estates (Figure 4.1.4). For example, around 43% of Tallinn's Russian-speaking population lives in Lasnamäe, the city's largest district, where they account for approximately 80% of residents.

THE SHARE OF PUPILS STUDYING IN RUSSIAN-MEDIUM SCHOOLS HAS LONG REMAINED STABLE

Although Estonia's integration policy has seen many successes, integration has nevertheless progressed relatively slowly. One key factor has been the early separation of children into parallel language-based educational tracks through the language of instruction in kindergartens and schools. While the share of children studying in schools with a language of instruction other than Estonian (primarily Russian) declined until 2012, this trend has since stabilised. In 2023, around 15% of children in Estonia were still receiving education in Russian (Figure 4.1.5). In both Tallinn and Ida-Virumaa, the proportion of pupils enrolled in Russian-medium education has remained broadly stable over the past decade, at approximately 30% and 50%, respectively. A similar pattern appears when focusing specifically on pupils whose home language is Russian: the earlier decline in Russian-medium enrolment has levelled off, and nearly half of Russian-speaking young people were still studying in Russian in 2023 (Figure 4.1.6). In Tallinn, school choice is primarily shaped by parental preference rather than by limited availability, as Estonian- and Russian-medium schools are often located in close proximity. Parents can therefore choose the language of instruction for their children. Studying in Russian has remained a significant educational pathway, with implications for young people's later life trajectories and their integration into Estonian society.

Several generations of Russian-speaking young people have completed their schooling in independent Estonia in school environments that have not ensured strong Estonian language

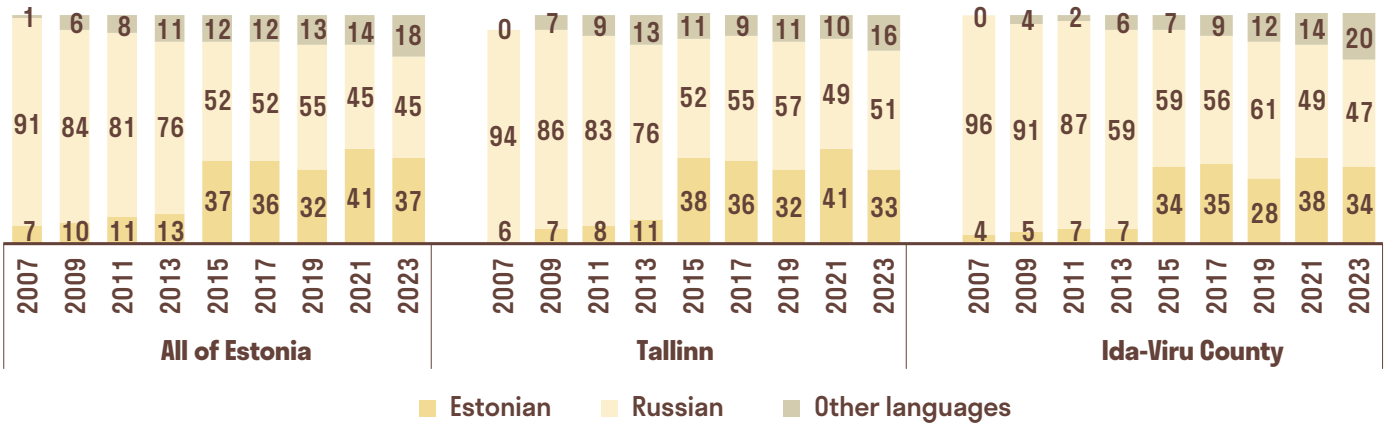
Figure 4.1.5 Change in the share of pupils in general education full-time study whose language of instruction is not Estonian, 1999–2023



SOURCE: Statistics Estonia[5]

NOTE. Pupils studying in Russian account for approximately 95% of those studying in a language other than Estonian.

Figure 4.1.6 Share of general education graduates with Russian as their home language, by language of instruction, 2007–2023



SOURCE: Infotechnological Mobility Observatory (IMO)[6]

skills; many have also had few opportunities to form friendships with Estonian peers. This hinders their integration into Estonian society. Compared with their peers educated in Estonian, young people who have completed upper secondary education in Russian are significantly more likely to envisage their future abroad. Among those who remain in Estonia, many face weaker labour market prospects due to limited language skills and narrower social networks.[7] The 2016/2017 Estonian Human Development Report[8] showed that unemployment is significantly higher among young people with Russian as their mother tongue than among Estonians of the same age. At the same time, a considerably larger share of Estonians hold higher-level positions, such as managers and senior specialists. These structural differences in labour market outcomes constrain residential choice: lower average incomes mean that people with Russian as their mother tongue have fewer opportunities to live in the same neighbourhoods as Estonians. It is therefore important to examine to what extent the life trajectories of Russian-speaking young people educated in Estonian differ from those educated in Russian.

STUDYING IN ESTONIAN-MEDIUM SCHOOLS HELPS BREAK OUT OF A VICIOUS CIRCLE OF SEGREGATION

There is extensive research on school choice, but relatively few studies examine how attending different types of schools shapes the later life trajectories and residential choices of young people from different ethnic backgrounds. Like the Nordic countries, Estonia uses a register-based census, which enables more complex longitudinal analyses by linking data on the same individuals over time across their life course. Whereas traditional censuses provide a cross-sectional snapshot of society at a single point in time, register-based data allow outcomes to be followed longitudinally.

In this article, we draw on longitudinal data on graduates of Tallinn basic schools and upper secondary schools from 2005 and 2006. We focus on young people with Russian as their mother tongue who, at the end of their studies, lived in Tallinn neighbourhoods where the share of Russian-speaking residents was above the city average.

Our analysis shows that the vast majority (94%) of young people with Russian as their mother tongue who grew up in neighbourhoods with a high share of Russian speakers – which we

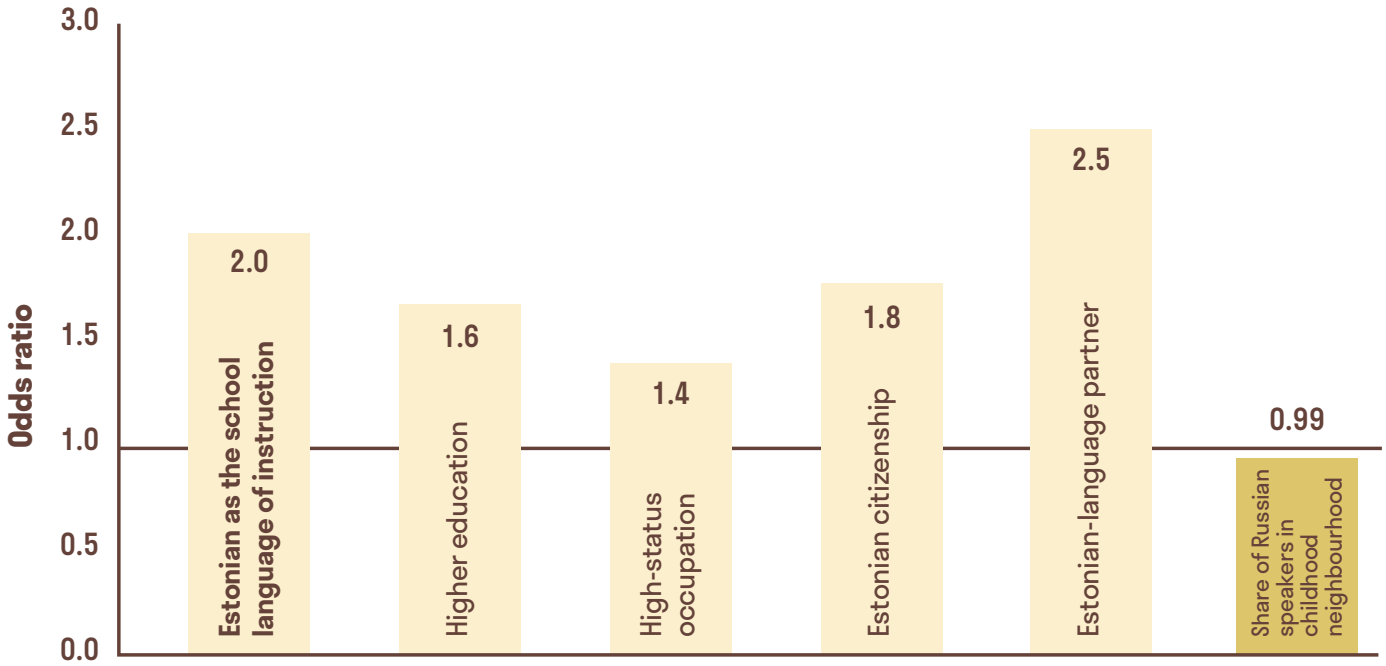
refer to as 'Russian-speaking neighbourhoods' – attended Russian-medium schools. Most (86%) also lived in Russian-speaking neighbourhoods in adulthood. Among those who moved away from their childhood neighbourhood, 68% relocated to another Russian-speaking neighbourhood. This points to a persistent pattern: Russian-speaking young people tend to remain in a familiar linguistic environment, where relatives, friends and acquaintances live and where services and infrastructure are available in Russian – for example, Russian-medium schools. The dominant life trajectory therefore consists of growing up in a Russian-speaking neighbourhood, attending a Russian-medium school and living in a Russian-speaking neighbourhood in adulthood. At the same time, there are indications of modest spatial integration compared with the parental generation. In adulthood, 14% of all young people and 32% of those who moved lived in neighbourhoods with a majority of Estonians, which we refer to as 'Estonian-speaking neighbourhoods'. Those who moved to Estonian-speaking neighbourhoods were almost exclusively Russian-speaking young people who had studied in Estonian-medium schools; their number was very small.

In addition to the language of instruction, several other factors may influence relocation to Estonian-speaking neighbourhoods. Our regression analysis (the final model is presented in Figure 4.1.7) examines the relationship between the language of instruction and residential outcomes in adulthood among young people who grew up in Russian-speaking neighbourhoods. Our primary interest is the extent to which adding other factors reduces the association between the school's language of instruction and residential choices in adulthood.

We added variables to the model step by step, starting with school characteristics. The results show that the school's language environment has a significant effect: studying in an Estonian-medium school increases the likelihood that a Russian-speaking young person will live in a neighbourhood with a majority of Estonians in adulthood. To test the robustness of this finding, we then included variables capturing socio-economic outcomes, including occupation. Even after controlling for socio-economic success, the language of instruction remains a significant predictor of residential choice in adulthood, although socio-economic factors also have an independent positive effect. Russian-speaking young people who have attained higher education or who work in higher-level occupations are more likely to live in Estonian-speaking neighbourhoods in adulthood than those with lower levels of education. These findings are consistent with spatial assimilation theory, which holds that higher socio-economic status enables minorities to move into neighbourhoods dominated by the majority population.

We then added variables capturing the young people's own integration and family background. The language of instruction remains a significant factor, indicating that studying in an Estonian-medium school is positively associated with living in an Estonian-speaking neighbourhood in adulthood. As with socio-economic factors, integration-related variables also have an independent positive effect. Having an Estonian partner increases the likelihood of living in an Estonian-speaking neighbourhood in adulthood. Estonian citizenship is likewise positively associated with residing in an Estonian-language environment. Among parental background variables, both parents' level of education and mother tongue influence school choice: children of parents with higher education and those from mixed-language families are more likely to attend Estonian-medium schools than children of parents with a lower level of education or two Russian-speaking parents. However, parental background is no longer statistically significant in explaining residential choices in adulthood. In the final step, we added the share of Russian-speaking residents in the childhood neighbourhood (Figure 4.1.7). Even after accounting for a wide range of factors shaping life trajectories, the language of instruction remains significant: studying in an Estonian-medium school doubles the likelihood that a Russian-speaking young person will live in a neighbourhood with a clear majority of Estonians in adulthood. In addition, the higher the share of Russian speakers in the childhood neighbourhood, the lower the likelihood of living in an Estonian-speaking neighbourhood as an adult.

Figure 4.1.7 Residential location in adulthood: Russian-speaking (0) or Estonian-speaking neighbourhood (1), and associated factors



SOURCE: figure by the authors

NOTE. The results are based on a multilevel binary regression model. The figure presents selected statistically significant results (confidence level of at least 90%) from the final model. The full model and its intermediate stages are described in detail by Kalm et al.[9] The reference categories for the variables shown in the figure are: for language of instruction, 'Russian'; for education, 'below upper secondary education'; for occupational status, 'lower occupation'; for citizenship, 'Russian citizenship'; and for partnership status, 'Russian partner'.

In summary, the association between the language of instruction and the linguistic composition of the neighbourhood of residence in adulthood remains significant after controlling for a range of individual and parental characteristics. Although only a small share of Russian-speaking young people study in Estonian-medium schools, our results show that studying alongside Estonians is strongly associated with moving to Estonian-speaking neighbourhoods in adulthood.

SUMMARY

One of the main findings of this article is that, twenty years ago, most parents of Russian-speaking children living in neighbourhoods with a high share of Russian-speaking residents chose Russian-medium schools for their children, even though an Estonian-medium school was usually available nearby. Although enrolment in Estonian-medium schools has increased over time, more than half of children with Russian as their mother tongue in Tallinn still graduated from Russian-medium general education schools in 2023, despite the introduction of immersion and integrated learning approaches that have diversified the languages used in instruction. Regardless of the language of schooling, these children's main social networks tend to remain Russian-speaking. In this way, segregation among ethnic minorities is reproduced through educational choices. Our analysis suggests that in a city with a large minority population, integration into the wider society may not rank highly among parents' priorities.

Choosing a Russian-medium school may reflect not financial constraints or perceived discrimination, but rather a wish to preserve language, culture and community vitality. For this reason, it is difficult to predict the precise impact of the ongoing transition to Estonian as

the language of instruction. Substantial ethnic residential segregation continues to reinforce school segregation: young people with Russian as their mother tongue still mainly live in Russian-speaking neighbourhoods and, even when they study in Estonian, often do so alongside peers of the same ethnic background.

Following the transition to Estonian-language education, the next step is to bring the school choices of Estonian- and Russian-speaking young people closer together. More broadly, integration means living and acting together, while segregation means living and acting separately. If the Estonian state seeks to promote minority integration, it must consider how to move towards more aligned educational choices. Studying together in the same schools is important from the perspective of integration, but achieving this is not straightforward. Some Estonian parents may perceive it as a threat to national identity or to the quality of their children's education. Experience from other countries also points to a potential risk: Estonian families who do not wish their children to study alongside children from Russian-speaking families may begin to avoid residential areas with a high share of Russian-speaking residents. This could, in turn, increase ethnic segregation in both housing and schools.

The need to take this next step and to address the potential challenges it entails is supported by another finding of this article: studying in Estonian-medium schools not only improves educational and labour market outcomes but also promotes the integration of ethnic groups in residential choices. This finding remains valid even after accounting for characteristics of the young people themselves and their parents, and it is significant regardless of parental financial resources. In other words, each incremental increase in joint schooling contributes to reducing future residential differences.

Alongside major reforms to the language of instruction in general education, progress can be accelerated if all policy decisions recognise that integration requires meaningful opportunities for children with different home languages to meet and interact. Extracurricular education offers strong potential in this regard. In cities and regions where both Estonian and Russian speakers are numerous, extracurricular activities are often organised along language lines – for example, in sports clubs or children's summer camps. Moving from a language-based to an interest-based approach in extracurricular education would help reduce segregation more rapidly among the current generation of children. Although our study focused on Tallinn, extracurricular activities in their various forms also provide an opportunity to strengthen the integration of children in Ida-Virumaa into Estonian society and into an authentic Estonian-language and cultural environment.

ACKNOWLEDGEMENTS

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REFLECTION

Aleksei Jašin

The article draws on data from Statistics Estonia showing that the number of pupils in Estonia's Russian-medium schools has remained stable. Over the past decade, around 50% of pupils in Ida-Virumaa and around 30% in Tallinn have studied in Russian. The findings once again provide research-backed evidence that attending a Russian-medium school is associated with the intergenerational reproduction of segregation patterns.

In light of the nationwide transition from Russian- to Estonian-language instruction that began in September 2024, I argue that this trend is now changing. The shift is not limited to the fact that all Year 1 and Year 4 pupils in schools undergoing the transition are studying in Estonian in the 2024/2025 academic year. In September 2023, 3,504 pupils began Year 1 in Tallinn, of whom 38.2% enrolled in schools undergoing the transition. In 2024, this share fell to 34.6%. By May 2025, the proportion of Year 1 applications to these schools had declined further to 30.3%. Over two years, this represents a decrease of eight percentage points, or approximately 400 children.

However, Russian-speaking children who now study in Estonian in schools undergoing the transition may still remain within the vicious circle of segregation by the end of their schooling, as the overwhelming majority of pupils in their schools and neighbourhoods come from non-Estonian-speaking backgrounds. The transition to Estonian-language education is expected primarily to improve Estonian language proficiency among pupils whose home language is not Estonian. This is only a first step and a precondition for meaningful contact with Estonian speakers and for breaking out of the vicious circle of segregation.

My recommendations for policymakers and practitioners are as follows.

Socio-economic inequality and ethnic segregation in education are closely intertwined, and solutions must address both. Reports by the Foresight Centre show that in Estonia the median income of pupils' families predicts performance in mathematics examinations.[10] In Tallinn, Russian-medium schools have, on average, lower academic outcomes and lower socio-economic indicators among pupils' families, reflecting the consequences of language-based segregation. Local governments should therefore develop action plans, supported by appropriate funding models, to reduce socio-economic inequality. Schools with the lowest academic results and socio-economic indicators could receive additional per capita funding based on the number of non-Estonian-speaking pupils and the median family income. These additional resources should be tied to clearly defined targets and measurable indicators over a set period – for example, five years. Strong educational leadership is also essential, including reinforcing school leadership capacity or rotating experienced leaders. A comparable approach has been implemented for several years in Helsinki, where outcomes are evaluated in cooperation with the University of Helsinki. In other countries, similar initiatives have been implemented, often referred to as school turnaround programmes.

Families with Estonian as their mother tongue should be encouraged to enrol their children in former Russian-language schools. In several Estonian-medium schools in Tallinn, the share of pupils with other home languages has increased significantly, while some transition schools are experiencing declining enrolment. The challenge is how to attract Estonian-speaking families to these schools. This can be supported by developing attractive and modern learning environments and by clearly communicating the strengths and distinctive features of transition schools. In Tallinn, several former Russian-

language kindergartens with new and modern facilities now have waiting lists, indicating that many Estonian-speaking families have enrolled their children. Transition schools could apply targeted positive measures, such as innovative teaching methods or smaller class sizes, to increase their appeal. In September 2025, Tallinn will open city-wide admission classes in four transition schools, where Estonian is taught as a first language. One class will follow the Montessori method, and all classes will have a maximum of 20 pupils, allowing for more individualised instruction. This requires additional funding. By 2030, when the transition in basic schools is complete, families with Estonian as their mother tongue could choose former Russian-language schools on the basis of proximity to home. School authorities can prepare for this by making transition schools more attractive to Estonian-speaking families.

Young people with different home languages should be brought together through extra-curricular education and sport. The out-of-school environment plays a major role and, in the areas of extracurricular education and youth sport, falls largely within the remit of local governments. One possible funding approach for private extracurricular schools and sports clubs would be to incentivise joint activities among young people with different home languages. Providers that organise mixed-language groups could receive additional funding from local authorities. This would encourage them to recruit teachers and coaches with the necessary linguistic and pedagogical skills to work in such settings. Tallinn will begin implementing this measure in the field of sport from autumn 2025, allocating approximately 2% of its 11 million euro sports budget to the initiative.

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4.2

How do we design a school network that adapts to declining pupil numbers while supporting educational goals and regional development?

Margus Pedaste, Triin Lauri, Kadi Kalm, Äli Leijen, Anto Aasa and Tiit Tammaru

KEY MESSAGES

- By 2050, many municipalities outside Estonia's major urban regions will face a sharp decline in the number of children of basic school age.
- Where a local basic school is available, most pupils attend their nearest school.
- Average educational outcomes differ only modestly between municipalities, meaning that a good basic education can be obtained across Estonia.
- Looking ahead, Estonia's school network has at least four possible development pathways, of which the principle of 'one municipality – one school' appears the most promising.

INTRODUCTION

The Estonian school system is built on the principle of a neighbourhood school close to home. However, proximity becomes less decisive at each successive level of education, as other

factors gain importance. School choice changes most markedly at the upper secondary level. Even so, the strength of the system depends on maintaining a consistently high standard across the basic school network.

This article focuses on the basic school network, starting from the premise that the education system must prevent educational inequality and ensure that all pupils receive a good education regardless of the school they attend. This is a demanding task, as also noted in a recent Foresight Centre's report on the future supply of teachers.[1] The core principles of the Estonian school system – the comprehensive school model, proximity to home and inclusive education – are under pressure from population decline in most towns and municipalities and from increasing urban segregation. People of different ethnic backgrounds and income levels increasingly live in separate neighbourhoods, which leads to unequal access to neighbourhood schools and reinforces the stratification associated with so-called elite schools.[2]

At the same time, regional demographic change has made the sustainability of the existing school network a central issue in both education and regional policy. In Tallinn and its surrounding areas, there is a shortage of school places, while in much of the rest of Estonia, especially in rural areas, there is a surplus. Decisions about closing small local schools may significantly shape the future of municipalities and towns. The sections that follow examine current trends and projections in the number of basic-school-age children outside major urban regions, as well as the factors influencing parental school choice and patterns of school-choice-driven mobility. By school-choice-driven mobility, we mean whether pupils attend a school close to home or travel to another locality, with particular attention to current patterns in rural areas.

DECLINING NUMBERS OF BASIC-SCHOOL-AGE CHILDREN OUTSIDE MAJOR URBAN REGIONS BY 2050

Analyses of demographic trends indicate that the number of school-age children in Estonia will decline significantly in the coming decades, though unevenly across regions.[3] While decreases are projected in most of the country, growth is expected in the urban regions of Tallinn and Tartu. In addition to existing projections of overall pupil numbers, we present forecasts specifically for basic-school-age children in Estonia's cities, towns and municipalities.

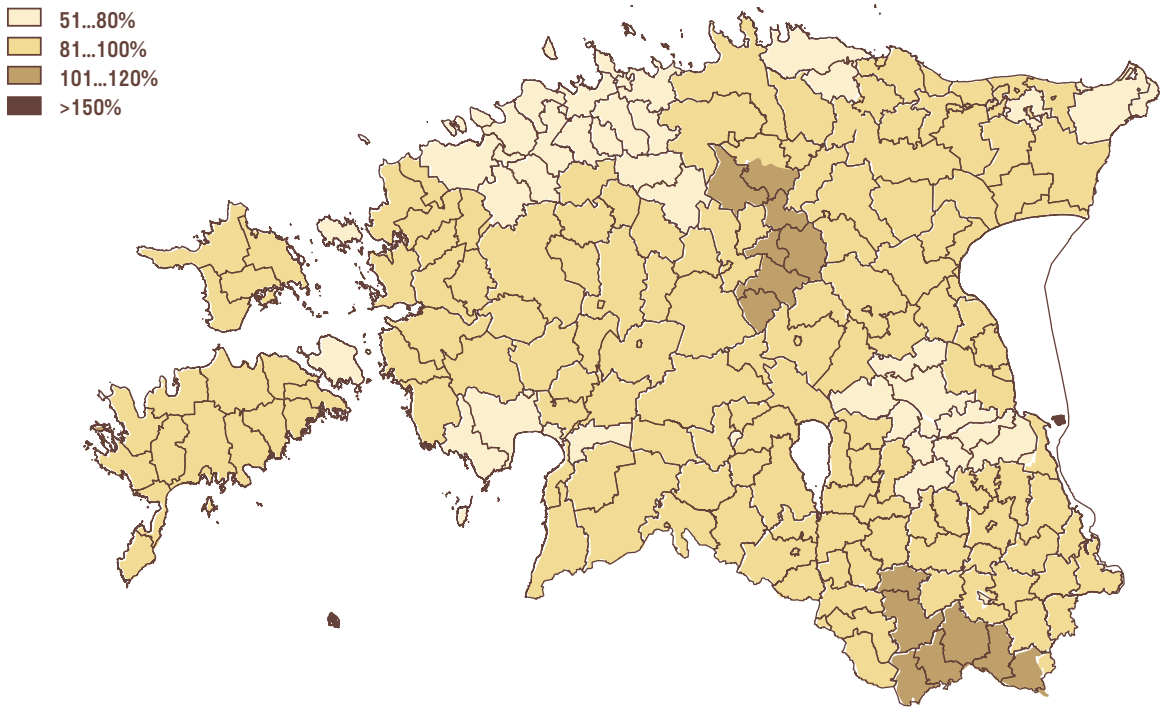
Recent population projections provide a clearer picture of how migration shapes regional demographic change.[4] The baseline scenario (Figure 4.2.1a) assumes that current birth and mortality rates continue and that there is no internal or external migration. Under this scenario, the number of basic-school-age children will decline in most municipalities, with growth projected in only a few (e.g. Rõuge, Antsla and Järva municipalities).

Even in larger urban regions such as Tallinn and Tartu, the number of basic-school-age children would decline by more than 20% if current fertility and mortality trends persisted. This is largely due to the present age structure (with currently large child cohorts) and lower fertility rates in larger cities.[5] However, the migration scenario (Figure 4.2.1b), which assumes the continuation of current migration trends, substantially changes the picture. Migration accelerates the decline in municipalities outside major urban regions, while increasing the number of children in the hinterlands of larger cities.

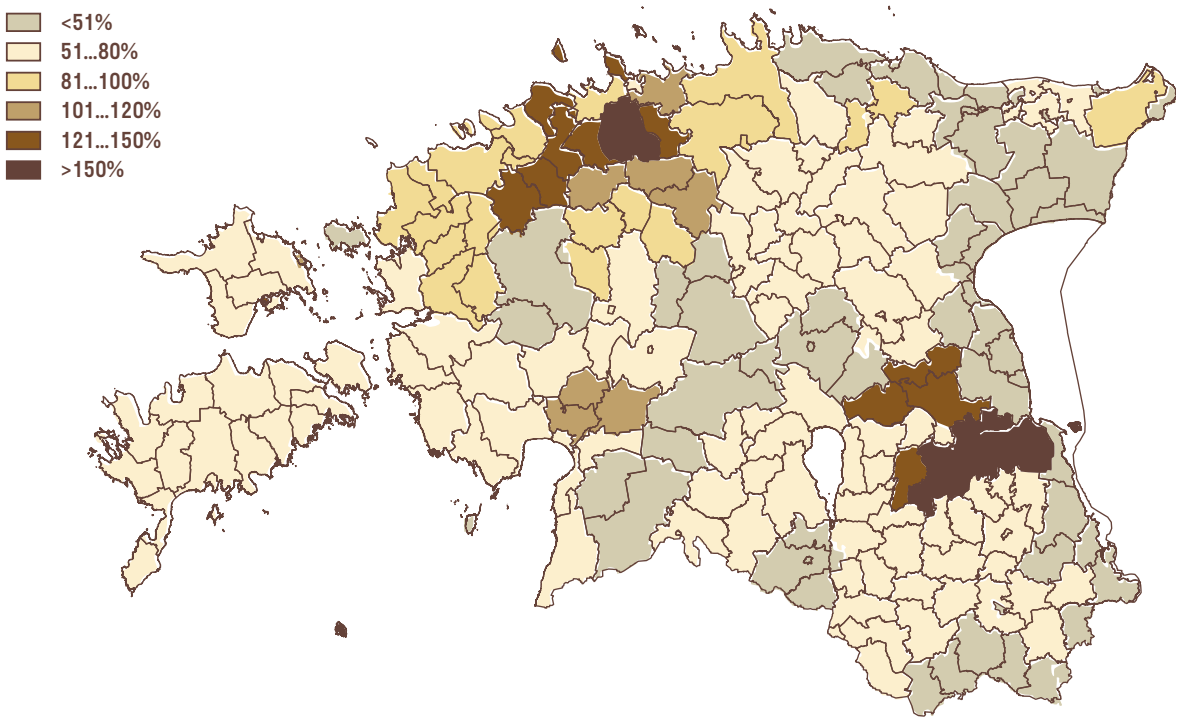
OUTSIDE MAJOR URBAN REGIONS, MOST PUPILS ATTEND THEIR LOCAL BASIC SCHOOL

In addition to broader demographic trends and related changes in the number and distribution of children, parental school choice decisions further complicate the design of the school network. Such decisions reflect a mix of rational, emotional and political considerations.[7] Ensuring a strong local basic school therefore requires not only demographic and migration projections but also an understanding of family choices, including whether children attend a nearby or more distant school. School choice has consequences that extend beyond educational and labour market outcomes: the school a child attends and the peers they study with shape social networks and

Figure 4.2.1 Change in the number of basic-school-age children in Estonian municipalities, 2024–2050



a) Baseline scenario



b) Migration scenario

SOURCE: National Spatial Plan 2024[6]

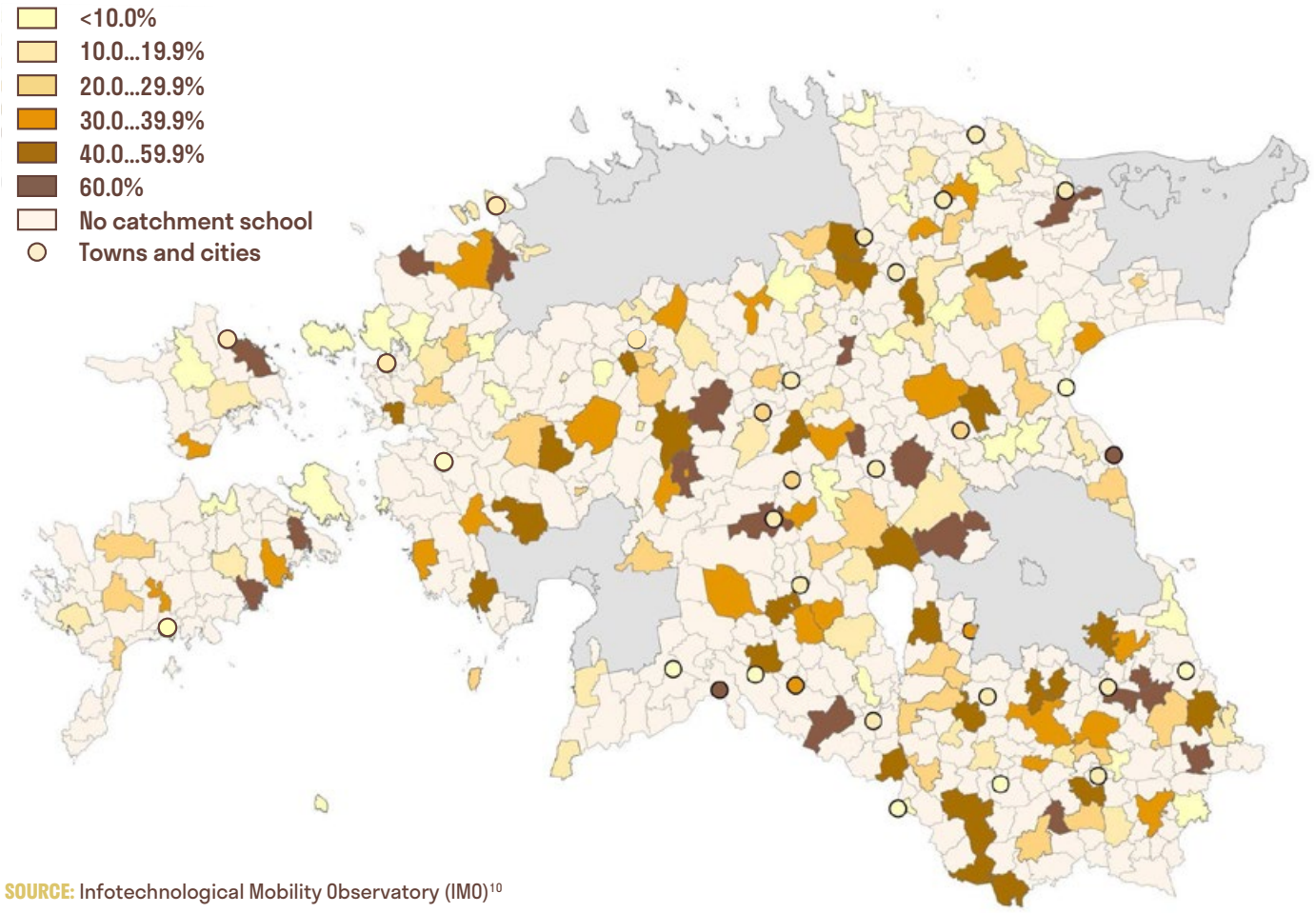
NOTE. The figure shows the percentage change in the number of children aged 5–14 in Estonian municipalities between 2024 and 2050, compared with 2024 (2024 = 100%).

social space over the life course. For example, Russian-medium schools are known to anchor pupils within the Russian-speaking community.[8]

Despite the importance of school choice for life trajectories, relatively little is known about the decisions of families living outside major urban regions. Existing research largely focuses on selective 'elite' schools in cities. At the same time, more than 40% of children in Estonia do not attend their designated local or neighbourhood school,[9] a figure heavily influenced by urban areas and the 'golden circle' municipalities surrounding cities.

In this article, we analyse data on graduates of general education basic schools from 2022 and 2023, focusing on children who have a basic school in their local area (excluding part-time, evening and special schools). The main spatial unit of analysis, referred to as the local area (see Figure 4.2.2), is a functionally coherent area comprising a single settlement or village, or a group of settlements or villages. The analysis excludes the urban regions of Tallinn and the main regional centres (Tartu, Pärnu and the urban centres of Ida-Viru County), as changes to the school network in areas outside major cities and their surroundings have the greatest implications for local development and school choice. In most local areas in Estonia, there is no basic school (shown as light areas in Figure 4.2.2). However, where a local basic school exists, it is typically the preferred option. In total, 5,640 children (20% of those completing basic school in 2022 and 2023) lived in such areas. Of these, nearly 80% (4,505 pupils) attended the local or neighbourhood school and around 20% (1,135) attended a school elsewhere (Figure 4.2.2). In other words, outside major urban regions, most pupils attend their local basic school if one is available.

Figure 4.2.2 Basic school pupils not attending their local school



SOURCE: Infotechnological Mobility Observatory (IMO)[10]

WHAT EXPLAINS SCHOOL-CHOICE-DRIVEN MOBILITY?

The following analysis examines which school- and pupil-level factors are associated with school-choice-driven mobility – that is, with studying at a school other than the local basic school. In other words, which indicators of school quality or family background distinguish pupils who attend a school outside their local area from those who remain in the local school? We use binary regression analysis, including pupil characteristics (father's and mother's education, occupational status, place of residence, and home language) and school characteristics (average mathematics examination results, teachers' qualifications and parental income levels). As data were incomplete for 656 children, the final analysis covers 4,984 pupils.

In interpreting the binary regression results, the reference value is 1 (Figure 4.2.3). Values below 1 indicate a negative association and values above 1 a positive association. The results show that higher teacher qualifications in the neighbourhood school reduce school-choice-driven mobility, increasing the likelihood that pupils attend the neighbourhood school. By contrast, the school's average mathematics examination result is not statistically significant

Studying outside the neighbourhood school is primarily associated with family background characteristics. Children from families with higher socio-economic status, particularly those whose fathers have higher socio-economic status, are more likely to attend a school outside their local area. Parental income levels are also higher in the schools chosen than in the corresponding neighbourhood schools. The results further indicate that children with Russian as their mother tongue are less likely to study outside their local area than children with Estonian as their mother tongue. The likelihood of school-choice-driven mobility also varies by region: pupils in central and western Estonia are less likely to attend a school outside their local area than those in southern Estonia, while pupils in northern and north-eastern Estonia do not differ significantly from those in southern Estonia.

A GOOD EDUCATION CAN BE OBTAINED IN ANY MUNICIPALITY

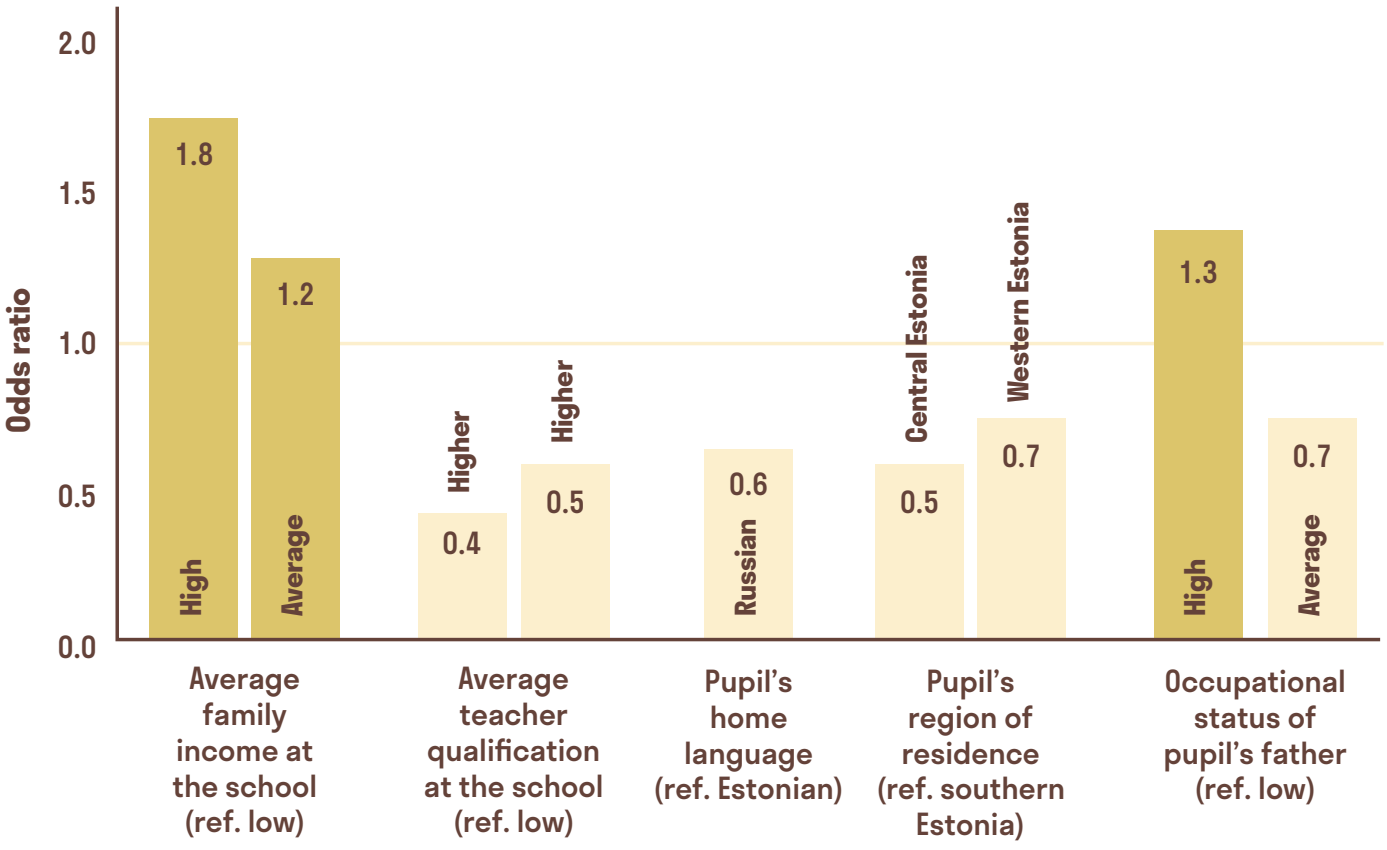
Schools fulfil multiple roles in children's lives. Alongside strong academic outcomes, schools are equally expected to support pupils' personal growth and prepare them to become full members of society.[11] In Estonia, these roles have long been assessed through subject-based tests – final examinations and standardised tests – as well as school satisfaction surveys that capture support for learners' autonomy, self-efficacy, self-directed learning, sense of belonging and collaboration. It is therefore relevant to ask what trends characterise the education system across the three dimensions of academic outcomes, personal growth and preparation for participation in society. From the perspective of this article, a more specific question arises: when parents of basic school pupils living outside major urban regions choose schools further from home, are these choices justified?

We address this question using three indices of educational outcomes: (1) academic performance (basic-school final examinations and standardised tests in Estonian, mathematics and science), (2) support for personal growth (perceived autonomy, support for autonomy, self-efficacy and self-direction skills), and (3) preparation for participation in society (sense of belonging, perceived usefulness and cost of group learning, and individual recognition).

We analyse data from 2019 and 2024 to assess recent developments. As outcomes depend not only on schools but also on pupils' socio-economic background and special educational needs, we weighted school results in the analysis of variance between municipalities using two factors: median parental income in 2021 and the share of pupils with special educational needs in 2019 and 2024. For clarity, however, the figures present unweighted average results, allowing the comparison of educational outcomes across municipalities regardless of differences in median parental income or the share of pupils with special educational needs.

The analysis shows that academic outcomes vary across Estonia's cities, towns and municipalities,

Figure 4.2.3 Results of the final binary regression model: 1 = does not attend the neighbourhood school; 0 = attends the neighbourhood school (where one exists)



SOURCE: Infotechnological Mobility Observatory (IMO)[12]

NOTE. Only statistically significant variables and categories (confidence level 90%) are shown in the figure. The model is controlled for the school's average mathematics examination result, the pupil's gender, the mother's occupational status and the educational level of both parents.

whereas support for personal growth and preparation for participation in society do not. Academic outcomes are stronger in Tallinn, Tartu and the surrounding 'golden circle' municipalities. There are also differences between rural and urban schools, but these depend less on location than on the content and organisation of teaching within schools. When municipalities are grouped more broadly, the achievement of goals related to personal growth and social participation shows little association with whether pupils study in Tallinn, Tartu, another urban area or a rural school.

A closer look (Figure 4.2.4) shows that academic outcomes exceed those of Tallinn in schools in 56 municipalities and those of Tartu in 41 towns and municipalities. In 2024, Estonia had 79 municipalities, meaning that in more than half of them average academic outcomes were higher. Although differences exist within municipalities, most Estonian cities, towns and municipalities do not face major concerns regarding basic school pupils' subject knowledge. Every child has the opportunity to receive a good education. Indices measuring personal growth and preparation for participation in society are higher than in Tallinn and Tartu in 51 and 53 municipalities, respectively. It is therefore understandable that most children living outside major urban regions attend their local school, and that school-choice-driven mobility – or more broadly, population movement from rural areas to Tallinn and Tartu – cannot be justified solely by concerns about educational quality elsewhere in Estonia.

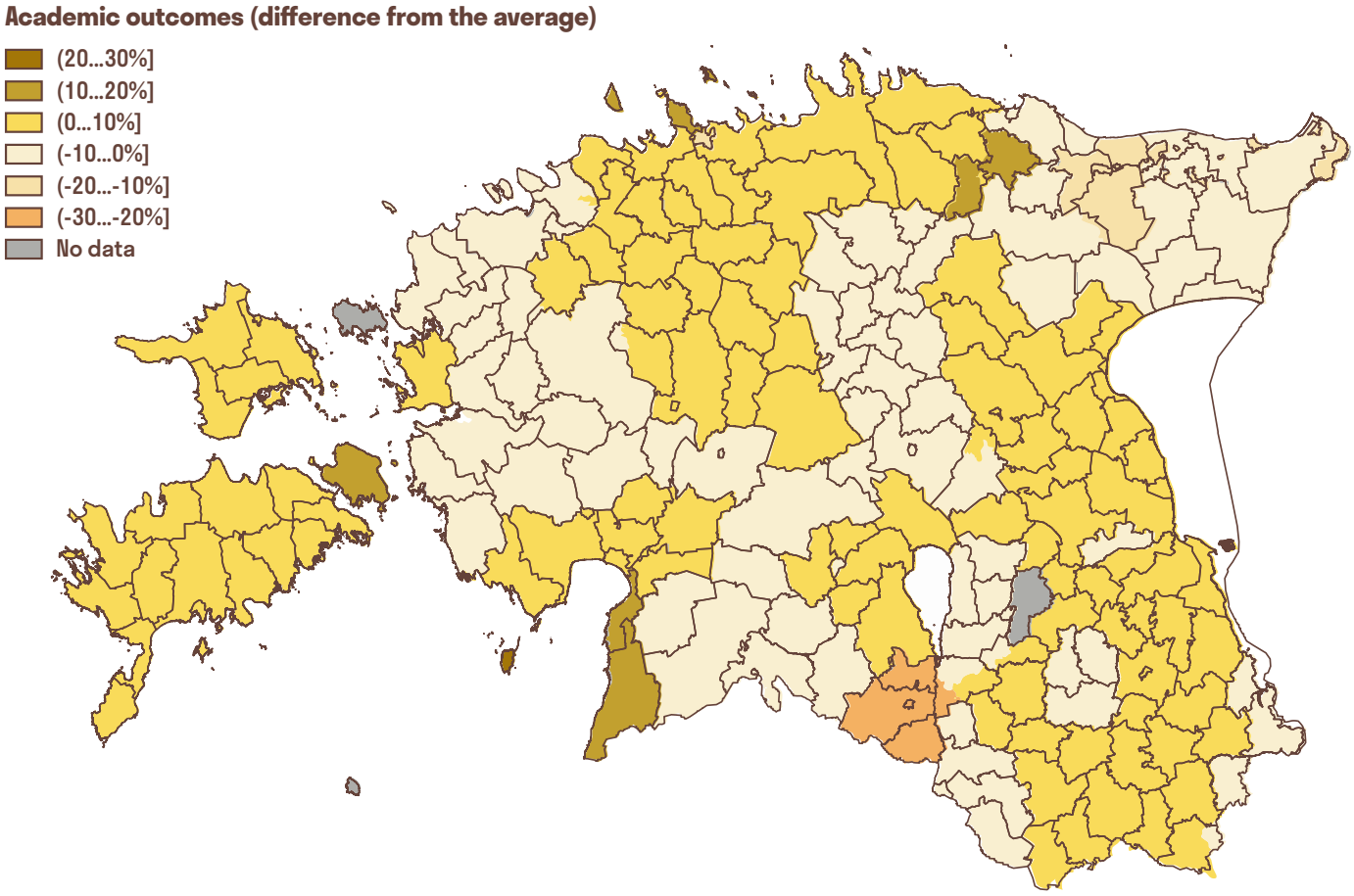
FUTURE PERSPECTIVE: ONE MUNICIPALITY – ONE SCHOOL

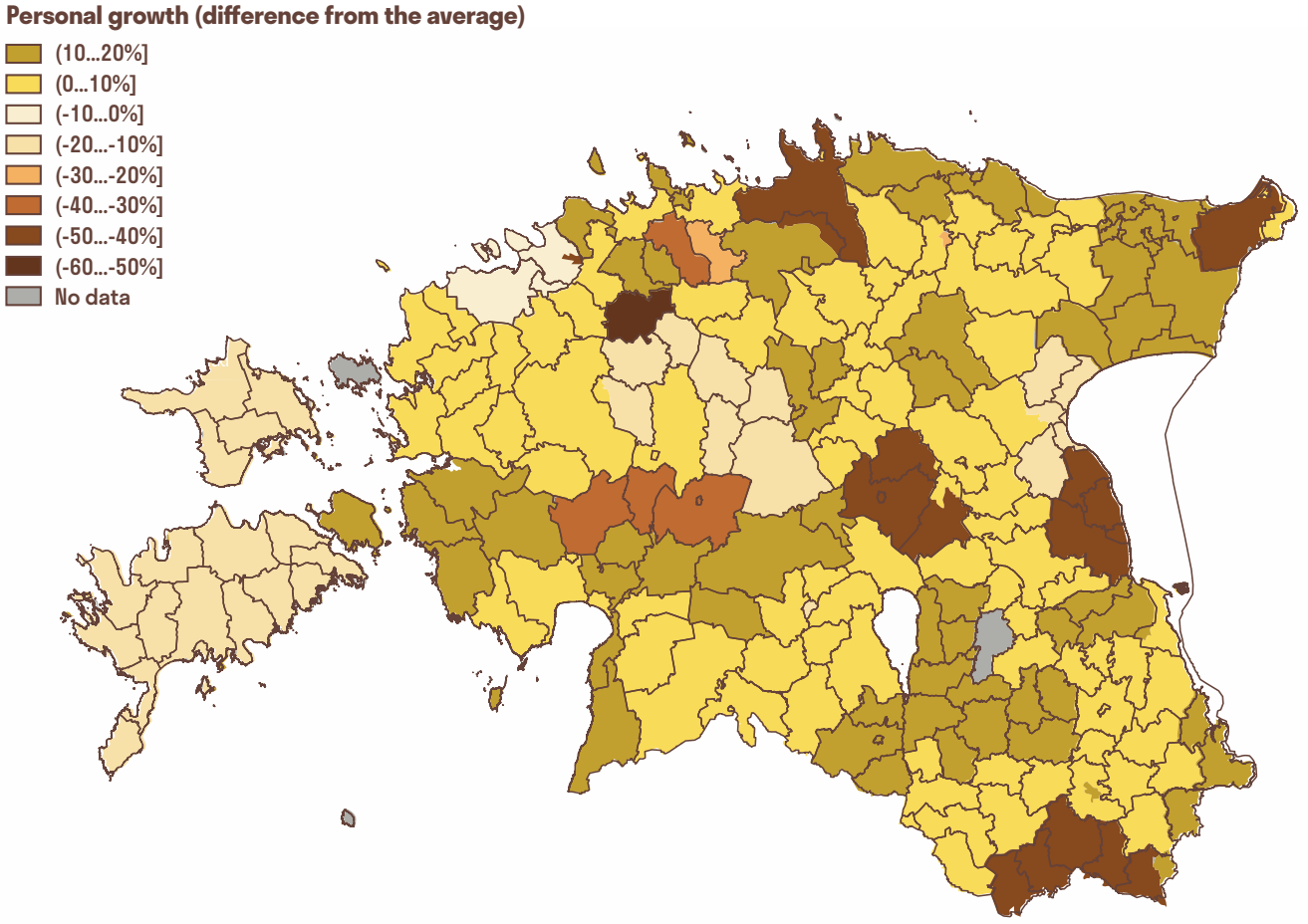
In summary, in most cities, towns and municipalities outside major urban regions there are no major concerns regarding average academic outcomes or, more broadly, educational quality, and most families choose the local school. The design of a school network that supports both educational and regional development objectives can build on this evidence and provide families with confidence that, at least until the end of basic school, children across Estonia can receive a good education in their home area. The main challenge is the projected decline in pupil numbers outside major urban regions over the coming decades. Migration-based population projections suggest a steeper decline than earlier forecasts that did not account for migration. Falling enrolment will increase pressure to close schools and, together with school-choice-driven mobility, may affect the viability and quality of rural schools. This could trigger a self-reinforcing cycle, accelerating mobility regardless of the school's objective quality. On this basis, four possible development pathways can be identified.

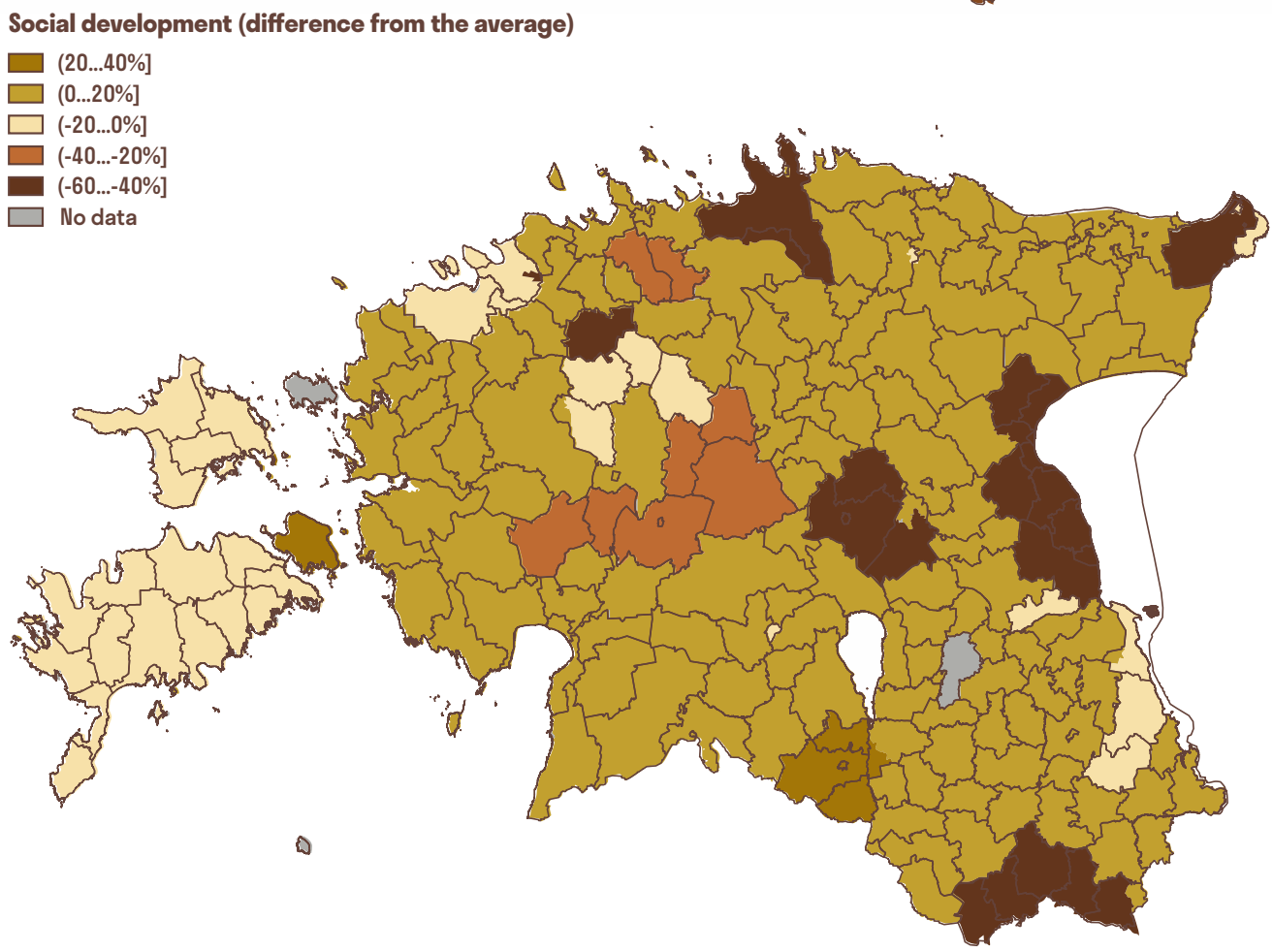
1. Maintain the current school network and communicate clearly that its strength will be ensured.

This pathway supports the choices currently made by most families outside major urban regions and may reduce school-choice-driven mobility, particularly if there is a clear commitment that small schools will not be closed and that the state or municipalities will ensure their viability. Such certainty may also encourage families to remain outside Tallinn and Tartu, thereby supporting regional development. However, this option may impose high costs and is constrained by teacher shortages.

Figure 4.2.4 Educational outcomes in Estonian municipalities, 2024







SOURCE: figure by the authors

NOTE. Intervals in the legend do not overlap. The lower bound is excluded, and the upper bound is included (e.g. (0; 20] means more than 0 up to and including 20).

2. Substantially reduce the school network without actively supporting school-choice-driven mobility.

This approach runs counter the current choices of families living outside major urban regions and is likely to increase migration to larger cities, with negative implications for regional development. As variation in educational outcomes is greatest in large urban areas, the academic success of pupils who move depends heavily on the specific school attended, a choice often shaped by family background. This pathway is consistent with the limited availability of educational resources but may increase inequality.

3. Reduce the school network while systematically supporting school-choice-driven mobility.

This option also diverges from current family preferences outside major urban regions. If school-choice-driven mobility is well organised and does not depend solely on families' access to private transport, its impact on regional development need not be negative. However, given the wider variation in outcomes between schools in larger cities, pupils' academic performance will depend on the school they attend. Although this pathway may respond to teacher shortages, it may prove financially burdensome due to rising transport costs and is not consistent with climate objectives.

4. Develop municipal school networks based on the principle 'one municipality – one school'.

As municipalities are responsible for basic schools, some have already introduced unified management structures, operating several school sites under a single administration and shared principles. Teachers and, where necessary, pupils can move between locations in a coordinated manner. This pathway aligns with current family preferences outside major urban regions, supports balanced regional development, addresses teacher shortages and may improve cost-efficiency.

These pathways are not mutually exclusive. For example, a reduced number of schools could be combined with the principle 'one municipality – one school'. However, decisions should be made by the communities concerned. Whatever approach is chosen, society must receive a clear message that different types of schools across Estonia provide good-quality education. Parents need confidence that the comprehensive school model functions in practice and that a pupil in a small rural school can receive education of the same quality up to the end of basic school as a pupil in central Tallinn.

Further development of the school network requires the systematic evaluation of schools' educational outcomes using modern assessment methods and the refinement of these methods so that assessments of school viability take relevant contextual factors into account, such as family background and class composition. Universities could play a role as independent evaluators of both academic outcomes and schools' support for personal growth and preparation for participation in society. Research is also needed to assess the effectiveness of new governance and funding models and to inform their further development. Given increasing educational diversity and the extension of compulsory education, it is important to understand how structural decisions affect outcomes, regional differences and the measures needed to support them.

Ultimately, confidence in the future is the most important factor for both education and regional development. This does not preclude ongoing adjustment of the school network, but clarity about the principles guiding its adaptation can strengthen trust. Such clarity can reassure parents that high-quality education is available not only in cities but in rural areas as well. In this way, the school network can contribute to equal opportunities and support regional development across Estonia.

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REFLECTION

Eve Eisenschmidt

Regional development is reflected in the school network, and partly empty school buildings in rural areas place pressure on the education system. In most regions of Estonia, neighbourhood schools achieve good educational outcomes, but migration projections raise concerns about the long-term viability of rural schools.

Although the state has developed upper secondary and vocational education as a unified network, the basic school network has remained under municipal responsibility following administrative reform and lacks a coherent national strategy. Many municipalities do not have sufficient resources or political support for the long-term planning of the school network, which hampers the development of a coherent and sustainable system. School-choice-driven mobility may occur regardless of the actual quality of education, and resources are insufficient to maintain a neighbourhood school in every area.

How can the school network be designed where political will or capacity is limited? Cooperation between municipalities and transparent governance are essential for building a strong basic-school network that ensures both access and quality. This requires focusing on the following priorities.

1. **Smart and data-driven school network planning.** The development of Estonia's school network requires a more strategic and forward-looking approach that is based on high-quality data and takes regional differences into account. National databases should be enhanced to integrate demographic projections, data on school-choice-driven mobility and indicators of school performance. One such indicator could be the educational outcomes index proposed by the authors of this article, which assesses schools not only on academic performance but also on how they support pupils' personal growth and preparation for participation in society. Through informed planning, it is possible to avoid painful and delayed school closure decisions and to direct investments where they have the greatest impact. High-quality data create the conditions for transparent and more equitable education governance, while strengthening trust in schools and supporting effective development of the school network.

2. **School districts as education alliances – collab-orative regional governance of the school net-work.** Education alliances would bring together several municipalities and enable school network management at the regional level. This would help to separate educational governance from day-to-day political pressures. Education alliances would also support more efficient use of resources – for example, by sharing teachers and support specialists, coordinating the work of school leaders, and fostering cooperation between stronger and weaker schools. They would create opportunities for joint quality assessment and long-term planning. The state could support such cooperation through funding mechanisms while preserving municipal autonomy.

3. **Trust and visibility – strengthening schools within communities.** Schools' reputation and the trust they enjoy within the community play an important role in families' school choices. School-choice-driven mobility does not always stem from substantive weaknesses in schools, but often from mistrust or uncertainty. At the same time, smaller schools in particular require support in shaping their public image, including professional assistance to articulate their strengths and communicate more effectively with local communities. High-quality education and a caring school environment do not depend on location, but on content and people.

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4.3

Educational inequality in life expectancy and ways to reduce it

Taavi Tillmann, Mall Leinsalu and Rainer Reile

KEY MESSAGES

- The lower a person's level of education, the higher their risk of morbidity and premature mortality.
- In Estonia, people with higher education live on average 11 years longer than those with basic education, and this gap has not narrowed over time.
- Reducing educational inequalities in life expectancy is a public health priority.
- Effective measures to reduce health inequalities include banning the sale of tobacco products to future generations, increasing the price of unhealthy food, restricting its advertising to children and introducing clear health labelling on food products.
- The shift of healthcare to the private sector should be limited, and preventive services should be developed in ways that take into account the needs and perspectives of people with lower levels of education.

INTRODUCTION

Health inequality refers to differences in health indicators between population groups. Such differences are observed across various characteristics that reflect social position. Variations in health related to place of residence, occupation, level of education, income, citizenship and ethnicity represent a social problem that is rooted in societal injustice.[1] Although research shows that health inequality is a universal phenomenon, health gaps tend to be wider in

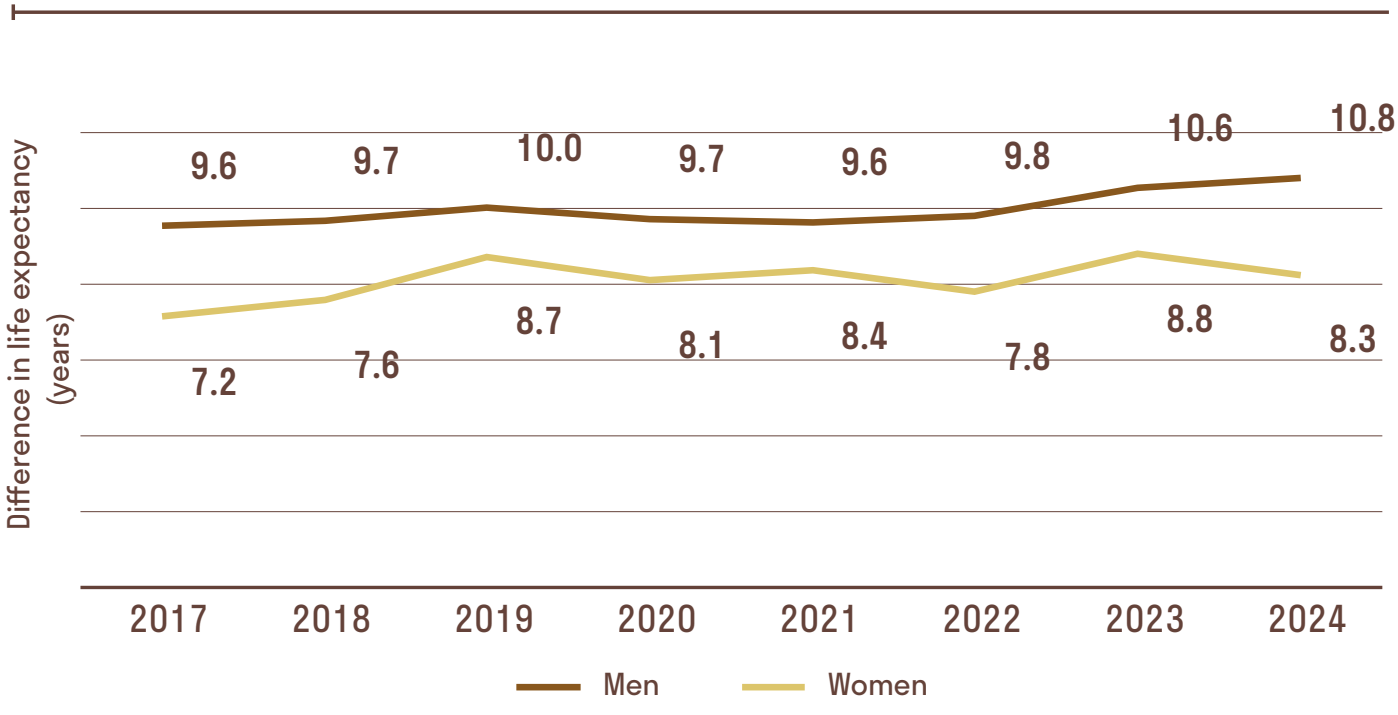
countries and regions where resources are distributed more unevenly and social cohesion is weaker.[2] But why should we accept a situation in which our health largely depends on the context into which we are born and in which we grow up, study, work and age?

EDUCATIONAL INEQUALITY IN LIFE EXPECTANCY AND ITS CAUSES

In Estonia today, people with higher education live on average around 11 years longer than those with only basic education. This difference – referred to below as the educational gap in life expectancy – is based on mortality data. It is not static and has changed markedly since Estonia regained independence. The difficult conditions of the transition period in the 1990s led to increased mortality and a decline in overall life expectancy, with people with higher education emerging as the winners and those with lower levels of education as the losers. By 2000, the educational gap in life expectancy had reached 13 years for men and 9 years for women.[3] Although the gap narrowed after the first decade of the 2000s (to 10 years for men and 7 years for women in 2016), it remained wider than the OECD average (8 and 6 years, respectively)[4] and has widened again in recent years (see Figure 4.3.1). Globally, higher levels of educational attainment are associated with lower mortality risk – each additional year of education reduces mortality risk by nearly 2%.[5] Why, however, does a longer educational trajectory, together with higher income, more favourable employment and broader opportunities, act as a protective factor for health?

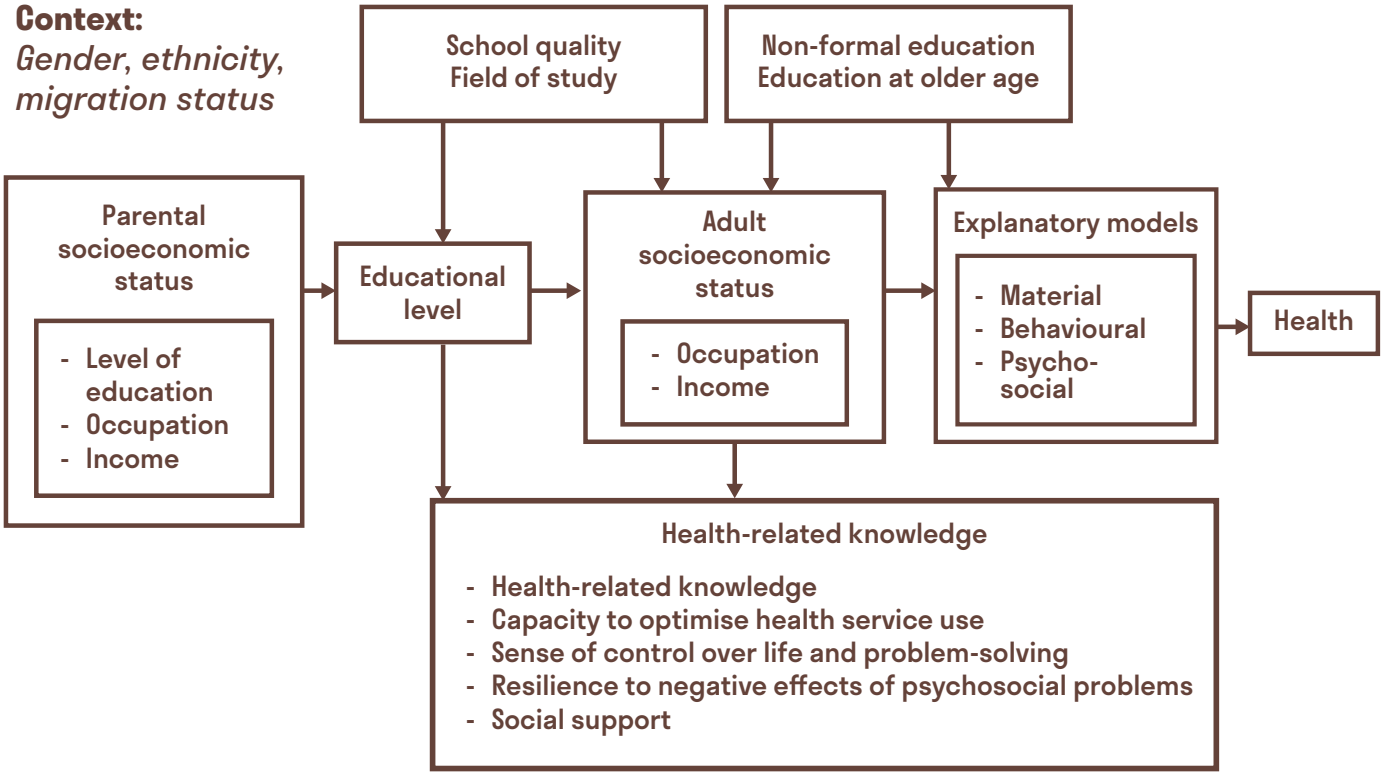
One of the most widely cited explanations for the link between education and health (Figure 4.3.2) is fundamental causes theory,[6] which views education as a gateway to a range of material and non-material resources. A higher level of education is associated with higher income, which expands choices regarding living conditions and lifestyle and helps create a more health-supportive environment. Longitudinal studies confirm the strong role of education and income in explaining differences in mortality.[7] At the same time, years spent in education provide a broad set of knowledge and skills. Health literacy – the ability to find, understand and use information and services to make health-related decisions and take appropriate action – plays an important role in explaining educational disparities in health.[8]

Figure 4.3.1 Difference in life expectancy between groups with basic and higher education, 2017–2024



SOURCE: Statistics Estonia[9]

Figure 4.3.2 Model of the relationship between education and health



SOURCE: figure by the authors, based on Khalatbari-Soltani et al.[10]

A lack of resources is an important source of stress among groups with lower socio-economic status. Stress, in turn, contributes to educational inequality in mortality, particularly in relation to cardiovascular diseases.[11] Parental education and unequal opportunities also shape children's health. For example, children of mothers with lower levels of education are more likely to become obese[12] or to start smoking.[13]

REDUCING EDUCATIONAL INEQUALITY IN HEALTH IS A CENTRAL OBJECTIVE OF THE NATIONAL HEALTH PLAN

Health inequality has been identified as a central public health problem in both the previous and the current Estonian national health plan.[14] One objective states that by 2030 the average life expectancy of people with basic education should not lag more than eight years behind that of people with higher education. In recent years, however, educational inequality in life expectancy in Estonia has increased rather than decreased. Achieving this objective is further complicated by the fact that health inequality may also be shaped by changes in the population structure. Broad access to education, together with demographic trends in contemporary Estonia, has altered the educational composition of the population. According to the 2021 census, 39% of people aged 20 and over had higher education and 15% had basic education.[15] In 2000, the corresponding figures were 26% and 27%.[16] In today's knowledge-based society, the group with only basic education likely differs from previous generations in terms of resources, personal characteristics and cognitive abilities, which in turn influence health-related decisions.[17] It would therefore be unrealistic to expect health inequality to diminish on its own; reducing it requires deliberate, evidence-based policy and effective interventions.

FROM CAUSES TO SOLUTIONS

In Estonia, cardiovascular diseases account for approximately half of the mortality gap between

people with basic and higher education, cancer for about one fifth and injuries and poisonings for nearly 13%.[18] Educational inequality in mortality is often caused by behavioural risk factors: smoking explains nearly one third of the gap, unhealthy diet (reflected in excess weight or hypertension) about one fifth and excessive alcohol consumption at least one tenth.[19] While conventional tobacco smoking has been declining in Estonia for some time, overweight and obesity are increasing.[20]

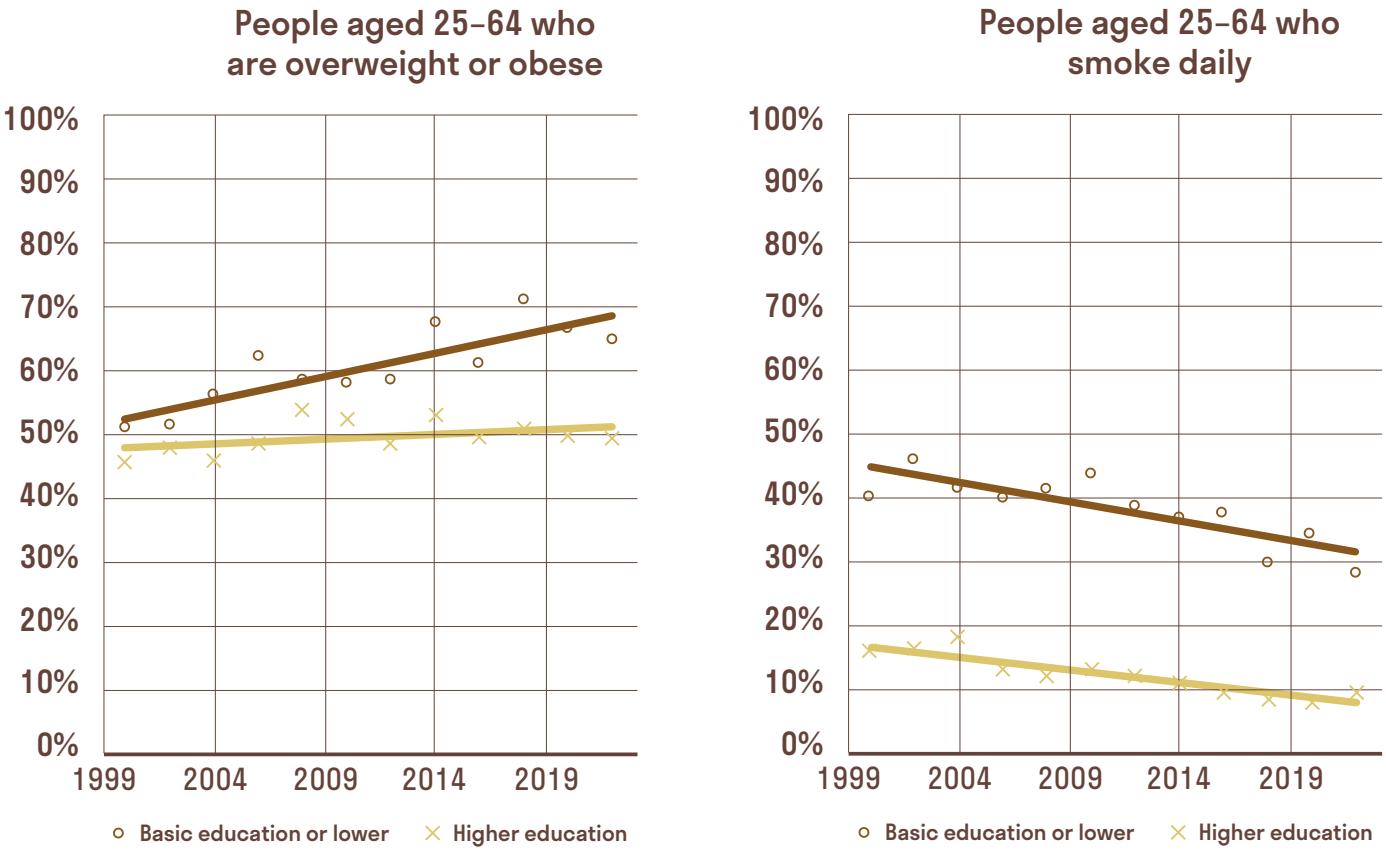
Changes in health behaviour have generally been less favourable among groups with lower levels of education, thereby deepening educational inequality (Figure 4.3.3). Measures to reduce inequality must therefore focus on preventing behavioural risk factors that contribute to disease and on promoting more equitable access to and use of healthcare services.

EFFECTIVE PREVENTION

To reduce educational inequalities in health, prevention efforts should focus primarily on reducing smoking and alcohol consumption and improving dietary habits, with the aim of lowering body weight and blood pressure. Over the past fifty years, a wide range of measures have been tested worldwide to achieve these goals. Drawing on evidence compiled by the World Health Organization (WHO) on the most effective interventions,[21] as well as individual studies and reviews, we outline below preventive measures that could help reduce educational inequality in life expectancy in Estonia.

The ambition to achieve a tobacco-free Estonia is an important step in reducing smoking-related mortality and associated educational inequality. Estonia's Green Paper on Tobacco Policy has provided the framework for prevention and policy in this field for about a decade.[23] As many countries

Figure 4.3.3 Overweight and smoking by educational level in the Estonian population



SOURCE: Health Behaviour Among the Estonian Adult Population Survey 2000–2022[22]

have strengthened their tobacco control policies, Estonia's position in the international ranking of tobacco control measures has not improved in recent years.[24] Out of a maximum of 100 points, Estonia continues to receive a moderate score (49 points), well below the United Kingdom (82 points) and also below Lithuania (52 points). Although excise duties on tobacco products have increased annually since 2018, the pace has not been sufficient, as the consumer price index for other goods has risen faster than tobacco prices since 2021.[25] Smokers are still present in children's playgrounds, on café terraces and in parks, where many countries have already introduced smoking bans. The most effective and cost-efficient interventions to reduce the availability and use of tobacco products are listed in the box 'Measures to reduce smoking'.[26] As the share of daily smokers is nearly three times higher among people with lower levels of education than among those with higher education,[27] tobacco control measures would also help reduce educational inequality in health.

MEASURES TO REDUCE SMOKING

- Increase tobacco taxation at a rate that exceeds growth in purchasing power
- Reducing the availability and visibility or attractiveness of tobacco products (sales restrictions and standardised packaging)
- Strengthening the enforcement of smoking bans in public places
- Promoting smoking cessation services and providing funding for nicotine replacement therapy

As in tobacco control, alcohol-related harm can be reduced through price regulation and restrictions on availability.[28] An evaluation of Estonia's alcohol policy[29] set out several recommendations (see the box 'Measures to reduce alcohol consumption'). Although Estonia's alcohol policy has become more coherent over the past two decades,[30] neighbouring Lithuania has implemented even more comprehensive reforms.[31] Lithuania also provides relevant evidence for Estonia on the impact of alcohol policy on educational inequality: following an increase in alcohol excise duty, the educational gap in overall mortality decreased by 13%.[32] Although this effect was observed in the short term, it suggests that well-designed policy can reduce educational health inequalities. Another important consideration is alcohol-related harm to others. Studies have demonstrated links between alcohol availability and violent crime and traffic accidents.[33]

MEASURES TO REDUCE ALCOHOL CONSUMPTION

- Increasing alcohol excise duty to a level that reduces the affordability of alcoholic beverages
- Restricting alcohol availability, including licensing systems, sales hours and distance sales
- Strengthening treatment and care systems for people with alcohol-related problems and health disorders

Healthier dietary habits would help reduce overweight and lower blood pressure, thereby contributing to a reduction in educational inequality in life expectancy. Among Estonian adults, frequent consumption of sugar-sweetened beverages is about three times more common among people with basic education than among those with higher education.[34] The taxation of sugar-sweetened beverages in Mexico and the United Kingdom reduced daily sugar intake and increased water consumption,

particularly among people with lower socio-economic status.[35] Reducing sugar consumption among groups with lower levels of education would lower obesity rates, which is a major risk factor for cardiovascular disease and cancer, and would thus help narrow the educational gap in life expectancy. While a sugar-sweetened beverage tax in Estonia might reduce obesity by around 2%,[36] a differentiated value-added tax on food – with higher rates on unhealthy products and lower rates on healthier options – could be more effective, reducing obesity by 20–50% according to a US modelling study.[37]

MEASURES SUPPORTING IMPROVED NUTRITION

- Regulating food prices by making unhealthy products more expensive and healthy products more affordable
- Restricting the marketing of unhealthy foods to children
- Introducing clear health labelling on food products

Reducing inequality requires making healthy food more accessible and appealing to children from families with lower levels of education and income. For example, in a randomised trial in Norway, Bere et al. provided free fruit to schoolchildren in the intervention group.[38] This led to higher daily fruit intake (and lower consumption of salty snacks) compared with children in control schools. The effect was particularly strong among children from lower-income families. This finding is consistent with a modelling study from the United Kingdom,[39] which found that banning television advertising of unhealthy food reduced childhood obesity by an average of 5%, with an effect two to three times greater among children from disadvantaged socio-economic backgrounds.

Positive changes in consumption may also result from reforming food labelling systems. Only about half of consumers read food labels, and the share is lower among people with lower levels of education. Reported reasons include small print, and dissatisfaction with food labelling has increased.[40] Although guidelines, manuals and packaging design recommendations have been promoted in Europe and Estonia for decades, rising dissatisfaction suggests that existing industry self-regulation is insufficient.

The most effective way to help, particularly people with lower levels of education, to understand and use health information more quickly would be to simplify its presentation on packaging. For example, food products could carry a clear Nutri-Score label on a scale from A to E, where A (green) indicates the healthiest choice and E (red) the least healthy. The rating would be based on eight nutritional components, including calorie and sugar content per 100 grams. Numerous randomised trials have shown that such front-of-pack labelling increases purchases of healthier foods, reduces calorie intake and thereby lowers obesity.[41] This approach could also help reduce educational health inequalities. A study conducted in Australia found that under voluntary industry self-regulation only 7% of products carried the label, whereas making the measure mandatory was associated with a fourteenfold increase in health benefits.[42] Differentiated pricing policies, restrictions on advertising unhealthy products to children and clear front-of-pack health labelling would be effective measures to improve dietary health (see the box 'Measures to support healthier nutrition').

HOW TO REDUCE EDUCATIONAL INEQUALITY IN THE USE OF HEALTHCARE

Educational inequality in the use of healthcare services has been relatively little studied in Estonia. In other countries, people with higher levels of education are two to three times more likely to undergo cholesterol and blood pressure measurements[43] and are more likely to receive preventive statin treatment.[44] Well-implemented treatment standards have helped reduce educational gaps in access to medical services,[45] which means that differences in the use of new medicines and adherence to treatment may be

smaller.[46] Nevertheless, outcomes in symptom-driven care pathways are also generally worse among groups with lower levels of education. A study in England found that after discharge from emergency departments, mortality was 10% higher among people with lower levels of education.[47] In South Korea, higher-income individuals have been found to receive faster emergency medical services, to have arrhythmias requiring intervention detected more often and to receive timely treatment at home; they also experience lower mortality than lower-income individuals.[48]

MEASURES TO SUPPORT THE USE OF HEALTHCARE SERVICES

- Identifying differences in the use and effectiveness of healthcare services by educational level
- Developing personalised, risk-based prevention, including for groups with lower levels of education
- Implementing smart digital solutions to support health services
- Involving people with lower levels of education in the design of preventive services

Over the past twenty years, the share of public sector funding in healthcare financing in Estonia has declined from 78% to 72%.[49] At the same time, the private sector's share in the provision of healthcare services has increased from 26% to 38%. In this context, the accessibility, usability and effectiveness of certain health services, including mental health services, may have declined most among groups with lower levels of education and income.

Participation in screening programmes reduces cancer mortality, yet uptake is socially patterned by educational level.[50] One way to increase participation in cervical cancer screening among people with lower levels of education is to offer home-based testing.[51] In Estonia, HPV self-testing was piloted in 2021[52] and the Health Insurance Fund now offers this option to all women invited to screening. Another approach to reducing educational inequalities in early cancer detection would be to tailor invitations to cervical and colorectal cancer screening based, among other factors, on the recipient's level of education.

This would improve the cost-effectiveness of screening programmes and enable more effective outreach to higher-risk groups – for example, by inviting them earlier or more frequently (see the box 'Measures to support the use of healthcare services').[53] A similar approach could be applied in the development of cardiovascular disease prevention services. Personalised prevention would involve integrating individual risk profiles into the routine work of family doctors and nurses, including not only genetic data but also behavioural and social risk factors.

New challenges and developments call for updated healthcare solutions. Smoking cessation services are cost-effective and help reduce educational inequality in smoking.[54] A digital application developed in Finland to support smoking cessation proved more effective in increasing quit rates than printed materials.[55] Digital services could also be developed to support dietary counselling, weight reduction and treatment adherence. Emerging technologies make it possible to detect and monitor high blood pressure through smart applications without requiring a visit to a healthcare facility.

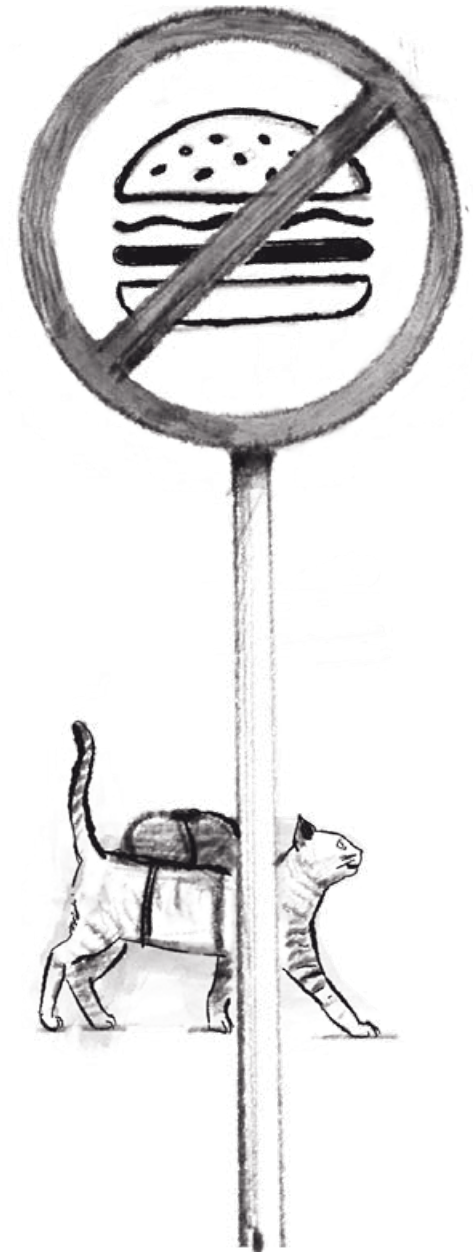
To reduce educational inequalities in the use of healthcare services, future users should be involved in the design of supportive services, with attention to the diversity of target groups. For example, in England an online smoking cessation service was co-designed with smokers with lower levels of education; following this, smoking rates declined by 43% among lower-educated groups, but not among those with higher education.[56] Such interventions may be particularly effective when communication strategies draw on opinion leaders suited to the target group, including influencers followed by people with lower levels of

education. Updated and more precisely targeted interventions in the use of healthcare services could reduce educational inequalities in risk factors as well as in morbidity and mortality.

SUMMARY

In Estonia, people with basic education live on average 11 years less than those with higher education. In recent years, this gap has somewhat widened. Educational inequality in life expectancy, and changes in it over time, are primarily linked to lifestyle factors (smoking, alcohol consumption and diet) as well as to the use of healthcare services. None of these factors depends solely on individual choice; they are also shaped by access to material and non-material resources. Alongside other measures, it is therefore important to reduce income inequality, which in Estonia remains higher than the European Union average.

Reducing health inequalities requires both population-wide measures (such as regulating the price, availability and advertising of tobacco, alcohol and unhealthy foods) and targeted interventions that address the specific needs and risk factors of different groups (for example, more effective smoking cessation services). This universal but targeted approach helps ensure that interventions also reach groups with fewer resources or lower levels of health literacy. Such differentiated interventions are therefore a prerequisite for reducing educational inequalities in life expectancy. The development of personalised interventions should make greater use of existing health, health behaviour and social data, digital tools, the involvement of risk groups in service design and social media channels to reach people with lower levels of education. This would make it possible to identify at-risk groups and provide them with timely, appropriate and equitable preventive services.



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Riina Sikkut

Educational inequality in health in Estonia is substantial and has not declined – people with higher education live on average 11 years longer than those with basic education. One third of this health gap is explained by smoking, one fifth by an unhealthy diet and one tenth by alcohol consumption, with access to healthcare services also playing an important role. Prevention must therefore address these risk factors and ensure access to medical care. Evidence-based policy makes unhealthy choices more expensive, reduces their availability, restricts advertising and requires clear labelling. This is easier said than done, as several evidence-based interventions lack broad political support, making rapid implementation unlikely.

What could be three steps towards a longer and healthier life for all?

First, stop placing responsibility solely on individuals. The risk of morbidity and mortality is linked to socio-economic characteristics in every country. Wider health disparities between population groups reflect social injustice. If education shapes health behaviour, income determines access to healthcare and parental background influences children's health, then health outcomes are not determined solely by personal choice but are also shaped by social norms, the distribution of resources and the broader living environment. As long as obesity is attributed to laziness, alcohol use to personal failure and smokers are told to cover their own healthcare costs, current health inequalities will be reproduced in the next generation.

Second, implement evidence-based recommendations so that children grow up healthier. Examples include providing healthy free school meals, banning advertising of unhealthy food to children, enforcing and strengthening supervision of existing regulations on the minimum age for alcohol sales and e-cigarettes, and restricting the distance sale of alcohol so that beer does not arrive at the doorstep within 20 minutes together with takeaway food.

Third, design prevention and healthcare services so that they are accessible and appropriate for target groups. The financial burden on vulnerable groups within the healthcare system should not increase, and the shift of service provision towards the private sector should be limited. Personalised, risk-based prevention should be developed – including support for smoking cessation, improved treatment adherence and weight reduction – and its design should take into account the views and experiences of people with lower levels of education.

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4.4

People with higher education value solidarity and innovation more, while security is valued equally across educational levels

Mare Ainsaar and Andu Rämmer

KEY MESSAGES

- In Estonia, the value placed on innovation and achievement has declined in recent years, except among people with higher education.
- Solidarity is valued more highly during periods of crisis and less highly at other times. Apparent educational differences in solidarity are largely explained by gender: people with higher education place greater importance on solidarity, but this pattern is observed primarily among women with higher education.
- Appreciation of nature is widespread in Estonia, but women and people with higher education place greater importance on environmental values.
- Security is valued less highly than before, and the importance attached to it does not vary by educational level. Women and people with lower incomes place greater importance on security.
- The value placed on hedonism is increasing in Estonia.

INTRODUCTION

This article examines the relationship between values and educational attainment. Values are abstract beliefs that, according to several theoretical approaches, guide people's preferences, behaviour and choices in different situations.[1] They reflect what individuals consider important in life. From the perspective of education, the study of values is particularly relevant because values are formed at a young age through the interaction between personal characteristics and the surrounding environment, including the education system, the home environment and upbringing, as well as society more broadly.[2] The development of a person's value system is also shaped by everyday practices – that is, by individual choices and behaviour.[3] Values are relatively stable over the life course, but they may change in response to major societal events (e.g. economic crises, pandemics, famine or armed conflict), personal life events (e.g. completing education, entering employment, marriage, having children or retirement) or age-related physical changes.[4]

Empirical research on the causal relationship between values and behaviour is limited, and it is not possible to determine conclusively whether values shape behaviour and choices or whether choices and actions have a greater influence on the formation of values.[5] Educational choices and levels of educational attainment may therefore reflect value preferences formed in youth, but the relationship may also arise because educational experiences shape individuals' values.[6]

In this article, we analyse five value orientations: innovation–achievement, solidarity, security, hedonism and appreciation of nature. These dimensions were selected considering the challenges facing contemporary society. Valuing innovation and achievement is important for societal development, the implementation of change and the acquisition of new knowledge. Solidarity is essential for social cohesion and for addressing shared societal challenges. Security can be regarded as a scarcity value, as both societal and individual appreciation of security may increase when it is perceived to be lacking. Hedonism, or the pursuit of pleasure, requires resources but may also function as a scarcity value. Appreciation of nature is particularly salient in the context of climate change, and we analyse its importance across different educational groups.

Data and methodology. There are several approaches to measuring values. In this article, we use a modified version of Schwartz's framework,[7] constructing five value orientations:[8] innovation–achievement (success and its recognition, creativity, new challenges and economic influence), solidarity (equal treatment of people, acceptance of differing opinions and helping others), security (societal and personal safety), hedonism (enjoyment and leisure) and appreciation of nature, which have previously been analysed in Estonia.[9]

The empirical analysis draws on data from a nationally representative survey of the Estonian population conducted as part of the European Social Survey. Data have been collected in Estonia every two years since 2004. Depending on the survey round, the sample size ranges from 1,300 to 2,000 respondents.

We analyse the values of people aged 30 and over, on the assumption that most individuals in this age group have completed their education. Respondents are divided into four educational groups: below upper secondary education, general upper secondary education, vocational upper secondary education and higher education. In examining overall changes in values, we also include Finland as a relevant comparison country. For a more detailed analysis of the factors shaping values, we use regression models that, in addition to education, include age, gender, value trends over time and income.

INNOVATION, SOLIDARITY AND THE NEED FOR SECURITY ARE DECLINING, WHILE HEDONISM IS INCREASING

Generally, among the five value orientations analysed, appreciation of nature is considered the most important, followed closely by security and solidarity. Innovation ranks fourth in importance, and hedonism is the least valued of the five in Estonian society.

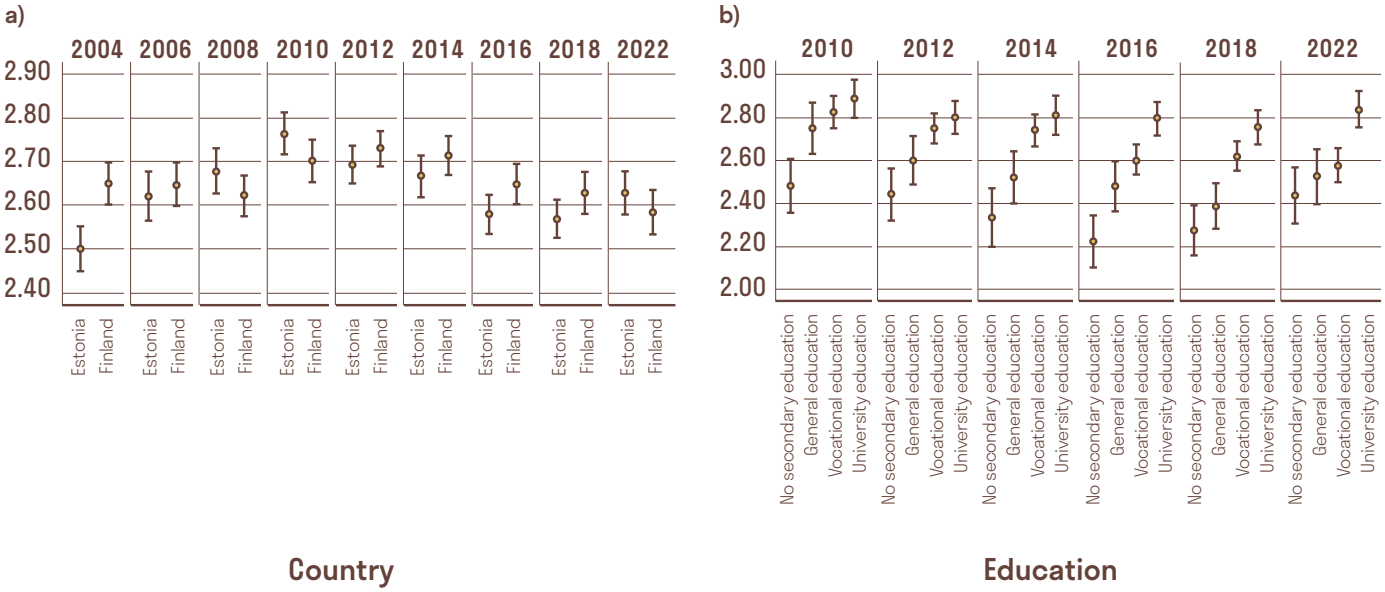
People with higher education value innovation and achievement more than other educational groups do. Previous research on the relationship between values and education has shown that openness to change is more characteristic of those with higher levels of education. Valuing the development of one's ideas and abilities both motivates individuals to continue their educational path and fosters independent thinking, intellectual openness and flexibility.[10] People with higher education also attach greater importance to achievement values. The influence of education on achievement values may reflect the role of standards-based assessment of learning outcomes in schools,[11] as well as stronger ambition to advance in life. Values have also been found to be significantly associated with academic performance[12] and with choice of field of study at university.[13]

Earlier studies in Estonia similarly show that people with lower levels of education place less importance on self-realisation values,[14] while those with higher education attach greater importance to innovation[15] and consider work and achievement more central.[16]

Figure 4.4.1a shows that in Estonia the value placed on innovation and achievement increased rapidly between 2004 and 2010, after which it declined, with a similar trend observed in Finland. In recent years, considerable effort has been made in Estonian schools to foster entrepreneurship among young people. It is therefore relevant to ask whether the value placed on innovation has also declined among younger cohorts. A separate analysis of Estonians aged 15–25 shows that since 2014, both innovativeness and orientation towards achievement have decreased among young people.

Figure 4.4.1a Change over time in the value placed on innovation and achievement in Estonia and Finland

Figure 4.4.1b Association between innovation–achievement values and education level in Estonia



SOURCE: figure by the authors based on European Social Survey data[17]

Figure 4.4.1b indicates that the decline in valuing innovation and achievement occurred across almost all educational groups, with only those with higher education largely unaffected. More detailed regression models, controlling for education, time trends, gender, age and respondents' assessments of their household income, do not account for the decline in the value placed on innovation and achievement. For example, the decrease cannot be attributed to changes in living standards or income, nor can it be explained by shifts in the age structure of society. Although younger people are generally more open to innovation and place greater importance on achievement than older individuals, population ageing does not account for the observed decline of innovation and achievement values.

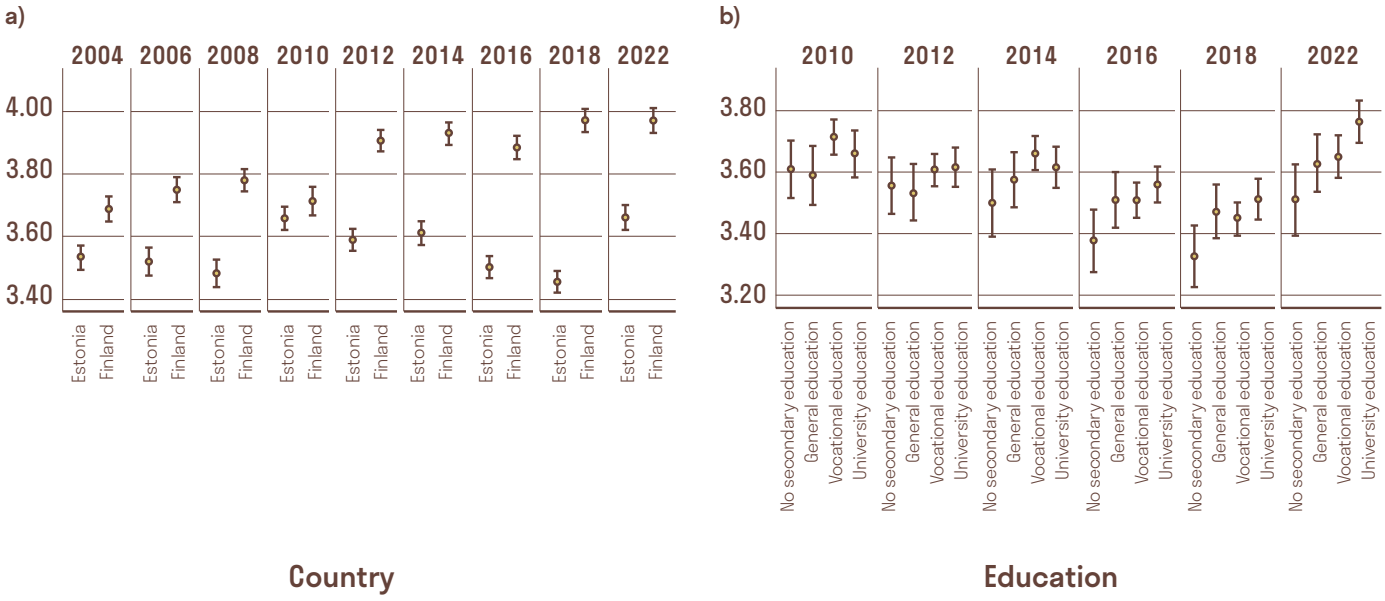
SOLIDARITY DEPENDS ON EDUCATION

Previous research has shown that tolerance increases with educational attainment.[18] In Estonia, periods of higher and lower solidarity are clearly distinguishable (Figure 4.4.2a). The 2009 economic crisis led to an increase in the value placed on solidarity, which lasted until 2014. From then on, the importance of solidarity declined again until 2018. In 2021, solidarity returned to its 2010 level due to the spread of Covid-19. In terms of the importance attributed to solidarity, Estonia differs markedly from Finland. In Finland, solidarity has generally remained at a higher level than in Estonia, with particularly large differences emerging from 2012 onwards.

From 2021, people with higher education in Estonia place greater importance on solidarity than those with lower levels of education (Figure 4.4.2b). However, more detailed regression models controlling for age, gender, income and survey year show that these educational differences are explained by the gender composition of the educational groups. Once gender is taken into account, differences by education level disappear. Women place greater importance on solidarity than men, while other characteristics have no significant effect.

Figure 4.4.2a Change over time in the value placed on solidarity in Estonia and Finland and its association with education in Estonia

Figure 4.4.2b Value placed on solidarity across educational groups in Estonia



SOURCE: figure by the authors based on European Social Survey data[19]

APPRECIATION OF NATURE VARIES OVER TIME AND DEPENDS ON GENDER

Nature has long been important to many people in Estonia, regardless of educational level. The importance attached to caring for nature increased in 2010 and 2018, but generally it has fluctuated over time (Figure 4.4.3a). In 2021, however, the importance attributed to the natural environment declined, mainly due to reduced support among groups with lower levels of education (Figure 4.4.3b). Regression models show that differences between people with higher education and other educational groups in valuing nature are linked to gender: women place greater importance on nature than men, and women are more strongly represented among those with higher education.

THE NEED FOR SECURITY DOES NOT DEPEND ON EDUCATION

Previous studies in other countries suggest that people with lower levels of education have a stronger need for security, as education enhances the ability to cope with life and may reduce the perceived importance of security. For individuals with lower educational attainment, stability and secure employment are more important than for those with higher education.[20]

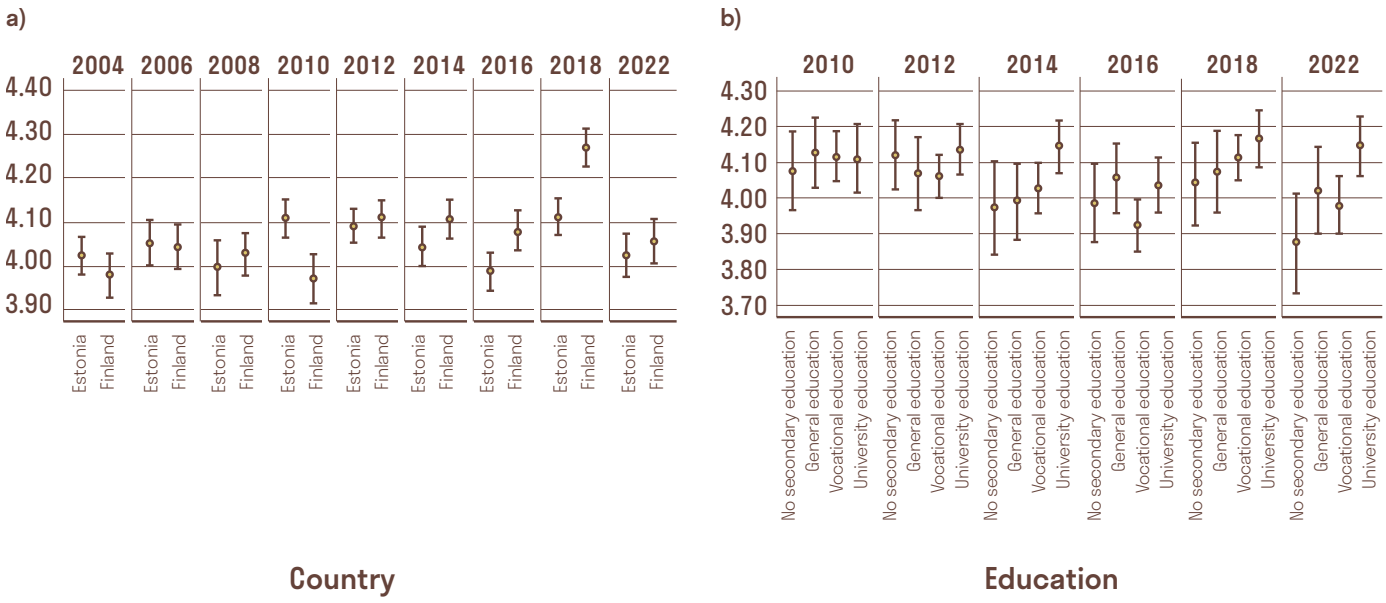
Since 2014, the value placed on security in Estonia has steadily declined, reaching a level comparable to Finland over the observed period (Figure 4.4.4a). However, there are no differences between educational groups in Estonia. Security is valued equally across all educational levels. Its importance depends primarily on gender and income: women and people with the lowest incomes report a greater need for security.

HEDONISM IS LEAST VALUED BY THOSE WITH THE LOWEST LEVEL OF EDUCATION

Hedonism, previously the least supported value orientation in Estonia, shows a clear upward trend (Figure 4.4.5a). Estonia, which had earlier lagged behind Finland in valuing enjoyment,[21] is now catching up with its neighbour. The sharp increases in 2010 and 2021 are particularly notable. Differences between educational groups are

Figure 4.4.3a Change over time in the value placed on nature in Estonia and Finland

Figure 4.4.3b Association between appreciation of nature and education in Estonia



SOURCE: figure by the authors based on European Social Survey data[22]

modest. Only people with below upper secondary education consistently report lower levels of support, although by 2021 these differences were no longer statistically significant. Analysis of the change in hedonism suggests that the increase cannot be explained by changes in population composition but is more likely associated with rising prosperity and greater societal security.

SUMMARY

We analysed how five value orientations – innovation–achievement, solidarity, appreciation of nature, security and hedonism – developed across educational groups in Estonia between 2010 and 2021. The analysis shows systematic differences by educational level in the case of innovation–achievement, solidarity and hedonism. People with higher education place greater importance on innovation, achievement and solidarity, while those with below upper secondary education attach less importance to hedonism. Appreciation of nature is also considered more important by people with higher education than by other groups. However, the differences between educational groups are not large.

The value placed on innovation and achievement increased rapidly between 2004 and 2010 and has since declined at all educational levels except among people with higher education. Those with higher education have also been the main drivers of innovation values in Estonia. The decline cannot be explained by population ageing but may reflect a reduced desire for novelty and a growing reluctance to take on challenges.

The value placed on solidarity has fluctuated. During the Covid-19 pandemic, solidarity was considered more important across all educational groups. Overall, since 2018, people with higher education have attached greater importance to solidarity than other groups, primarily because women with higher education place particularly strong emphasis on solidarity.

The importance attached to caring for nature increased sharply in 2010 and 2018. In the context of climate activism and the green transition, this is not surprising. More notable is the decline in 2021 among people with lower levels of education, which may indicate fatigue with climate and environmental issues amid worsening economic conditions during the pandemic.

Figure 4.4.4a Change over time in the value placed on security in Estonia and Finland

Figure 4.4.4b Association between security values and education in Estonia



SOURCE: figure by the authors based on European Social Survey data[23]

The value placed on security has declined in Estonia from 2014 onward, with no differences between educational groups. The long-term decline is likely linked to improvements in overall living standards.

By contrast, the value placed on hedonism increased and approached the level observed in Finland, where it had previously been considerably higher.

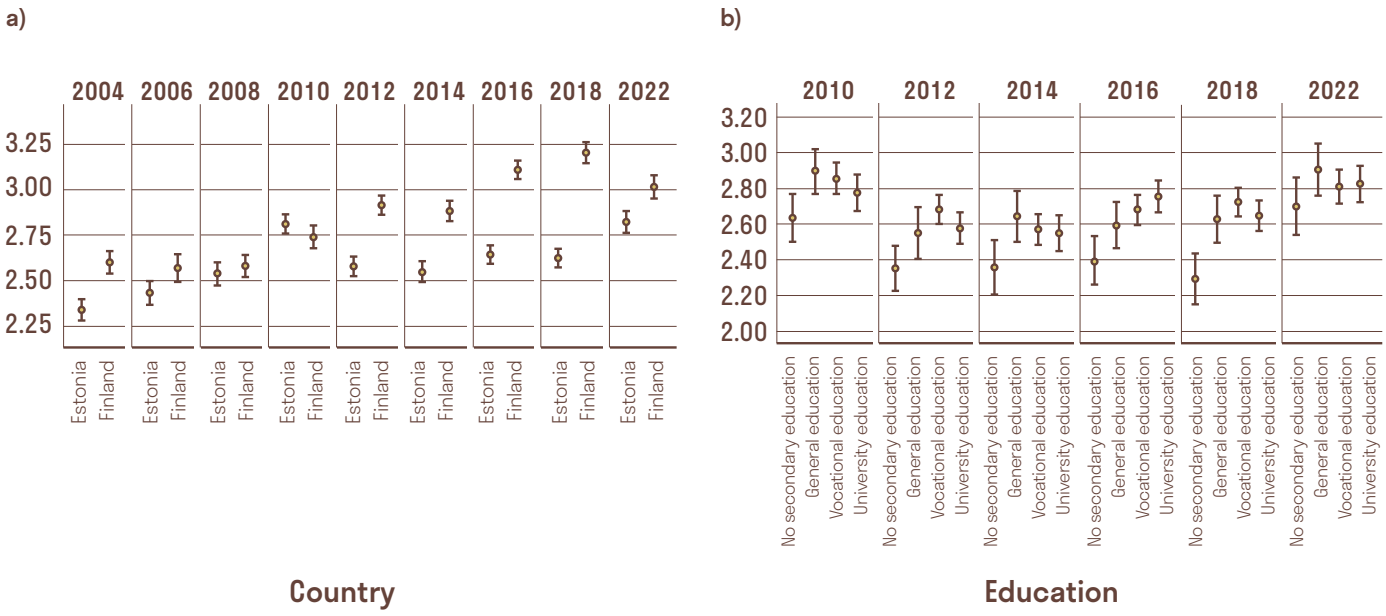
Overall, values changed over time and within educational groups. Some orientations, such as security, shifted in the same direction across all educational groups. For most values – innovation, solidarity, appreciation of nature and hedonism – changes occurred both over time and between educational groups.

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Figure 4.4.5a Change over time in the value placed on hedonism in Estonia and Finland

Figure 4.4.5b Association between hedonism and education in Estonia



SOURCE: figure by the authors based on European Social Survey data[24]

REFLECTION

Äli Leijen

The analyses presented in the article show that, among the five value orientations examined, appreciation of nature is considered the most important in Estonian society. This is followed by security and solidarity. Innovation ranks fourth, and hedonism is valued least. Values have fluctuated over time and, for example, hedonism has shown an upward trend compared with earlier years. Somewhat unexpectedly, the data indicate that the value placed on security did not increase following the outbreak of the full-scale war in Ukraine. Data collected in 2021 instead show a decline in the importance attributed to security, particularly compared with 2014. Future survey rounds may reveal further shifts in the value attached to security. Compared with Finland, the most recent data show the largest differences in solidarity. While the article focuses primarily on comparisons over time and between groups, this reflection considers how values are shaped and put into practice.

First, value formation requires deliberate attention. If values are not acknowledged, examined and consciously cultivated, they will develop implicitly. In Estonia, greater emphasis should be placed on values within the national curriculum, particularly in relation to the development of general competences. To date, the curriculum has largely presented lists and brief descriptions of key competences, with less attention to the broader vision and value framework within which these competences should be cultivated.

Second, articulating and naming values is not enough. Greater focus is needed on how values are translated into practice and how they can be effectively cultivated. Declared values do not always correspond to behaviour, and behaviour may not reflect stated priorities. For the past 18 years, appreciation of nature has consistently been identified as the most important value in Estonian society. This might suggest that environmental concern is expressed in consistent and systematic action. However, experts note that raising awareness of climate change and environmental issues, and encouraging new behavioural patterns, still require sustained effort in Estonia.[25] The relationship between values, attitudes and behaviour has been widely studied, and it is well established that attitudes do not automatically lead to behavioural change.[26] In education for sustainable development, increasing emphasis is therefore placed not only on shaping knowledge and attitudes but also on supporting concrete changes in behaviour.[27]



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Software updated – but what about learning?


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5.0 Introduction

Software updated – but what about learning?

Birgy Lorenz and Kaido Kikkas

KEY MESSAGES

- **A fourth generational shift is underway in digital learning resources.** This marks a deeper transformation than before and a move towards a self-regulating digital ecosystem. The new generation of adaptive digital learning resources enables a more personalised and flexible approach to learning, drawing on artificial intelligence and distributed systems. The distinction between proprietary and open educational resources is increasingly blurred.
- **AI can help reduce educational inequalities and support inclusive teaching** by offering new learning opportunities and assisting teachers where resources are limited. However, its use must be informed and responsible: AI is not a cure-all, and alongside opportunities we must also recognise risks, such as widening inequality and declining learning skills.
- **The focus should be on learners' needs rather than on technological options.** Dependence on specific service providers (vendor lock-in) should be avoided, and new technologies, including AI, should be used cautiously, also considering emerging risks.
- **Digital developments call for a rethinking of the aims of education and a willingness to experiment both boldly and responsibly.** The human being must remain at the centre.

INTRODUCTION

Education is the foundation of Estonia's future. Although our small country has gained international recognition for the performance of its education system, as reflected in PISA results, it now faces new challenges that demand systemic and bold change. Rapid technological progress, widening socio-economic disparities, the expanding role of digital education, and the evolving needs of teachers and learners all influence the coherence and long-term resilience of the education system.

WHAT WILL THE NEXT DECADE BRING?

Over the coming decade, the teacher's role will increasingly evolve into that of a mentor and facilitator of the learning process who helps

pupils use digital technologies to maximise their learning. At the same time, pupils will gain greater autonomy and responsibility for managing their own learning. A key question is whether – and how – the human connection between teachers and learners can be maintained. Collaborative learning environments and hands-on activities are likely to grow in importance. The Covid-19 pandemic and the resulting digital leap challenged teachers to adapt to new methods. In the next decade, a balance will emerge between digital and traditional approaches. Continuous professional development will be essential for teachers to use adaptive teaching tools effectively while maintaining high-quality learning experiences. At the same time, the need for mental health support will increase, as the constant use of technology can heighten anxiety and stress among both teachers and pupils.

AI-driven learning analytics will enable schools and teachers to monitor pupils' progress and learning outcomes with greater precision. Data-based decision-making will allow teachers to adjust teaching methods more quickly and accurately, while deeper data analysis will help identify learning difficulties at an early stage. This, however, also calls for stronger data protection measures and the development of the ability to critically interpret data.

Over the next decade, more evidence will emerge on how digital technologies affect learning outcomes. Although current findings are mixed, future assessments will provide a clearer understanding of implementation quality and allow for more targeted improvement. Greater investment in educational innovation will help ensure that new technologies promote deeper and more lasting learning.

Educational technology will also become more accessible for pupils with special needs. AI-based learning solutions will offer personalised support, such as speech recognition, text-to-speech functions and virtual tutors. Schools will invest more in technological solutions that ensure equal access to learning for all pupils.

The wider use of digital learning materials and asynchronous study depends largely on technological infrastructure. Estonia is already a highly advanced digital nation, but in the next decade it will need to ensure fast internet connectivity and up-to-date devices in every school. More investment will be directed towards improving access to digital tools in smaller schools and rural areas, reducing regional disparities and providing equal learning opportunities for all.

Looking ahead, policymakers and schools alike must address the question of how to guarantee every child in Estonia access to high-quality education, regardless of location or socio-economic background. The use of technology in education must be guided by deliberate choices that support both teachers and learners on their path of development.

This chapter focuses on four critical areas: adaptive learning materials, the use of AI, the legal challenges of regulating technology, and responsible digital innovation. Together, these will largely determine how well Estonia's education system can meet current and future demands. They are vital not only for education policymakers but also for schools, teachers and families whose children need learning that is both high-quality and accessible.

SMART DIGITAL LEARNING RESOURCES ARE EVOLVING INTO AN ADAPTIVE ECOSYSTEM

In the first article of the chapter, Mart Laanpere and Hans Põldoja discuss how education can be made more flexible and adaptive, providing learning experiences tailored to individual needs. At the same time, it is crucial to ensure that technology is equally accessible to all learners, regardless of their socio-economic background or place of residence. Developing teachers' digital competence and supporting the acquisition of technological infrastructure must be supported.

SMART USE OF ARTIFICIAL INTELLIGENCE REQUIRES HUMAN INTELLIGENCE

In the second article, Birgy Lorenz and Kaspar Kruup explore new ways for education to offer personalised learning opportunities while strengthening critical thinking and problem-

solving skills. Yet the use of AI can also deepen inequalities between those with access to resources and skills and those without. AI-based learning is most effective when pupils possess sufficient self-regulation skills. Its use must therefore be guided by a clear ethical framework that ensures the protection of privacy and personal data. Training for both pupils and teachers in the use of new technologies is essential to prevent the negative effects of AI on education.

ESTONIA'S EDUCATION SYSTEM IN THE WINDS OF TECHNOLOGICAL AND LEGAL CHANGE

In the third article, Kaido Kikkas and Riin Saadjärv highlight the challenges posed by technological dependency, which can limit the innovative capacity and autonomy of Estonia's education system. To ensure the best opportunities for pupils and teachers, decisions should prioritise the use of domestic solutions and help avoid dependence on large foreign corporations. It is also necessary to find ways to prevent vendor lock-in and guarantee equal access for all schools and learners. Addressing legal and ethical issues – particularly those concerning data protection and privacy – is vital to ensure the responsible use of technology.

TODAY'S CLASSROOMS ARE IN URGENT NEED OF DIGITAL INNOVATION

In the fourth article, Margus Pedaste and Emanuele Bardone emphasise that educational technology must support learners' all-round development. Digital solutions should not remain mere instruments of technological substitution but should instead promote qualitative and inclusive learning processes.

The responsible use of digital technologies in education requires more than simply integrating them into teaching; it calls for a deep understanding of how technology can transform learning and teaching. New technologies must support pupils' critical thinking, capacity for collaboration and autonomy. Innovation must take into account social and ethical dimensions, as well as the shared role of teachers and learners in shaping the classroom of the future.

These areas are crucial for ensuring the sustainability of Estonian education. Decision-makers must make informed choices for a future in which every child and teacher has access to high-quality educational opportunities, regardless of their location or resources.

HOW DO WE MOVE FORWARD?

Expectations for innovation and the smart use of digital technology in education are rising, but this potential often remains unrealised due to systemic barriers, fear, fragmentation and insufficient digital competence. The reflections that accompany the four articles highlight key issues and propose concrete ways forward.

- Clear and forward-looking rules for data use must be established to enable the collection and analysis of information on how educational digital tools are used and what impact they have. Such rules should protect users' rights while at the same time supporting the development and interoperability of the digital ecosystem.
- Only evidence-based and learning-supportive AI solutions should be developed and adopted – those designed to help pupils overcome individual learning obstacles. Creating an intelligent learning coach could help learners become more self-directed and less dependent on AI-generated answers.
- Teachers need systematic and meaningful digital competence development, along with support to overcome concerns related to copyright, data protection and AI. Awareness-raising and practical guidance should help them use digital technologies in education safely and confidently.
- Educational innovation requires strategic, research-informed external support – including mentors, architects, researchers and funding – and room for bold experimentation in forward-looking schools, while maintaining ethical responsibility and ensuring alternative learning opportunities for pupils.


Laps kasutas AI-d
kes on süüdi ?!

5.1

Smart digital learning resources are evolving into an adaptive ecosystem

Mart Laanpere and Hans Põldoja

KEY MESSAGES

- The field of digital learning resources is undergoing its fourth generational shift. This marks a deeper transformation than before, as the field moves towards a self-regulating digital ecosystem.
- Commercial and open learning resources, two previously separate ecosystems, are increasingly converging.
- Estonia's Lifelong Learning Strategy 2020,[1] the Digital Turn Programme[2] and the shift to distance learning during the Covid-19 pandemic have accelerated the development of a self-regulating digital learning ecosystem, which has now reached a crossroads and requires forward-looking decisions.
- Adaptive digital learning resources and learning analytics, currently being tested only within research circles, offer the means to realise the flexible learning objectives set out in Estonia's Education Development Plan 2035.[3]

INTRODUCTION

When Estonia launched the Tiigrihüpe (Tiger Leap) programme[4] in 1996, its initiators were wise enough to secure not only hardware and internet connections for schools but also subject-specific educational software. At the time, such software was distributed on CD-ROMs and websites and consisted of computer programmes offering learning materials divided into lessons or

reference resources, mainly in the form of text and images, and less often as interactive multimedia. In 2008, the Koolielu (School Life) portal was created through a collaboration between the Tiger Leap Foundation and Tallinn University's Educational Technology Centre. It provided teachers with a platform for sharing their own presentations, notes, worksheets, tests and similar materials. However, the first generation of commercial digital textbooks emerged without a national framework or government support, and the small size of Estonia's textbook market severely limited publishers' capacity for digital innovation.

An early success story in the field of digital learning resources for non-formal education was Teooria.ee (2008), an online platform for practising traffic theory used in driving schools, as well as web-based tools supporting the informal learning of Estonian, such as ETV's Mudila and Keeleklikk. This article examines the current state and future prospects of the field in Estonia, placing it in the broader context of European and global trends.

THE EVOLUTION OF DIGITAL LEARNING RESOURCES TOWARDS A SELF-REGULATING ECOSYSTEM

Education technology experts in Estonia use the terms 'e-learning' *(e-õpe)* and 'digital learning' *(digiõpe)* interchangeably to refer to teaching and learning supported by digital tools – hardware, software and digital learning materials. Digital learning therefore does not refer solely to online distance learning but often takes place in classrooms with the help of digital tools. Web-based learning environments used in digital learning can be grouped into:

- group communication platforms, such as Microsoft Teams or Google Classroom;
- institutional learning management systems (LMSs), the most widely used in Estonian universities being Moodle;
- personal learning portfolios, such as a learner's personal WordPress blog.

All three types of learning environments share a common feature: teachers and pupils must populate them with digital content – learning materials, tasks and solutions – while the web platform helps structure, manage, submit and provide feedback on this content. More specific types of digital learning resources include digital textbooks (the most widely used platforms in Estonian schools are Opiq and Maurus), educational mobile applications (e.g. Math99 for gamified maths learning), subject-specific digital services (e.g. GeoGebra), services supporting particular learning methods (e.g. the debate platform Kialo or the concept mapping tool CMapTools), and assessment services (e.g. the Estonian Examination Information System, EIS). People less familiar with educational technology often confuse learning environments with study information systems. In Estonian schools, the most common of these are eKool and Stuudium, and in vocational education, Tahvel. These systems serve administrative rather than instructional functions, managing pupils and class groups.

Repositories have been created for storing and sharing digital learning materials online. These allow keyword searches by text, author or filters, provide recommendation systems for popular or similar materials, and enable browsing by curriculum or target group. The main national open-access repository for digital learning resources is the e-Schoolbag (e-Koolikott), maintained by the Ministry of Education and Research. It contains over 40,000 interactive learning materials and enables teachers to create or adapt interactive resources in HTML5 format. Materials created with H5P can be used directly in e-Schoolbag (without logging in) or exported to learning environments such as Moodle or Canvas, which can generate rich datasets for detailed learning analytics.

The development of the digital learning resources and related services currently used in the Estonian education system was strongly driven by the Lifelong Learning Strategy 2014–2020, which included the Digital Turn Programme. As a result, by the start of the Covid-19 pandemic, the curricula for both lower and upper secondary schools were already largely covered by both open-access materials published in e-Schoolbag and commercial digital textbooks on the Opiq platform. Although Estonia's current Education Development Plan 2021–2035[5] no longer refers explicitly to digital learning resources, one of

its central goals – flexible learning pathways – presupposes the availability of smart digital learning tools.

Together, these services are often described as forming a digital learning ecosystem. The metaphor draws on biological ecosystems to describe how modern digital services are distributed, adaptive, self-organising and interconnected. One of the key challenges of this approach is that learners' personal data, behavioural patterns, user accounts and performance records are stored across numerous service providers, some of which operate under different legal frameworks and may pass data on to third parties. For this reason, the next generation of digital learning resources must be developed with clear technical and legal requirements for service providers to ensure secure integration with central registers and study information systems while keeping learners anonymous to the service providers. Such an anonymity-preserving service integration interface is supported by the Learning Tools Interoperability (LTI) standard developed by the global edtech consortium 1EdTech. With the rapid spread of AI-based services in education, risks to learners' privacy and the intellectual property of authors are growing even more serious. It is therefore crucial for Estonia to establish strict requirements for digital learning ecosystem services used in general education in the near future.

In summary, the development of digital learning resources and related services in Estonia over the past 30 years – and looking ahead – can be divided into four generations:

1. Integrated educational software (1996–2003): distributed on CD-ROMs and websites
2. File-based static digital learning materials (2003–2016): presentations, text files and web pages
3. Web 2.0 transformation (2016–2024): interactive materials hosted by external service providers (e.g. Kahoot, Desmos and LearningApps)
4. Adaptive, AI-supported digital learning resources (from 2024): designed to support flexible learning pathways, personalised learning and learning analytics, distributed within a decentralised service ecosystem.

The following sections examine the current state of digital learning resources in two ecosystems – open/free and commercial – which have evolved separately due to differing legal and business frameworks. We then outline possible future scenarios for Estonia's digital learning ecosystem based on trends in science and technology.

THE CONVERGENCE OF OPEN AND COMMERCIAL EDUCATIONAL RESOURCES

From a copyright perspective, digital learning resources can be divided into open educational resources (OER) and commercial educational resources. In the case of the latter, all rights – including the right to copy, distribute and modify the work – remain solely with the owner, even if the material is freely accessible online. Open educational resources, by contrast, are freely available and adaptable learning materials that can be used, modified and shared without restrictive licensing. According to UNESCO, which leads the global OER movement, open educational resources are 'learning materials that may be freely used and distributed, often under open content licences such as Creative Commons.'[6] The main motivations for creating and sharing OER are to improve access to education, enhance the quality of learning materials, promote the democratisation of education and encourage educational innovation.[7]

Traditional copyright gives the author full control over their work, but it also significantly restricts access, free use and adaptation of digital learning resources.[8] As in many other countries, in Estonia the main producers of copyright-protected digital learning materials are textbook publishers. In recent years, however, they have been joined by educational technology startups such as Foxcademy, Math99 and Praktikal. The largest commercial digital learning platform in Estonia is Opiq, developed by Star Cloud OÜ, which hosts more than 500 digital textbooks for general education schools published by various companies. The advantage of open content licences such as

Creative Commons[9] is that they balance the rights of authors and users.[10] Their weakness, however, is that teachers who adapt resources often overlook the fact that they have included images or texts protected by copyright in materials carrying a CC BY-SA licence.[11] Another unresolved issue is how to license learning materials that include content generated with the help of artificial intelligence.

Estonia's largest open-access digital learning platform, e-Schoolbag, was created in 2016 at the request of the Ministry of Education and Research. To facilitate reuse, all interactive learning materials on the platform carry the CC BY-SA licence. In general, however, Estonian schools prefer commercial learning materials – especially digital textbooks – that comply with the national curriculum and whose quality is ensured through professional reviewing. The procurement of educational materials and digital learning resources for schools is funded by the Ministry of Education and Research, yet the level of state support has remained unchanged for a decade at 57 euros per pupil per academic year. During that time, the state budget has grown by 126% and the average salary of general education teachers by 115%; the average textbook price has doubled. Applied research projects commissioned by the Ministry, such as DigiEfekt led by the University of Tartu (see Article 5.4), have provided research-based solutions but have had little direct impact on the development of commercial digital learning resources by publishers and edtech startups. The Ministry is planning to introduce an entirely new approach to funding the procurement of digital learning resources – one based on teacher vouchers – to create a marketplace for selling both teacher-created and company-produced materials directly to the target audience. The situation described above has already widened educational disparities between wealthier and poorer municipalities. The former have long been accustomed to using their own budgets to purchase high-quality digital learning licences for their schools. Unless measures are taken in the coming years to increase textbook funding and develop a functioning market for digital learning resources, unequal access to learning materials will increasingly deepen educational inequality.

DIGITAL LEARNING RESOURCES AT A CROSSROADS AFTER COVID-19

After the pandemic ended and the responsibility for paying Opiq licence fees shifted to schools, the platform's user numbers fell threefold. Interviews with teachers and school leaders[12] suggest that lack of funding was not the only reason behind this sharp decline. Both teachers and pupils seemed to experience 'digital fatigue' – a desire to return to ordinary school life. While countries such as France, Sweden and Denmark had already banned smart devices in schools, Estonia's Ministry of Education and Research has so far maintained its support for schools' right to make autonomous decisions. An alternative approach, following the examples of Portugal and Austria, would be to provide every pupil with a laptop or tablet through state support to ensure equal access to quality education, even in the smallest schools and least affluent municipalities.

Acquiring and using high-quality digital learning resources remains a challenge. In addition to affordable digital textbook licences and the continued development of open educational materials, this also requires access to digital devices and internet connectivity in every classroom. These are areas where the Estonian school system still has considerable room for improvement. Experts who have long worked in the field now share an understanding expressed by President Toomas Hendrik Ilves in his 2014 Independence Day address: 'What brought us here will not take us further.'[13] If the state decides to give educational technology companies the opportunity and responsibility to build the next-generation digital learning ecosystem on a market-driven basis, it should at the same time ensure equal access to learning resources for all educational institutions, teachers and learners. However, a market-based approach combined with greater state support would address only the needs of formal education, leaving non-formal education – such as art, music and sports schools, technology and nature clubs, and adult education – in a disadvantaged position. In these fields, learning content is highly diverse, and there is virtually no financially sustainable market.

The field of digital learning resources is now entering a phase of sociotechnical transition, where innovators are testing alternative technical, pedagogical and economic models for the next generation of digital learning ecosystems. For example, in Austria, the startup Teachino.io is gaining popularity in schools by replacing static repositories with large language models that generate adaptive learning pathways and automatically produce materials tailored to each pupil's level and learning habits. In this sense, the adaptivity of future digital learning resources may take on a new meaning. AI could not only select the most suitable learning activities and materials from existing ones but also generate them in personalised form, based on the learner's goals and detailed learning analytics. It should be noted, however, that current experiments with automatically generated adaptive digital materials have not yet been recognised by researchers or teachers as being on a par with those created by subject experts.

Based on the developments outlined above, three possible scenarios can be envisioned for the next decade in the evolution of digital learning resources:

- **Stagnation.** If Estonia's current solutions and funding levels persist, the field of digital learning resources will stagnate, inequality between schools and municipalities will increase, and innovation will fade. New digital tools will be developed mainly within informal education that many parents will be unable to afford, such as gamified learning environments.

- **A two-tier system.** Limited and mostly media-driven innovations – such as AI-based platforms – will bring rapid progress only for a small community of motivated innovators and schools, while the mainstream education system remains digitally under-resourced, textbook-based and focused on traditional exam preparation.

- **Flexible smart learning for all.** A social, cultural, economic and technological generational shift in the digital learning resource ecosystem, driven by collaboration between universities, the public sector, and private enterprises to create a new, accessible pool of digital learning resources for all schools. The foundations for such a system would include converting the national curriculum into a machine-readable format and developing adaptive digital learning resources and AI-supported tools to enable flexible, learner-centred and self-directed learning pathways.

The following section presents the findings of the EduFlex applied research project, commissioned by the Ministry of Education and Research and carried out by Tallinn University between 2021 and 2024; its results point towards the third scenario.

A VISION OF THE FUTURE: FLEXIBLE LEARNING PATHWAYS AND ADAPTIVE DIGITAL RESOURCES

Among its goals for 2035, Estonia's current Education Development Plan seeks to create more flexible learning structures and content and to reduce barriers between different types of formal and non-formal education. The plan and related documents repeatedly refer to flexible learning pathways, though without defining the concept in detail. The EduFlex project's primary goal was to establish a scientifically grounded conceptual framework for understanding, describing and studying flexible learning pathways and learner-centred education.[14] In addition, the project sought to test this framework in practice by implementing various types of flexible learning, along with supporting learning resources, environments and methodologies, in real school settings.

We began by clarifying key terms – for example, distinguishing between instructional trajectories designed through instructional design for many learners and a personal learning path, which refers to the record left on a digital platform by a learner's interactions with digital learning materials, peers and teachers. We also distinguished four levels of learning trajectories:

- macro-level trajectories offering learners flexible choices between types of schools, study areas, and general or vocational education;

- meso-level trajectories describing options available to learners within a specific school level – choices between elective subjects, courses, ability groups and modes of study;
- micro-level trajectories representing differentiated approaches for achieving one or two specific learning outcomes;
- nano-level trajectories that no one is likely to have the resources to document fully, but where a teacher or AI-based agent can, during a single lesson, recognise individual learning needs and support them through varied activities, resources, guidance or other methods.

At all levels, a degree of flexibility can be built into trajectories, even when all learners are ultimately expected to achieve the same learning outcomes. Earlier generations of adaptive learning platforms – from programmed learning in the 1960s to adaptive hypermedia in the 1990s – understood adaptivity mainly as sequencing tasks and materials according to individual learner performance, without giving the learner any control. The EduFlex project, by contrast, aimed to support co-regulated learning, where the learner (in collaboration with the teacher where necessary) decides on the next type of activity – for example, individual, pair or group work – as well as the task's difficulty level, number of repetitions and modes of support, such as hints or examples. A recommendation algorithm analyses the learner's digital path and suggests appropriate options, but the final decision must involve human judgement. Such flexible learning requires, in addition to subject knowledge, the systematic development of self-regulation and learning skills in every learner and every learning trajectory.

Designing and analysing micro- and nano-level flexible learning pathways first requires breaking down the learning outcomes defined in the national curriculum into smaller knowledge and skill units and linking each outcome to digital learning objects available across different platforms. Before EduFlex began, a working group on flexible learning pathway infrastructure led by data scientist Peep Küngas had already started this work at the Ministry of Education and Research. By 2021, the group had developed a machine-readable format for describing learning outcomes in the national curriculum, with examples published on the Semantic MediaWiki platform. Building on this approach, EduFlex created flexible learning trajectories for Year 9 algebra based on a machine-readable domain model, complemented with interactive exercises developed in the H5P content authoring tool, which is used in e-Schoolbag. These trajectories were tested with nearly 200 pupils in real classroom settings, their individual learning paths were collected and analysed using learning analytics tools,[15] and experiments were conducted with AI-assisted generation of adaptive tasks at specified levels of complexity.[16] The cautious conclusion was that, for now, the automatic generation of adaptive activities and tasks by text-based AI tools is feasible only with the involvement of a human expert.

Turning this vision into the foundation of a new digital learning regime will require solving numerous technical, pedagogical, economic and legal challenges. For example, Estonia's Personal Data Protection Act and the GDPR currently do not permit the large-scale collection of learners' performance data envisioned here. There are also serious obstacles to integrating open and commercial learning materials within flexible learning pathways (unless the state first purchases licences for all commercial materials for all learners). Nevertheless, within the global community of educational technology innovators, new technical standards and market models are emerging that could pave the way for a next-generation digital learning ecosystem – one that allows cross-use of learning content from multiple providers alongside open educational resources.

REFLECTION

Margus Pedaste

Thirty years since the launch of Estonia's Tiger Leap programme, we now have a broad range of learning environments, digital textbooks, educational apps, digital learning materials, learning-support services, digital study information systems and repositories. Collectively, these are often referred to as the digital learning ecosystem. But can we really call it that? When these tools are managed by different owners, hosted on different platforms, used by some teachers and pupils but not others – when everyone builds their own system or none at all – is it still an ecosystem? In teachers' professional standards, the educational ecosystem is defined as a network of institutions, educators, learners and other individuals and organisations within a region, the relationships between them, and the resources available to its members. In the digital world, resources exist and are created, managed and used by people, but these actors often do not form a coherent network. The different applications, services and content rarely interact with one another. In this sense, we are still some way from a genuine ecosystem.

The main obstacle to building a digital learning ecosystem lies in the use of data within an increasingly restrictive legal environment. Can we influence the international policies that, as a member of the European Union, we are obliged to follow? People are becoming more aware and more sensitive, and laws often protect us pre-emptively against almost any use of data. Yet without data, no meaningful connections can be made between the components of the network; without those connections, we cannot know what works well and what does not in the digital domain. As a result, the world of digital solutions risks becoming a confusing patchwork of isolated elements in which neither teachers nor pupils have confidence.

To turn this confusion into a functioning ecosystem, three things are needed.

1. **Clear rules that support development and smart solutions.** The use of digital learning resources can only become truly smart if researchers, developers, teachers and learners are able to collect and use data systematically about the use and effectiveness of all digital tools, services and content. Such data makes it possible to determine which learning outcomes are achieved through which approaches. Regulations should not hinder the processing of data needed for innovation – on the contrary, they should facilitate it. Data can and should be anonymised, but it must remain connected. This is essential for a new Tiger Leap: Estonia can be a true innovator only if its rules enable smart, data-informed decisions while protecting people's rights.

2. **Fair compensation for contributors to the ecosystem.** We already have a vast array of components to integrate into a digital learning ecosystem – some open-access, others commercial. For the ecosystem to function organically, there must be a system that ensures fair remuneration for those who create applications, services or content. Beyond financial incentives, social impact is also crucial – the opportunity to shape how learners perceive and understand the world.

3. **Personal digital devices and internet access for every learner to reduce educational inequality.** A digital learning ecosystem can function only if most learning takes place within it and leaves a digital record. Many countries are moving in the opposite direction, introducing national restrictions on pupils' use of digital devices. Estonia, however, has the opportunity to lead by example – to show the world how to expand pupils' digital autonomy while supporting collaborative learning, self-regulation skills and the assessment of not only academic achievement but also of learners' mental, physical, social and emotional well-being.

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5.2

Smart use of artificial intelligence requires human intelligence

Birgy Lorenz and Kaspar Kruup

KEY MESSAGES

- **Artificial intelligence (AI) can help reduce educational inequalities and support inclusive education** by offering new learning opportunities and assisting teachers, who work with limited resources. However, this requires informed and responsible use.
- **When used purposefully, AI can support personalised and effective learning** by helping to tailor content to learners' needs and supporting the development of critical thinking and problem-solving skills.
- **AI may deepen educational inequality** because it primarily benefits those who already possess self-regulated learning and thinking skills, while less independent learners risk becoming passive consumers of technology.
- **Excessive and passive use of AI can hinder the development of learning skills**, since overreliance on technology may reduce learning habits and critical thinking, leaving learners less able to acquire and analyse knowledge actively.
- **AI-generated content is not always distinguishable from human-created work.** This poses new challenges in assessing knowledge and originality in education while calling into question traditional teaching and assessment methods.

INTRODUCTION

In recent years, AI has profoundly influenced education by offering new possibilities for personalised learning and teacher support. At the same time, its misuse can deepen inequality and hinder critical thinking.

Estonia is a leading country in digital education,[1,2] and since 2025, the integration of AI in schools has become part of a broader educational reform initiative called the AI Leap (TI-Hüpe).[3] The main challenge is to ensure that all learners can use

AI to strengthen, rather than lose, their learning skills. The main challenge is to ensure that all learners can use AI to strengthen, rather than lose, their learning skills.

This article explores the impact of AI on education, focusing on the risks of increasing inequality and ways to prevent it, changes in learning habits and critical thinking, and how teachers are adapting. We analyse both the positive and negative aspects of AI use and offer ways to ensure its balanced and responsible implementation.

AI IN SCHOOLS: SHAPING THE FUTURE OR CHASING THE HYPE?

If Estonia aims to position itself as a leader in AI access and education, it needs initiatives and investment to integrate these technologies into schools and promote personalised learning.

Estonian government agencies have drawn up a White Paper on Artificial Intelligence,[4] which highlights the key role of education in developing a data-driven society and economy by equipping people with essential data and AI skills and integrating these into curricula at all levels of education. Plans also include using AI to personalise learning and strengthen digital competences, ensuring Estonia has a competitive and technologically literate workforce by 2030.[5] Similarly, public awareness of the opportunities and risks of AI must be raised to make its use consistent across society, not limited to the public sector.[6]

To support this, the Ministry of Education and Research established an advisory council on AI in 2024 to ensure meaningful goals and continuity in related developments. In addition, guidelines have been prepared for schools.[7] To provide access to AI and reduce educational inequalities, it is essential to stay informed about both successful and unsuccessful interventions, policies and pilot projects implemented in other countries (such as in the European Union,[8] the United States,[9] the United Kingdom,[10] Australia[11] and Asia[12]). These examples reveal overenthusiasm, rushed decisions that may stall implementation, and efforts to regulate AI development pre-emptively – and at times unsustainably. The implementation of AI has prompted the education sector, which usually acts reactively, to become proactive. This means we must be ready for highly flexible decision-making to ensure that the AI Leap does not turn into mere AI hype.

GROWING TECHNOLOGY USE MAY OFFSET EFFICIENCY GAINS

AI is not equally accessible to everyone in the education system. Economic status, place of residence and school resources affect opportunities to use AI – cities have better technological infrastructure and resources, young people encounter AI more often, and schools with STEM (science, technology, engineering and mathematics) programmes lead the way in applying technology.[13] At the same time, it should not be overlooked that AI applications can enhance the quality of education and bring back to education people with disabilities, who stand to benefit most clearly from technological progress.[14] On the other hand, access to AI is also regulated by the European Union's AI Act,[15] which highlights the need for transparency in developing and using AI solutions in education and restricts high-risk applications such as monitoring learners' emotions. Educational institutions must understand the principles behind AI systems to prevent technology from deepening inequality and to safeguard learners' fundamental right to privacy. Meanwhile, technology companies are considering whether to offer their services in Europe at all, and if so, at what additional cost to consumers.

In the broader context of accessibility and the green transition, it must be remembered that the cost of using AI depends on both economic trends and energy consumption. If large corporations achieve monopoly power, they may raise prices and lower service quality, reducing the accessibility of AI solutions for educational institutions.[16] Furthermore, AI systems increase carbon dioxide emissions, which casts doubt on their environmental sustainability.[17] This creates a situation where greater use of technology cancels out the efficiency gains it initially delivered. As a result, countries and schools that have become heavily reliant on AI may soon find themselves

facing rising energy costs and the environmental consequences of higher emissions, which make previously affordable software prohibitively expensive. The divide between schools and countries that can afford AI in education and those that cannot will thus deepen further – not to mention the broader question of the environmental sustainability of widespread AI use.

HUMAN INTELLIGENCE BEFORE ARTIFICIAL INTELLIGENCE

The use of AI presupposes thinking skills and the ability to reflect on one's own thinking – metacognition.[18] Modern technological interfaces are designed to be so intuitive that ordinary users need no special technical skills. Yet there remains a clear distinction between everyday users and developers, the latter requiring a deep understanding of AI algorithms and how they function.

AI should be used to support, not replace, human intelligence. To ensure that learners and teachers use it in this way, the foundations of thinking skills must be laid before AI is introduced. When we speak about self-regulated learners and learning to learn, we are referring to metacognitive skills – the ability to observe one's own thinking, detect errors, set cognitive goals and direct thought processes purposefully.[19] If schools teach these skills, learners can benefit from AI as a means of developing their intellect.[20] However, if the focus remains solely on correct answers and performance monitoring, the introduction of AI may lead to superficial learning and a decline in critical engagement – that is, to the passive use of AI.[21] Educational institutions must therefore consider whether their teaching methods genuinely promote critical thinking or merely encourage unreflective task completion with technological shortcuts. In the worst case, this hampers the development of learners' thinking because no real thinking takes place at all.

Teachers and schools play a central role in guiding the informed and critical use of AI. They must develop both their own and their pupils' metacognitive abilities so that AI serves as a tool for effective learning rather than an instrument that erodes learning habits and, in the worst case, exposes learners' data publicly.[22] The issue, in this sense, is not necessarily a decline in academic performance but rather that lessons and tasks which never required thinking in the first place could not have raised that level anyway. The real risk lies in the fact that some pupils learn to use technology to enhance their cognitive growth, while others delegate thinking entirely to the machine and lose the ability to reflect on what they may have lost in the process. To prevent this, schools and educators must critically assess whether their teaching truly demands, supports and develops thinking. If the answer is not an evidence-based 'Yes!', then the hasty introduction of AI is likely to be more harmful than beneficial. Schools that fail to harness the potential of human intelligence are unlikely to make effective use of artificial intelligence.

As awareness of metacognitive skills and related learning practices is still evolving, responsibility for ensuring the sensible use of AI rests largely with schools and teachers. Teachers must understand how pupils think, how their thinking develops and how it can be supported. This enables the creation of an environment that encourages thinking – one in which AI has its place within clearly defined boundaries. It should also be remembered that more than five years ago Estonia set a goal for its learners to become not merely consumers but creators of new technologies.[23] To develop AI, many will later need to acquire university-level knowledge and skills in areas such as machine learning, deep learning, natural language processing, computer vision, data science, statistics, algorithm design, big data analysis, cloud computing, cybersecurity and fields yet to be invented.[24] This means that pupils should be introduced to these subjects, including AI, already in general or vocational education. Regardless of whether they later choose to study information technology or not, everyone needs to develop crucial 21st-century competencies: problem-solving, critical thinking, communication, the ability to recognise bias and a sense of ethics in using AI – all of which are essential for thriving in the information society.

IF AI EVALUATES YOU, THEN WHO EVALUATES THE AI?

The use of AI in education raises ethical questions related to algorithmic bias, data protection and the misuse of AI tools. Transparency in data collection and processing is essential to safeguard privacy and prevent violations of learners' rights.[25] Regulating the use of AI in education requires clear ethical guidelines and stronger data protection measures. Schools and educational institutions must understand how AI makes decisions and what data it uses in order to avoid unfair assessments and unequal opportunities.[26] The same applies to Estonian educational technology companies seeking to create new and innovative AI-based applications. However, not every big-data-driven application is suitable for the school environment.

Applications designed for surveillance rather than supporting learning should be treated with caution. When pupils use text-generating tools to complete homework, schools may understandably wish to distinguish AI-assisted work from that produced independently. Yet this desire puts schools in a vulnerable position, making them susceptible to exploitation by companies that sell so-called generative AI detection services. Although such providers often market their software as highly accurate, it is technologically impossible to avoid false positives, which can lead to unjust accusations of AI use directed at pupils who have done nothing wrong. Particular care is needed with AI-based monitoring systems in examinations, where pupils may be wrongly accused of plagiarism or of submitting work generated with AI assistance.[27] The authoritative appearance of these technologies and the promises made by their developers can be misleading, and excessive reliance on them undermines the trust that should exist between pupils and teachers, schools and the state. Turning to yet another technology to solve the problems created by the first is not a sustainable path forward.

TEACHING 2.0 AND THE REDISTRIBUTION OF ROLES IN THE AGE OF AI

AI is transforming the role of teachers: their traditional task of transmitting knowledge is increasingly giving way to guiding and supporting learners. AI tools can enable personalised learning and help manage classrooms, but they also demand new competencies from teachers, including digital literacy, the ability to interpret data and the ethical use of AI.[28] While today's technologies do not yet allow for fully automated personalisation, that future is not far off.

Challenges related to AI in the classroom include access to AI resources, evaluating their reliability and integrating them into existing curricula. AI also affects teacher–pupil interaction by enabling personalised learning and adapting instruction and support to individual learners, thereby enhancing the overall learning experience. However, particular attention must be paid to preserving meaningful human relationships in an increasingly digitalised classroom.

Looking to the near future, by 2030 Estonia is likely to implement automated training programmes and tools that enable teachers and pupils to use AI in an informed, critical and effective way. Ongoing discussions will address the challenges of large-scale AI implementation, the changing nature of the learning process and the evolving role of the teacher.[29] The intelligent use of AI can help reduce teachers' workloads, support differentiated tasks, enable personalised assessment and provide individual guidance. Teachers will possess strong skills in both digitalisation and AI use, working alongside automated AI teaching assistants. Teacher burnout and turnover are expected to decrease as intelligent AI systems take over routine tasks.

Nevertheless, it is essential to recognise that AI can never fully replace teachers, as meaningful relationships and the development of critical thinking require human guidance. Teachers must understand how to use AI in ways that support learning rather than hindering independent thought.[30] For example, teachers might use AI to design and check assignments, while pupils use it as a consultation partner in a Socratic dialogue.

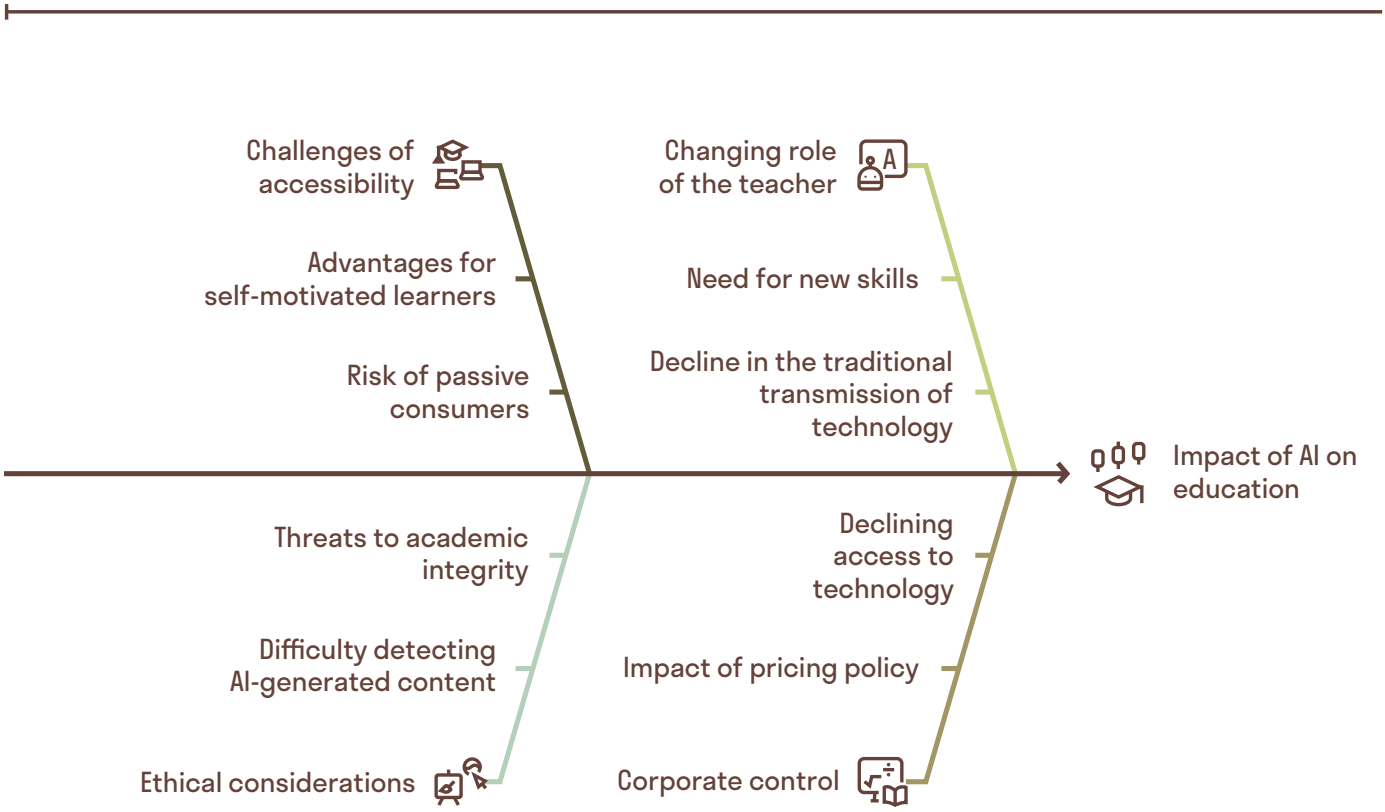
To meet these expectations, Estonia's education policy, supporting frameworks and funding mechanisms must be reviewed to help teachers adapt to AI-enriched learning environments and tools. Ongoing feedback from teachers and opportunities for professional development will ensure that the integration of new technologies into education proceeds responsibly and effectively.

NO KNOWLEDGE WITHOUT LEARNING, NO SKILLS WITHOUT KNOWLEDGE

AI can help personalise learning and reduce teachers' workloads, but its use must be informed and responsible (Figure 5.2.1). The availability of new technologies depends on economic and technological resources, which makes nationally implemented measures necessary to ensure equal opportunities for all learners.

Curricula must promote digital literacy, critical thinking and metacognitive skills so that learners can use technology consciously. The ethical use of AI requires transparency, data protection and, necessarily, teacher training. Overuse of AI must also be avoided, as it can inhibit independent thought. In the future, ensuring the affordability and sustainability of AI services will be vital to avoid dependence on monopolistic providers. Successful use of AI in education depends on cooperation between educational institutions, the state and the technology sector – through training initiatives and by sharing best practices with both learners and society at large. Only through this kind of collaboration can we build the necessary awareness and turn knowledge into practical skills.

Figure 5.2.1 Responsible integration of artificial intelligence in education



SOURCE: figure by the authors

REFLECTION

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The problem of learning in the age of AI is overlooked only by those unconcerned with learners' information processing working only at a superficial level, or not at all. For everyone else, the elephant in the room – a focus on performance rather than mastery – has been stomping about for decades and has now become even more visible with the rise of AI. Yet it bears repeating a fundamental truth: contemporary learning science holds that the most effective learning happens through the learner's own construction and co-construction of knowledge. In other words, genuine learning is still a slow, deep and argumentative or reasoning-based process – one that moves from practice to theory, where individuals, alone or with others, seek to construct explanations, definitions, formulas, conclusions, assumptions, solutions, insights, syntheses and applications through dialogue.[31] This is precisely the process that AI must never do on our behalf, because thinking skills cannot develop in our minds without direct engagement (and deteriorate if we stop exercising them). Accordingly, in a well-designed educational framework, scientifically grounded AI learning tools – whose genuinely effective forms are still being developed at the time of writing – should mainly be used when no expert teacher or peers are present. In short, AI should serve learning only during a certain portion of the total study time, and time spent together with real people should not be wasted on AI.

The human psyche is an integrated whole – and was so long before AI. To understand what AI can improve in education – or make worse – we must first look squarely at education's own challenges. Perhaps the greatest of these is that many participants in the learning process still do not understand the nature of learning itself, which has wide-ranging consequences. Learners often judge the effectiveness of learning during the process, based on how easy or pleasant it feels, when in fact the opposite tends to be true: effortful learning is more effective.[32] Supporting learning requires an understanding of how mental processes develop: the nature of cognition, the functioning and growth of executive functions, motivation, emotions, how these are interpreted and regulated, and much more. All these factors interact, and when they – or other factors such as social and emotional competence – create barriers to learning, AI-based support tools may help overcome them.

As the article notes, AI can act either as an accelerator of development or as a dangerous substitute for the learner's own thinking – much like a physical education teacher running laps on behalf of their pupils. Ideally, AI should function as a scientifically grounded, step-by-step support system for learners struggling with specific learning difficulties – much like a teacher would, if they could always be there at the right moment. An AI-based solution should be used only up to the ideal point at which it becomes unnecessary – the moment when the learner has internalised the relevant learning skill. This is when learning strategies, attention control, reflection on learning, understanding of learning processes, or metacognition have become part of the learner's own thinking – when the pupil has become an autonomous learner and no longer needs AI as a learning coach.

We do not yet know for how many types of learning difficulties AI could be useful, and optimism may be premature. One key question for the future is whether we can create an AI that acts as an attentive 'learning coach', informed by contemporary research and capable of interpreting a learner's verbal input while considering the many interrelated factors that shape cognition – both universal and individual – and prioritising them appropriately. For example, it may be futile to teach learning strategies to a pupil at times when they are convinced the subject is simply 'not for them', or to offer deep discussion when the learner first needs step-by-

step support in sustaining attention and realising that attention itself can be trained.

Developing research-based educational AI requires rigorous validation, testing and refinement, along with attentiveness to potential unintended or harmful side effects. I share the article's concern that the greatest risk lies in delegating essential cognitive operations and deep information processing to AI due to an insufficient understanding of how learning works. Moreover, there are learners whose difficulties lie elsewhere and who may not even reach the stage of problematic AI use – for them, a specialist AI, which does not yet exist, could possibly become a powerful form of support.

The transformation of the entire learning process. AI in education resembles both the Covid-19 pandemic and the Trojan horse – it cannot be ignored and makes it impossible to continue as before, yet it also holds the potential to bring long-awaited changes to learning processes that have long been waiting to enter the education system. An education system that uses AI wisely could resemble an enhanced version of the flipped classroom, but one enhanced by all the insights of modern learning science. Everything pupils do at home should aim to deepen their understanding, not to produce something for submission. Home learning should involve preparing for upcoming lessons through reading, exploration and reflection, building prior knowledge that resides in the learner's mind rather than in something tangible to be submitted, possibly for assessment. This does not mean that pupils should not be encouraged to represent their learning to themselves in various ways, such as through visualisations, questions, conclusions, idea summaries, notes identifying points of confusion, syntheses or derivations. In this process, AI could serve as a valuable discussion partner, helping the learner reach insights through experimentation; the goal is not for AI to think but for it to help the learner think more effectively and deeply. In school, learning would then take the form of co-construction with real human minds – applying knowledge collaboratively or individually to solve complex problems in new contexts. The aim would be to recognise that what was learned at home is not yet fully understood and that applying knowledge in different contexts exposes gaps in understanding – the point at which genuine learning begins. It is also important to remember that if home learning focuses on the individual construction of knowledge, such as through constructive reading, reflection or curiosity, the workload should not be excessive, as deep learning is both time- and energy-intensive.

Assessment's influence on learning. Finally, we must ask: why do pupils so often focus on performance rather than learning? It is encouraging that assessment principles are currently under review. The grading system used in Estonia today originated in the Russian Empire in the first half of the 19th century.[33] Its preservation is at odds with growing evidence that numerical grading does not promote deep learning, motivation, self-assessment skills, relationships, psychological well-being or a commitment to lifelong learning.[34] In the current system, grades inevitably become ends in themselves rather than means. This is reflected in how AI is used today: when assessment practices signal that mistakes are punishable and grades matter more than understanding, and when assignments lack meaning from the learner's perspective, it is hardly surprising that pupils turn to AI to produce flawless results rather than to deepen their knowledge. Pupils do what their learning environment directs them to do. Though we created this situation ourselves, AI now compels us to reconsider how pupils perceive what happens in school – the nature and purpose of learning itself.

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5.3

Estonia's education system in the winds of technological and legal change

Kaido Kikkas and Riin Saadjärv

KEY MESSAGES

- Estonia's education sector has sought to keep pace with technological and legal change, though with mixed success.
- New technological solutions – especially artificial intelligence – require appropriate regulation, along with broader consideration of their impact. Every major technological advance brings new security and privacy risks, and the entire digital technology market needs regulation through quality standards.
- The current alignment with the interests of large corporations must change – vendor lock-in poses a problem in the long term.
- The focus should be on learners' needs rather than on technological possibilities.

INTRODUCTION

Technology evolves rapidly while the law is inherently stable. When a slowly changing legal framework must regulate fast-developing technology, problems arise. This issue has been discussed for years – for example, it was addressed by the World Economic Forum in 2018[1] – and the debate has only intensified since the Covid-19 pandemic and the subsequent boom in AI.

Since the days of the Tiger Leap (Tiigrihüpe) programme, Estonia's education system has consistently sought to keep pace with new trends. At the turn of the century, e-learning and, with it, the open educational resources movement reached Estonia. Meanwhile, progress has long been hindered by the dominance of a few large corporations whose products control key

technological tools and environments, leading to the problem of vendor lock-in. Moreover, every significant technological advance has brought with it new risks to security and privacy.

NEW DEVELOPMENTS, NEW PROBLEMS: SECURITY AND PRIVACY

As noted earlier, nearly every technological innovation brings new risks. In Estonia's education landscape, a wide range of security issues has already emerged – from long-standing concerns such as weak password practices and online scams to newer challenges like deepfakes and data privacy in AI training. The main areas of concern in this field can be summarised as follows:

- **Cyber threats.** The education sector is targeted much like businesses and government agencies, and the range of attackers and motives is broad – from a mischievous student's prank to the actions of organised groups seeking to steal, alter or destroy data. Examples include the cyberattack on Tartu Health Care College on 4 September 2020[2] and the ransomware attacks in 2024 targeting Järvamaa Vocational Training Centre and Tallinn Health Care College.[3]

- **Device-related risks.** Smart devices are widely permitted across Estonia's education sector, and the line between institutional and personal devices is often blurred – for example, in terms of network access. Risks therefore arise both from insufficiently regulated device use (including smartphone dependency) and from poorly managed bring-your-own-device (BYOD) policies, such as inconsistent software versions and missing security updates across devices.

- **Physical environment risks.** In addition to classic network-based cyberattacks, educational institutions must also address threats that exploit physical infrastructure.

- **Insider threats.** For example, on 5 November 2020, a schoolboy from Rapla ordered a cyberattack against his own school.[4]

- **Data protection.** In education, this includes safeguarding data about students and staff, as well as managing access rights for parents and other authorised parties. In one case in 2021, a parent petitioned the Chancellor of Justice to restrict another parent's access to their child's e-school account.[5]

- **Data handling by external services.** Schools today rely on a wide range of external digital services – from web-based learning applications, learning management and information systems to cloud platforms, social media and, increasingly, AI applications. It should be noted that almost all well-known large language models (LLMs) operate as cloud services, meaning that user queries are stored on remote servers outside the user's direct control.

When shaping the legal framework, a good starting point would be for each educational institution to establish or update its information security policy. As noted in the Estonian Information System Authority's (RIA) cybersecurity yearbook,[6] one way to mitigate risks is to apply the Estonian Information Security Standard (E-ITS) within the education sector.[7]

OFF-THE-SHELF SOLUTIONS: CONVENIENT BUT RISKY FOR SCHOOLS

Debates about the role of digital technologies in education have expanded in recent years – from post-pandemic digital fatigue to the need to limit the use of smart devices and the transition to e-examinations. Since the national curriculum[8] places digital competence at the core of education, it is essential that achieving this competence does not depend on a student's place of residence, school type or family's socioeconomic status.

In Estonia, responsibility for covering school expenses and procuring IT equipment lies with the school's governing body – for general education schools, this is usually the local government.[9] However, local governments' capacity to invest in technology varies considerably, depending primarily on their economic resources but

also on their priorities. As school owners, local governments have the right to establish general rules for school operations, including the use of digital tools and technologies, but schools typically retain the freedom to choose solutions not centrally procured by the municipality.

All schools within the same local authority typically rely on either Microsoft or Google for Education as their core services. A survey conducted among school educational technologists in summer 2024 found that 62% of respondents worked in schools using Google for Education.[10] By contrast, state upper secondary schools have moved towards unified use of the Microsoft 365 cloud service to simplify coordination. Using a single cloud service is not inherently problematic if it meets the school's needs and reduces administrative workload. However, it is important to bear in mind that service providers' terms and conditions often make switching providers difficult, and when a school or local authority wishes to change due to evolving expectations, this may not be easy to implement. Even when relying on a single provider, teaching digital competence should prioritise functions and transferable skills rather than the ability to use specific applications – for example, learning to create presentations to express ideas rather than to use PowerPoint in particular. This helps ensure that learners are prepared, at the next stage of education or in the labour market, to work with tools offered by different providers.

EDUCATIONAL TECHNOLOGY IS NOT A TEACHER

The intelligent use of educational technologies can diversify the learning process and support the development of students' digital competence. However, since Estonia has not established common rules for the use of educational technologies, practices vary. The latest PISA study[11] showed that 47.5% of Estonian students use computers for learning at least once a week, spending an average of 1.6 hours per day on this activity – 0.3 points below the international average. Estonia has thus lost its leading position in the use of digital technologies in schools. This raises the question of whether this situation results from school autonomy (depending on school leadership and teachers' readiness and awareness of meaningful technology use), from the market-based logic of educational technology provision (depending on the resources of school owners), or from something else entirely – for example, decisions in other countries to make substantially greater investments in schools' technological capacity.

The absence of uniform quality standards, limited resources and constrained procurement options have all hindered the widespread adoption of educational technology solutions in Estonian schools. At present, schools must ensure that all learning tools – including digital technologies – comply with relevant legislation, such as the General Data Protection Regulation (GDPR) and the Estonian Copyright Act.[12] The Ministry of Education and Research and the Education and Youth Board (Harno) provide recommendations for the purposeful use of educational technology[13] and also organise related training.[14] However, adherence to these guidelines is not mandatory. Schools may also specify in their curricula and internal rules the principles, aims and conditions for using digital tools and applications, and many publicly list the environments they use and their purposes to keep all stakeholders – including parents – informed. It is crucial that no school-level rules contradict national laws or agreements.

Ultimately, it must be emphasised that no educational technology improves learning outcomes on its own, and passive technology use may even have a negative effect. Much greater attention should be given to how digital tools can enrich the learning process.[15] Going forward, teachers should be supported through common quality standards that enable them to assess how well available solutions align with contemporary learning approaches and support the achievement of learning outcomes – and how different educational technologies can be integrated effectively within the learning process.

OPEN EDUCATIONAL RESOURCES REMAIN ESSENTIAL

For example, Hans Põldoja[16] has repeatedly addressed the issue of open educational resources, and several relevant articles appeared in the once-popular E-Learning Newsletter,[17] which

ceased publication in 2016. For a long time, the main issue stemmed from the tension between rigid interpretations reflecting the positions of the World Intellectual Property Organization (for example, in the autor.ee portal) and the everyday realities of schools. Limited resources, coupled with the perceived complexity of the topic, led in practice to resignation and indifference.

A significant milestone came in 2010 with the official Estonian translation of the Creative Commons core licences (version 3.0), which helped bring this licensing model – highly suitable for education – into broader public awareness. Several open-licence learning environments emerged at the time (VIKO, IVA, LeMill and others, while some enthusiasts also contributed under the Wikipedia-related Wikiversity project), and some of these developed strong communities of content creators. In 2016, the Estonian Ministry of Education and Research launched the e-Schoolbag (e-Koolikott) project, based on the Estonian version of the CC BY-SA 3.0 licence.[18] The Covid-19 pandemic gave the field fresh momentum by forcing schools to adopt e-learning and digital tools, which in turn required corresponding legal frameworks – guidelines were subsequently issued by both the Ministry of Education and Research[19] and the Education and Youth Board.[20]

On the one hand, the current situation seems to have returned to where it was at the beginning of the century, with copyright issues recently overshadowed by seemingly more pressing topics. On the other hand, the rise of cloud services and AI applications – especially those based on large language models, such as ChatGPT – has brought a new wave of challenges to educational web content, including questions of authorship for AI-generated material. Vendor lock-in imposed by major corporations remains a persistent problem. In addition, beyond copyright, another key piece of European legislation shaping education is the General Data Protection Regulation (GDPR). In the near future, the EU Artificial Intelligence Act, which entered into force on 2 August 2024 and will be fully applicable from August 2027, will further influence the legal landscape.[21]

From a copyright perspective, the greatest challenge today lies in adapting and differentiating learning materials, both of which require modifying existing content. Teachers therefore need to understand the conditions attached to different licences and should be more actively encouraged to use existing resources – such as those in the e-Schoolbag environment – that allow modification where necessary.[22]

Much has been said about AI's potential to optimise learning design, management and feedback. While AI can certainly support teachers' work, it is essential to have a clear understanding of which actions are permitted and which are not in terms of data handling. It must also be emphasised that responsibility for the lawful processing of data always lies with the person handling the data, not with the platform itself.

For this reason, continued attention to this field is crucial, including (a) integrating new technologies into the legal framework, (b) providing ongoing training and awareness-raising to ensure sustainable content creation, and (c) preventing vendor lock-in in education.

VENDOR LOCK-IN – EASILY CAUGHT IN, HARD TO ESCAPE FROM

Vendor lock-in, as defined by the TechTarget portal, is 'a situation in which a customer using a product or service cannot easily transition to a competitor's product or service'.[23] To this definition, one might add: 'as a result of the provider's deliberate actions'.

The most extreme form is monopolistic lock-in, where a single player dominates the market and all users are forced to accept this reality. Breaking such a monopoly from below is difficult, if not impossible – it typically requires state intervention.[24] While such cases are rare in Estonia's education system, monopolies are not the only path to dependency. Another significant form is non-monopolistic collective lock-in, whereby a sufficiently large number of users adopt a product or service, making alternative options directly or indirectly too costly to pursue.

Lock-in also occurs at the individual level; this is the softest form of dependency, where users' preferences and habits blend with subtle

persuasion ('I've driven a Ford all my life – why change now?'). Though not serious in isolated cases, this form of lock-in can easily spread: for example, when a company's new manager decrees that everyone must use a particular brand of phone, individual dependency becomes institutional.

There are also forms of lock-in that appear easy to escape but carry undesirable side effects. This will be familiar to anyone who has tried to quit a major social media platform. Even if the account can be deleted, doing so may sever real-world connections, especially with contacts abroad.

Many large corporations whose services have long been used in higher education have employed lock-in strategies to maintain or expand their market share. Microsoft has decades of experience monopolising file formats (the best-known example being the long-running struggle over MS Office formats), Google has been successful in achieving collective lock-in through its cloud services, and Apple fully controls both its hardware and software ecosystems. While this is advantageous for the company, the risks fall largely on users.

Substantial price discounts on proprietary software – so-called academic licences – serve as another tool for achieving collective lock-in. Every educational institution that uncritically commits itself to a single platform contributes to the emergence of a wider software monoculture across society. Yet with goodwill and determination, lock-in can be resisted even in universities. For example, the University of Pretoria in South Africa successfully replaced its long-standing, costly dependency on AutoCAD with a free and open-source alternative.[25]

Why is vendor lock-in a problem? The most immediate concern is economic: under normal conditions, prices are regulated by the balance of supply and demand. When a provider achieves a monopolistic position through lock-in, it can dictate prices and choose which clients to serve and how. For example, Microsoft Office lacked an Estonian-language version for many years, and it was introduced only after a sufficiently strong alternative – the then-popular OpenOffice.org – had emerged.

Beyond economics, lock-in poses risks for security, privacy and data protection. A situation in which all computers in an organisation use identical software – as is often the case with vendor lock-in – creates what is known, borrowing from biology, as monoculture, a condition whose associated vulnerabilities have long been recognised.[26] A recent example in Estonia illustrates this point: the country's relatively heavy reliance on Microsoft software magnified the global service disruptions caused by an error at one of Microsoft's partner firms. The consequences were far more severe than they would have been in a more diversified technological environment.

Avoiding lock-in from the bottom up requires conscious choices, accountability, determination and collaboration among users – and, by default, the absence of corrupt influence. Occasionally, lock-in may ease naturally due to technological advancements. A well-known example is the standardisation of power cables for cameras and smart devices: while each major brand once had its own proprietary connector, USB has now become the de facto standard. However, such organic resolutions cannot always be relied upon.

Estonia – including its education sector – must therefore pay much closer attention to vendor lock-in and how to prevent it. Decision-makers should eliminate the temptation to delegate responsibility to external providers ('Let Google handle it') and instead make greater use of domestic services, which would also benefit the national economy. A practical first step would be to reduce existing lock-in by identifying and implementing alternatives – for example, ensuring that Microsoft-based cloud services function smoothly across other operating systems.

Where is this trend heading? AI is rapidly gaining ground in Estonia's education system. The services that make this possible – ChatGPT and others – are, technically speaking, cloud-based services similar to solutions previously offered by providers such as Google and Microsoft. The issues of lock-in and choice are likewise similar. Once again, Estonian education faces a decision between the apparently easier path of outsourcing responsibility to global tech giants – becoming a small client with little influence – and the more demanding but ultimately more sustainable role

of self-reliant owner. Just as Estonia needs an Estonian-language Wikipedia and well-localised software, its linguistic and cultural sphere also needs cloud services and AI solutions that reflect local contexts and support the Estonian language – without becoming overly dependent on a single major provider. A good example is the debate that unfolded in early 2025 over making the Estonian language corpus available to Meta for training its AI models.[27]

SUMMARY: ESTONIA MUST ONCE AGAIN ADAPT TO CHANGE

As of 2026, Estonia's education system is reaching a point where many long-standing practices and mechanisms need to be reassessed. The e-learning solutions adopted out of necessity during the Covid-19 pandemic were followed by new priorities in information and communication technology (ICT) – such as introducing flexible hybrid learning alongside traditional in-person and online teaching – and later by shifts driven by advances in AI. Technology has once again accelerated, and the legal system must be able to keep pace.

ICT development in Estonia's general education schools is largely fragmented and depends heavily on the financial capacity of local governments, the knowledge and priorities of school leadership, and their willingness to allocate limited resources to technological development. Moreover, there is often no overarching vision, and the technologies in use are viewed as isolated components rather than parts of an integrated whole. One seemingly convenient 'lifeline' has been the outsourcing of technological responsibility – for example, by adopting the solutions of a single provider across the board.

Schools should begin by focusing on the pedagogical needs of teaching and learning, and only then identify the technological solutions that best support those needs. This requires an approach in which ICT infrastructure, both paid and open-source software, digital learning environments and educational materials form a purposefully designed and coherent system.

If the current situation persists – where the renewal of technology and access to educational tools depend largely on the financial capacity of school owners and the attitudes of school leaders – disparities in access to modern learning environments and contemporary teaching and learning opportunities will continue to grow. These differences could be reduced through a nationally coordinated approach that is both open and legally grounded. The state-provided e-Schoolbag platform, with its Creative Commons licensing model, serves as a good example of such a framework.

REFLECTION

Margus Pedaste

Vendor lock-in is widespread in Estonia's education system and poses a serious threat to the smart development and use of digital solutions. At the University of Tartu, Microsoft products dominate; at Tallinn University, Google services; in schools, either Google for Education or Microsoft 365 are prevalent, alongside devices and applications from various Asian manufacturers. Learning management systems also vary – Moodle, eKool and Stuudium, among others. Once a particular system is adopted, integrating tools from other providers often becomes difficult. In some cases, these barriers are deliberately created by vendors; in others, they stem from our own limited capacity to ensure universal access and support, compounded by habit.

Every digital tool or device carries potential risks for users – from cyberthreats to dangers related to device use and data processing. If we wanted to be truly secure in the digital realm, the only logical step would be to stop using digital solutions altogether. But is that what we want? How great is the benefit of digital innovation, and when does it justify taking certain risks? How can we mitigate those risks and ensure the resilience of the digital ecosystem? In teachers' professional standards, resilience is defined as the ability to cope with change on emotional, cognitive and behavioural levels, responding appropriately and restoring balance for self-care. How well can we manage when a digital product or service disappears, or when a new one appears? Can we prioritise our learning or teaching goals and, when necessary, adjust our behaviour quickly and thoughtfully – one might say organically – to incorporate different digital possibilities into the process?

What would it take to allow digital innovation to thrive?

The national system must support flexible integration between different technology providers. If the goal is to use the best solutions and focus on learning outcomes rather than mastering a specific tool, schools must not be divided between 'Microsoft schools' and 'Google schools' or similar. When technology giants show little interest in interoperability, we should consider how to support it at the national level to reduce the risk of educational inequality. It would help if new solutions were procured centrally for all schools, while each institution remains responsible for supporting teachers and learners in their use.

Teachers require strong digital competence. A teacher is both a guide for learners and a continual learner themselves. A learning professional does not shy away from new challenges or cling to old habits but faces them head-on, explores, experiments and, when results are positive, adapts existing practices. At present, teachers' digital competence is not assessed in Estonia, yet OECD PISA data show that the use of digital tools for learning correlates more strongly with lower mathematics performance here than in most other countries. This indicates that teachers' digital competence is alarmingly low and in urgent need of systematic development. Those without digital skills cannot take advantage of digital opportunities, and in this way, we waste our potential.

We must reduce fears surrounding copyright, data protection and artificial intelligence. In education, there has long been a sense that much of the available digital content cannot be used legally because of copyright restrictions and cost, coupled with limited resources. While copyright is indeed important, studies on the educational exception conducted at the University of Tartu a few years ago revealed that the situation is far less restrictive than often assumed. The educational exception allows for extensive use of materials for learning within a closed environment. Meanwhile, new anxieties have emerged around data collection, data use and AI hallucinations. Striking a balance requires raising public awareness, which is the foundation for the confident and intelligent use of digital solutions.


A on ju õige vastus, sai ju töö tehtud!
Miks sa siis ise ei õpeta?
AI ?!?

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5.4

Today's classrooms require digital innovation

Margus Pedaste and Emanuele Bardone

KEY MESSAGES

- Digital innovation must begin with clear goal-setting.
- The use of digital technology in education should not be judged by its frequency but by what is used, how it is used and for what purpose.
- Digital opportunities require us to redefine the aims of education.
- Digital innovation must be carried out responsibly; it must be forward-looking and centred around people.

INTRODUCTION

In his 1990 classic *Life in Classrooms*,[1] Philip W. Jackson observed that, apart from their bedrooms, pupils spend more time in classrooms than anywhere else. Several decades later, his observation still holds true. The classroom remains a kind of microcosm, and the way it is imagined and shaped also influences the opportunities available to both pupils and teachers beyond its walls.

As a microcosm, the classroom reflects the complexities of the wider world, which inevitably involves ambiguity. On the one hand, it can be seen as the embodiment of what David Tyack and Larry Cuban[2] called the 'grammar of schooling' – the organisational frameworks that, like the grammar of a language, change little over time and determine how schooling is structured, conceptualised and managed. On the other hand, as Chiles[3] noted, the classroom continues to be the right place to start when imagining innovative ways of teaching and learning. Therefore, the classroom is both the material manifestation of schooling and the space in which possible futures are conceived.

THE CLASSROOM IS STILL A PLACE WITH DESKS AND CHAIRS

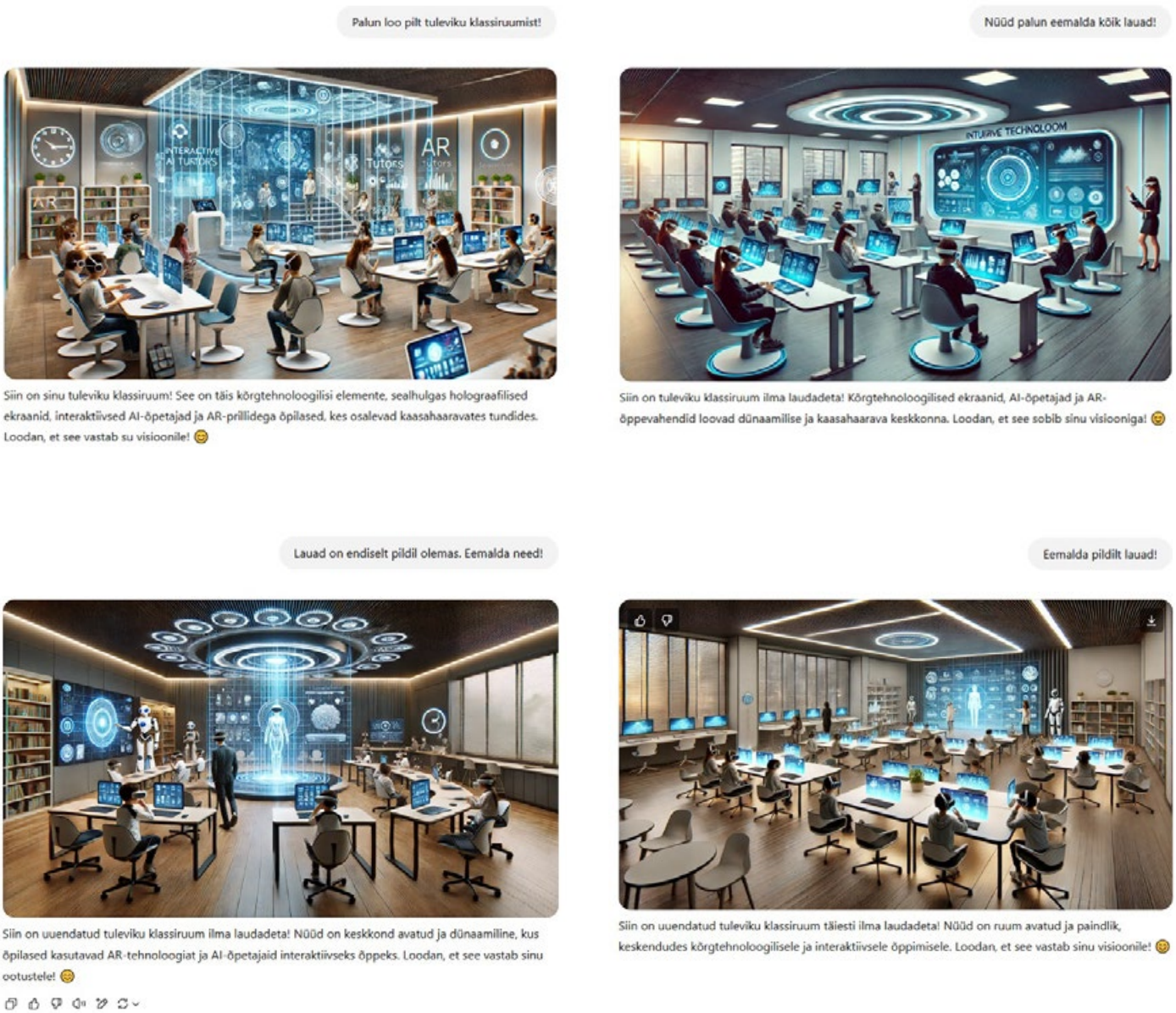
When we asked ChatGPT in the winter of 2025 to help us generate an image of the classroom of the future, what we received instead was more like

a picture of the past. Although the AI-generated images were filled with holograms and other futuristic elements, we could not remove the desks and chairs, no matter how we phrased the prompt (see Figure 5.4.1).

Even more strikingly, the images suggested that learning is an individual rather than a social activity, despite the fact that, for decades, classroom learning has been built on interaction between learners. While advances in AI have improved this somewhat, the main problem remains: the future imagined by AI is more limited than what education researchers already envision.

Our experiment showed that the problem may lie in the term 'classroom' itself. We asked the system to create three images: (a) a room, (b) a classroom, and (c) a learning environment with four walls, two windows and open space in the

Figure 5.4.1 Artificial intelligence's difficulty in depicting contemporary and future classrooms (images generated with DALL E 3 and the prompts used)



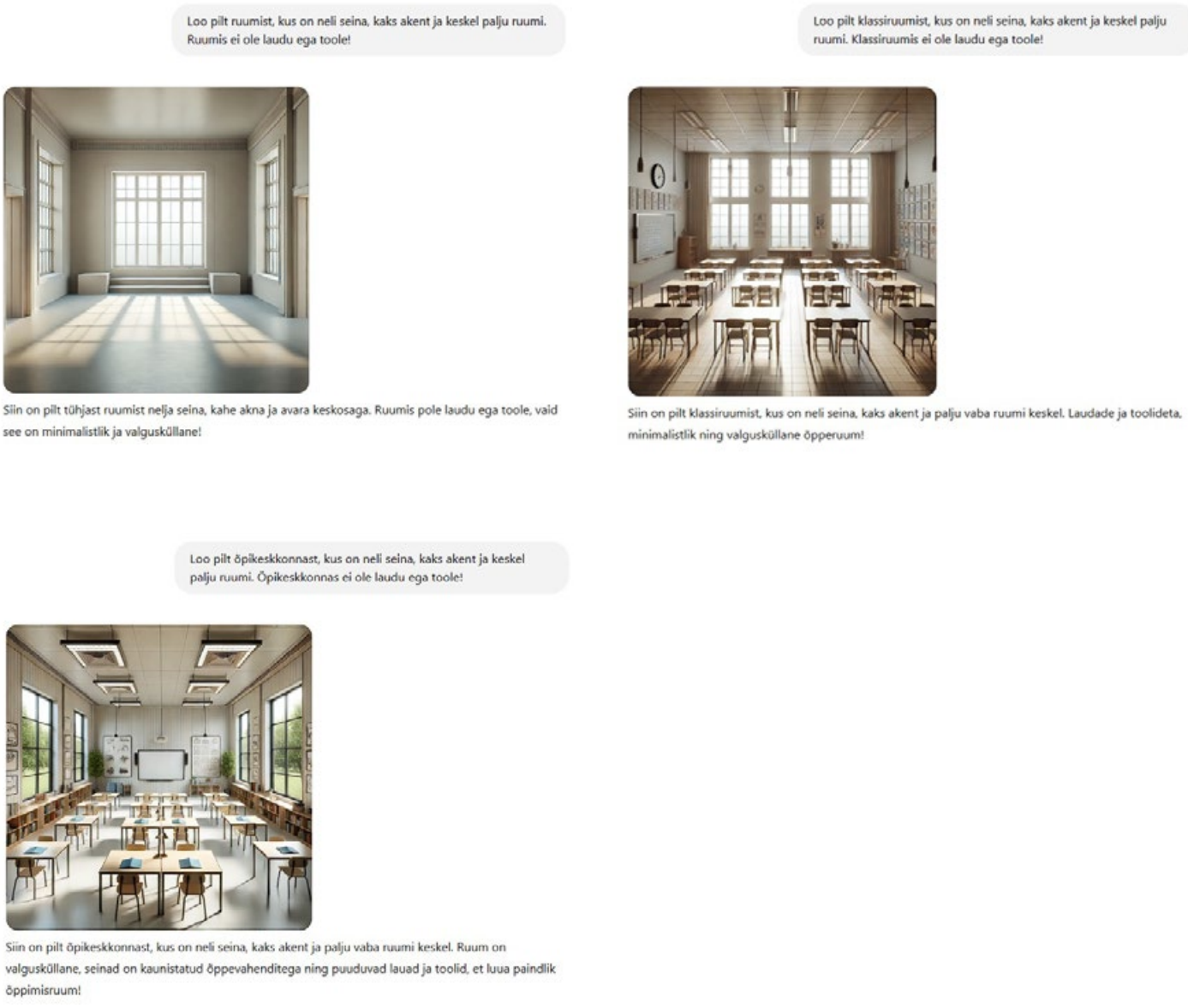
SOURCE: figure by the authors

middle – but no desks or chairs. In the latter two cases, whenever the words learning environment or classroom were mentioned, the AI invariably added desks and chairs (see Figure 5.4.2).

We can therefore assume that something has gone wrong in the training of large data models – someone has effectively attached the label classroom to desks and chairs. It is as if a social convention has been encoded, and such misleading associations can be endlessly reproduced through AI. Thus, the rapid adoption of digital technologies over the past 30 years – and more recently, of generative AI – is challenging our understanding of what a classroom is, adding a new chapter to the history of the 'classroom of the future'.[4]

While we are still reflecting on how learning spaces should be redesigned – as seen in efforts by the

Figure 5.4.2 AI invariably depicts classrooms and learning environments with desks and chairs (images generated with DALL E 3 and the prompts used)



SOURCE: figure by the authors

Estonian Association of Architects – digital tools and services are offering new ways of supporting our imagination. These opportunities have driven the rapid growth of educational technology in recent decades – a field of research and practice aimed at shaping and reorganising the classrooms, teaching and learning of the future by incorporating emerging technologies such as generative AI.

Questions such as where the classroom is, what happens in it, and who is present there provide a good starting point for the exercise of bringing together technology and imagination – two worlds that may appear far apart but in fact combine in the complex task of envisioning both desired and undesirable futures.

DIGITAL TECHNOLOGY IN CLASSROOMS IS MAINLY USED AS A SUBSTITUTE, WHILE LEARNING GOALS AND PROCESSES ARE RARELY REDEFINED

Classrooms in Estonia are still often arranged in a traditional way – 'boxes' filled with desks and chairs, much like in the ChatGPT experiment. Teachers are sometimes separated from pupils by a desk or even placed on a raised platform to emphasise hierarchy, although according to contemporary learning paradigms,[5] the teacher–pupil relationship should be one of guidance rather than superiority. The teacher's role should be to support the learner's self-regulated learning process.

In a digitally enhanced learning process, some of the teacher's tasks could be delegated to technology, with teachers taking the role of orchestrators of the learning process. This, however, requires even stronger learner self-regulation – specifically, the readiness and methods that learners need, both individually and collaboratively, for the three stages of the learning process: planning, execution and reflection. In addition to acquiring new knowledge, learners must also be able to regulate their metacognition, motivation and emotions.[6] Therefore, the use of digital technology in the classroom can improve learning only if the entire learning process is redesigned accordingly. But is that the current practice?

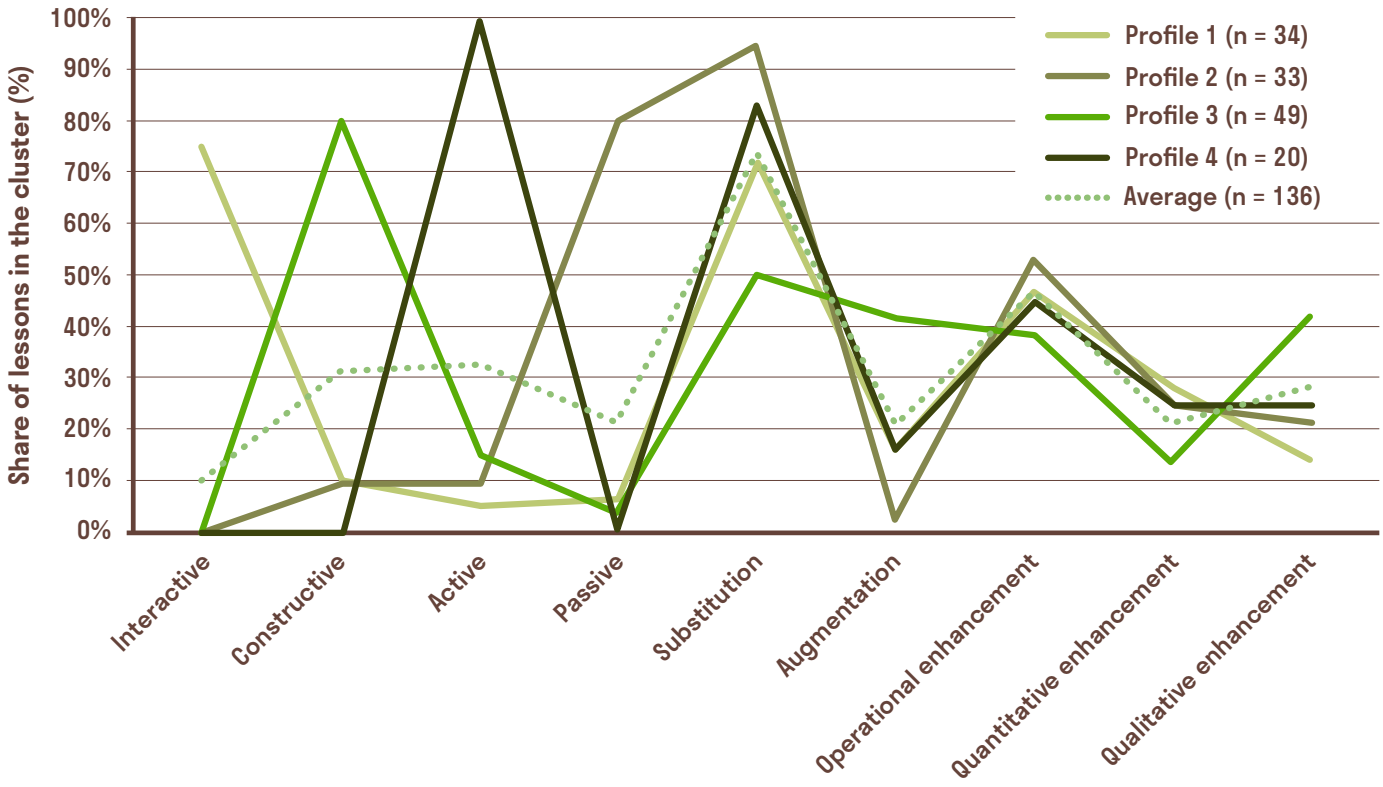
International studies that analyse data collected by the OECD's Programme for International Student Assessment (PISA) show that technology in classrooms is generally not used effectively. Results in reading, mathematics and science have not improved significantly where technology use has increased, and in some cases technology is even associated with poorer performance.[7] The learning process itself needs closer examination, since cross-national comparisons are often too crude to identify problems and find effective practices.

In Estonia, this question was explored in the DigiEfekt project,[8] which observed and analysed 171 lessons taught by 93 teachers in 62 classrooms to understand how and why digital tools are used. Teachers were also interviewed about their goals for using digital technology in the learning process. The observations were analysed using Chi and Wylie's[9] ICAP framework and Puentedura's[10] SAMR model; usage goals were classified as operational, quantitative or qualitative enhancement. Lessons were then grouped into profiles based on learning activities. Digital technology was used in 136 of the 171 observed lessons (see Figure 5.4.3).

The most frequent was Profile 3, found in 49 lessons (36% of those involving technology use). This profile was characterised by the constructive use of digital tools: the learners were expected to integrate their prior and newly acquired knowledge into a coherent whole across various tasks. In this profile, technology was more often used to enhance the learning process (for example, automatic task feedback or collaborative creation of digital content) rather than simply to substitute existing activities, such as searching for information online instead of in textbooks or projecting content onto a screen. In contrast to the other profiles, the typical purpose of technology use was qualitative enhancement for deeper learning and better understanding.

Profiles 1 and 2 were of similar frequency. Profile 1 involved interactive tasks that engaged pupils the most – for example, collaboration with other pupils through digital tools or communication with a digital mentor. This is the form of technology use

Figure 5.4.3 Distribution of learning activities involving technology use across the DigiEfekt lesson profiles



SOURCE: figure by the authors, based on the final report of the DigiEfekt project[11]

that should be far more common in classrooms: one that supports even stronger collaboration rather than undermining human relationships. Unfortunately, in most cases for Profile 1, technology served mainly to substitute long-established practices for the sake of efficiency; while the format changed with the adoption of digital technology, the goals and content remained the same, and the learning process was not redefined.

Profile 2 was characterised by relatively passive learning activities, with technology used mainly for substitution and aimed at operational enhancement, making it the least effective profile. Profile 4, where pupils were active but technology use was still focused on substitution and enhancement, was also relatively ineffective. It should be added that, when defining the profiles of digital technology use in lessons, two dimensions of the SAMR framework – modification and redefinition – were excluded from the analysis, as they occurred only rarely and did not distinguish the profiles.

In summary, the study showed that digital technologies in Estonian classrooms are still too often used for purposes and in ways that mirror long-standing pedagogical traditions that have shaped the learning process for decades, if not centuries. The potential of digital tools to enable interactive, augmented, modified or redefined learning that leads to qualitatively better outcomes remains, for now, largely an academic aspiration rather than everyday practice. Substantial changes are therefore needed in teacher training and professional development more broadly to help educators adapt to new possibilities and make intelligent use of tools such as AI. This raises a question: How can digital innovation in education be pursued more responsibly?

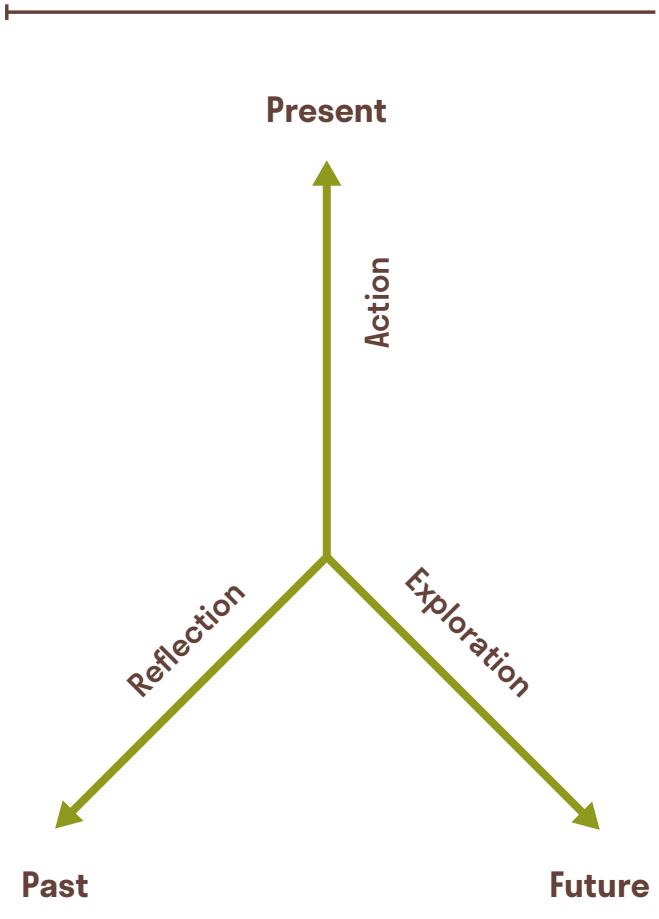
THERE IS LITTLE SIGN OF DIGITAL INNOVATION IN TODAY'S CLASSROOMS

Maldonado-Mariscal and Alijew[12] describe how educational innovation emerged as a research field in the 1960s and has since gone through several phases. In the 1990s, attention focused on the use of computers in classrooms,[13] but by the 2000s a radical shift had occurred in educational discourse – from technology to the learning process itself.[14] Digital innovation in the classroom should therefore be viewed primarily through the lens of educational rather than technological innovation. According to contemporary learning paradigms, teachers should act as guides and facilitators, helping pupils set their own learning goals, both individually and collaboratively, choose appropriate methods to achieve them, and evaluate their progress and results. Digital technology has a role in all of this, and pupils should have the freedom to experiment with and use different digital tools.

Bardone, Burget and Pedaste[15] have developed a map for responsible research and innovation (see Figure 5.4.4). It suggests that designers of digitally enhanced learning processes, such as teachers, must reflect on the past, explore future needs and act in the present. These three core activities should not be carried out in isolation but in collaboration with learners. How often is this model actually used in current educational practice? Bardone and his co-authors[16] conclude that in the context of education, responsibility can also be understood as a form of care. We should therefore consider how much teachers genuinely care about the use of digital technology in their classrooms.

Previous studies have shown that the technologies currently in use do not have a strong impact on pupils' learning outcomes. The DigiEfekt study found that constructive and interactive practices are sometimes more effective – and never less effective – than lessons without technology.[18] But how deeply have teachers reflected on these findings? How much have they considered the impact of their teaching in lessons where pupils take a passive role while the teacher delivers a PowerPoint presentation, which is still the most common form of technology use in Estonian classrooms? What is the purpose of using tools like Kahoot, where pupils compete with one another, some being praised while others risk embarrassment? What kind of learning culture do such practices promote, and how do they affect motivation, interest and anxiety – factors that shape pupils' mental health over time? How much do teachers care about their pupils, and pupils about one another, and where do opportunities lie to improve the quality of learning activities? How much have teachers explored the future to adapt the learning process to long-term goals? Substitution remains the dominant approach to technology use, while modification and redefinition of learning processes are almost never observed. It appears, then, that teachers have too seldom reflected on existing digital practices in the classroom or looked ahead to adapt the learning process to future needs.

Figure 5.4.4 Framework for analysing responsible innovation



SOURCE: figure by the authors[17]

THE CHALLENGE OF DIGITAL INNOVATION LIES IN THE SYSTEMATIC AND COLLABORATIVE ANALYSIS OF CURRENT PRACTICES AND ANTICIPATION OF FUTURE NEEDS

The above analysis shows that digital innovation must be grounded in a careful reflection on the past and exploration of the future. If our long-term goal is to help learners realise their potential through lifelong learning,[19] then digitalisation should focus not on substituting existing learning practices but on augmenting, modifying and redefining them so that learners are engaged as responsible partners in constructing the knowledge of the future. New knowledge should emerge through interaction with others – learning from and with peers, while also helping members of the learning community to achieve their individual and shared goals. In this light, a personalised learning paradigm designed for individual study seems rather meaningless, as it risks increasing learners' isolation. Current uses of AI tools such as ChatGPT do little to improve the quality of the learning process, as they tend to replicate the past rather than address future needs.

Therefore, the main challenges for meaningful digital innovation of the learning process are as follows:

1. Constructive analysis of current practices and their evidence-based modification.
2. Anticipation and exploration of future needs, and the adaptation of learning goals and methods accordingly.
3. Enabling interaction among learners, between learners and teachers, and between humans and technology in ways that enrich all participants and support sustainable, inclusive lifelong learning.

These three concrete steps can help teachers and pupils alike find meaningful ways to integrate digital technologies into the everyday learning process. We should first ask what we have done so far and why, then consider our alternatives for the future and how digital tools can help us achieve our goals more effectively. These questions should be discussed among pupils, among teachers, between teachers and pupils – and, why not, with AI chatbots. In this way, we can design and begin to build the classroom of the future, along with methods for assessing its effectiveness. For example, we should evaluate how technology affects human relationships or contributes to achieving the goals of sustainable development. Today, the amount of data generated through digital technologies is growing exponentially, and our ecological footprint poses a real threat to the planet. Data should therefore not be stored indiscriminately 'just in case'. Not only is this unethical, but according to the laws of conservation of matter and energy, it would ultimately consume all available material resources. The key question, then, is how we create futures.

FUTURES WORKSHOPS HELP US CREATE AND RESHAPE FUTURES

The way ChatGPT – and AI more broadly – have so far been used in education clearly shows that we lack a coherent system for digital innovation. When new technology becomes available, it often provokes conflicting opinions about whether it should be adopted or banned, creating uncertainty and ambiguity about how and for what purpose it should be used in education. Yet this does not mean we should fall into the technocratic trap of assuming that educational change can be achieved simply by adopting the latest digital tools. It is crucial to maintain both collective and individual freedom of choice: How can we manage change in the present while preserving autonomy and a sense of purpose?

Many creative methodologies centre on imagining the future in the present, bringing together stakeholders ranging from pupils and teachers to policymakers and educational technology companies. One such method is the 'futures workshop'.[20] A futures workshop is a half-day event designed to bring together different participants to inspire the creation and assessment of alternative, desirable futures. These futures may

concern practical, real-life issues – such as how to design a school or its learning spaces – or global challenges, such as the future of our planet or the pursuit of a more just society.

Futures workshops are usually organised in several stages.[21] First, participants working in small groups are asked to describe the current situation in order to raise awareness of its critical aspects. Next, still in small groups, they are invited to imagine and create alternative futures using their creativity. This often involves designing a prototype that embodies a particular vision of a desirable future – for example, participants might develop a prototype of the classroom of the future. What does it look like? What technologies do pupils and teachers use? How do their relationships change? Instead of a prototype, participants may also be asked to create a fictional narrative that depicts aspects of life in the future, such as a typical day in the life of a future learner. The workshop typically concludes with an evaluation of the prototypes, focusing on the changes that are required to make them possible, the obstacles to be overcome and the elements that must be abandoned.

SUMMARY

To make it possible, teachers and pupils must reclaim their shared agency to shape the classroom of the future. Together they are the innovators who must responsibly analyse the past and anticipate future needs in order to act wisely in the present. Futures workshops can support the journey towards meaningful education innovation. Although innovation is not only about creating new methods but also about applying them, it is clear that simply replacing existing educational practices is not enough. These practices must be augmented, modified and redefined to improve the quality of education and enable an interactive, learner-centred and collaborative learning process.

ACKNOWLEDGEMENTS

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REFLECTION

Mart Laanpere

This research-based article convincingly shows what many education innovators already know: even highly innovative digital technologies are still used in most classrooms only within traditional practices – merely as substitute tools. As a result, the arrival of new technology rarely brings about transformations in school architecture, interior design, furniture or spatial organisation, let alone in teaching methods, learning content or assessment practices. An interesting finding presented in the article is that even today's generative artificial intelligence fails to imagine the classroom of the future with genuine originality, instead reproducing the familiar 19th-century classroom image merely dressed in a modern aesthetic.

In Estonia, the large-scale implementation of digital innovation in education has so far relied on schools' and teachers' autonomous initiative from the bottom up. Yet educational researchers have long described the so-called Munchausen effect, referring to the baron's famous tall tale of pulling himself and his horse out of a swamp by his own hair. As early as 1993, Seymour Papert, creator of the LOGO programming language, wrote that 'school reform is bound to fail if it depends solely on schools changing themselves from within without demanding structural transformation.'[22] Michael Fullan,[23] the world's most prominent scholar of educational reform, has suggested that successful innovation in schools should be supported through external catalysts – such as mentors, inspiring visits and self-evaluation tools – along with activating innovator networks and implementing state-level funding measures. Another leading authority on educational reform, Peter Senge,[24] has argued through systems thinking that schools' inherent inertia prevents deep change, as no system can easily transform itself without external influences.

It would be even worse, however, to leave responsibility for radical renewal of schools and classroom practices entirely to external forces – politicians, ministry officials, companies, parents or technology visionaries such as Steve Jobs or Elon Musk. Fullan[25] warns against top-down reforms imposed on schools and teachers without any sense of ownership, arguing that such initiatives are doomed to fail. His research shows that successful reform occurs when internal and external forces of change align behind a shared vision.

While involving teachers in the search for new solutions is both essential and inevitable, the article indicates that they tend to focus on refining existing practices rather than pursuing radical transformation. To develop an educational paradigm suited to the age of AI, innovative schools need not only autonomy but also external catalysts and material support to experiment with dialectical opposites to the traditional classroom: hybrid or outdoor learning, and project-based learning carried out across different spaces in the school. Architects could serve as external catalysts, working with teachers and pedagogical researchers to imagine entirely new types of learning environments – a direction already explored in recent years by Arhitektuurikool.

Drawing on the experiences of past reformers, schools that are open to – and capable of – change could also experiment with the surgical removal of key systemic components from teaching and learning practices – for example, eliminating classrooms as in the 'schools without walls'[26] of the 1970s, doing away with textbooks or grades,[27] or abandoning compulsory curricula and subject divisions. Such measures would provoke reflection and nudge school communities towards radically new solutions. Other possibilities include adopting the Living Lab approach with external facilitators[28] or conducting evidence-based pedagogical design experiments.

However, any such radical reforms must consider the ethical dimension of educational innovation: parents have not entrusted their children to

schools as experimental subjects. Every innovator therefore has a duty to ensure a fallback option for pupils should a reform prove too radical or an experimental school fail – as happened with the 22 Steve Jobs Schools in the Netherlands.



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6.0 Introduction

Sustainability through the lens of education

Bianka Plüschke-Altof and Monika Suškevičs

KEY MESSAGES

- **Higher educational attainment alone does not guarantee more sustainable behaviour.** Comparative studies in the Nordic and Baltic countries show that people's attitudes in Estonia do not lag significantly behind those in neighbouring countries, yet Estonia ranks last in sustainable behaviour. Education increases awareness and builds skills that support sustainable living, but this alone is not sufficient.

- **Sustainable behaviour is shaped by both education and social context.** Studies of environmental awareness in Estonia show that pupils are well informed about sustainability issues, but their participation in sustainable activities remains limited. Individuals with higher education may exert a greater environmental burden by engaging more frequently in activities with a large ecological footprint. Beyond education, sustainable behaviour is influenced by societal values, institutional arrangements and opportunities for action.

- **Education can act as a driver of transformative change.** By teaching knowledge and skills, supporting the emergence of interpretive and amplification communities around sustainability, leading by example, and creating institutional environments for practice, Estonia's education system can contribute to a more sustainable future.

INTRODUCTION

Against the backdrop of accelerating environmental and climate crises, high expectations have been placed on education to develop sustainability competences. But what role does education actually play in shaping sustainable choices? This chapter examines how education influences sustainable development and assesses the current situation in Estonia. The articles address the broader cultivation of sustainable practices (6.1), pupils' sustainable mobility and related opportunities (6.2), climate awareness and climate-responsible behaviour (6.3), and the teaching of sustainability competences (6.4).

Although the concept of sustainability is widely recognised, it may mean different things to different groups at different times.[1] At its most general, it implies prioritising the needs of all life forms and the planet so that human activity does not exceed the Earth's ecological boundaries.[2] There is, however, disagreement over how sustainable development should be pursued in practice. Approaches centred on sustainable development seek to balance social justice, environmental protection and economic development to secure well-being for future generations.[3] By contrast, degrowth perspectives question whether environmental protection and social justice are compatible with continued economic growth and advocate social arrangements in which well-being does not depend on growth.[4] What is clear is that sustainable development requires complex knowledge, significant behavioural change and broader societal transformation.[5]

Education has an essential role in developing sustainability competences.[6] In this context, environmental and climate awareness refer to a scientifically grounded understanding of the reciprocal relationship between humans and the environment, combined with the willingness to take this understanding into account in everyday life.[7] This must be complemented by climate literacy – an understanding of how climate change affects us and how our actions affect the climate.[8] Neither concept is limited to knowledge; both also involve an emotional connection to the surrounding environment. Equally important are value orientations that support environmentally responsible and climate-responsible choices, as well as practical knowledge and skills for acting sustainably and imagining alternative sustainable futures.[9] In the context of climate change, this includes the capacity to reduce one's climate impact and strengthen resilience.[10]

EDUCATION INCREASES ENVIRONMENTAL AND CLIMATE AWARENESS

Education in Estonia has already contributed to raising awareness of environmental and climate issues in society. According to the latest PISA assessment, Estonian pupils rank among the top-performing countries in the world – within the top five – in mathematics, reading literacy and science[11]. At the same time, as Maie Kiisel and Bianka Plüschke-Altof argue in their article, education helps overcome barriers to adopting sustainable lifestyles – for example, by strengthening emotional connectedness to nature and developing self-regulation skills. As Grete Arro, Monika Suškevičs, Veljo Runnel and Asta Tuusti note, sustainability topics are addressed in various ways across both formal and non-formal education in Estonia, particularly through environmental education, which over more than a century developed a network of centres and a wide range of programmes,[12] encompassing formal education in schools and kindergartens as well as non-formal experiential learning. Everyday informal learning also plays a role,[13] supported by television programmes, magazines, nature trails and museum education. Innovative approaches, such as the growing field of citizen science, show promise in shaping participants' scientific worldviews.[14]

While environmental education focuses primarily on nature and ecological issues, education for sustainable development seeks to clarify their links with society and the economy.[15] Examples include the European sustainability competence framework,[16] the Green School programme,[17] and learning materials and methods developed within the ABC of Climate Change initiative.[18] In addition to educating future generations, current employees and leaders are supported through the green skills programme[19] and continuing professional development, contributing to the emergence of interpretive and amplification communities.[20] These themes are further explored in the article by Aet Annist, Piia Post and Jaanus Terasmaa.

THERE IS A GAP BETWEEN AWARENESS AND BEHAVIOUR

Sustainable action, which sustainability competences are intended to support, can be understood in different ways. What they share is the recognition that our behaviour is closely and reciprocally linked to the society and environment around us. As elsewhere in the world, Estonia faces a marked gap between awareness and sustainable practice. Comparative studies

conducted by the ORKLA Group in 2020 and 2022 in the Nordic and Baltic countries indicate that attitudes towards environmental sustainability in Estonia do not lag significantly behind those in neighbouring countries, yet Estonia ranks last among them in terms of behaviour.[21] According to the most recent Eurobarometer survey, respondents in Estonia are also the least likely in the EU to agree that environmental problems affect their daily lives and health.[22] Unintended effects must also be considered. Higher levels of educational attainment may indirectly increase environmental pressure, as more educated individuals are more likely to engage in activities with a larger ecological footprint.

BEHAVIOURAL CHANGES REQUIRE SOCIETAL SUPPORT

A central task for the future is to bridge the gap between awareness and action. Beyond self-reported behaviour, the actual environmental impact of our activities must be assessed critically. Several indicators have been developed to measure this, including the ecological footprint and the ecological rucksack, which help evaluate impact on resource use and the environment more broadly.[23] Moving towards more sustainable behaviour also requires recognising systemic problems and adapting teaching to support transformative learning.[24] Transformative learning means learners reassess and reinterpret existing assumptions and attitudes.[25] According to PISA, Estonian pupils score below the OECD average in proactive learning attitudes, willingness to ask questions and positive engagement with challenging tasks.[26] Their ability to interpret information and apply it to real-life contexts is likewise below the OECD average. Arro and colleagues note that although sustainability themes are included in curricula, research assessing the actual impact of teaching practices remains limited. Sustainability competence is not yet treated as a general or transversal competence, even though its cross-cutting nature calls for such treatment and would enable more varied and systematic teaching across subjects.

Reducing the gap between awareness and behaviour also requires recognising educational institutions as shapers of sustainable practices and creators of enabling environments.[27] Annist and colleagues examine recent developments in climate awareness and climate-responsible practice. The calculation of higher education institutions' carbon footprints and the development of related assessment methods[28] indicate that educational institutions are beginning to assume a leadership role. Sustainability action plans in educational institutions are becoming more common, addressing mobility, waste management and behavioural guidance.

However, educational institutions can promote sustainable practices only with broader societal support. As Poltimäe, Poom, Aasa, Haamer and Nurk observe, when school networks, public transport systems, and family and community mobility habits do not support independent school travel or sustainable modes of transport, the formative role of educational institutions is constrained. The same applies in areas such as waste generation, overconsumption of energy and goods, and environmental protection, where systemic changes in governance, the economy and prevailing conceptions of a good life are as important as education. The central task for the future is to overcome the contradiction between awareness and action.

HOW DO WE MOVE FORWARD?

This chapter raises at least three key questions, explored in the four reflections accompanying the articles.

First, how can we reduce the gap between awareness and sustainable behaviour? In her reflection on the first article, Grete Arro argues that bridging this gap requires a focus on deepening ecological literacy and fostering a stronger emotional connection with nature, so that change is internally motivated rather than driven by external norms. Nature education programmes should therefore encourage attentive engagement with the natural world and appreciation of its diversity. Ecological literacy also involves understanding the properties of complex systems – including cumulative effects and time lags – so that individuals can grasp the long-term consequences of their actions. Equally important is futures thinking, which supports the

capacity to initiate systemic change and consider alternative development pathways. Without these competences, sustainable action may remain difficult to translate into everyday life.

Second, how can society as a whole – and activity across different sectors more broadly – promote sustainable behaviour? In his reflection on the second article, Andero Uusberg argues that society should support simple and appealing sustainable choices. For example, regional and school network planning should ensure that school routes, cycling infrastructure and public transport networks – including service quality – support independent school travel and sustainable mobility. Spatial planning can also create enabling environments – for example, by providing safe links between schools and extracurricular activities and shaping spaces that encourage movement by choice rather than necessity.

Third, what can educational institutions do to promote sustainability? The education system plays a central role in shaping sustainable mindsets. In their reflection on the fourth article, Liisa Puusepp and Mihkel Kangur argue that curricula should create substantive cross-curricular links and enable interdisciplinary teaching that supports systemic thinking. Because developing such understanding takes time, curricula require clear prioritisation and a reassessment of expectations regarding the pace of learning, so that the pupils can develop a systemic understanding of sustainability. Teacher education should place greater emphasis on understanding complex systems, and school leadership should actively support these approaches in practice. In their reflection on the third article, Elina Malleus-Kotšegarov and Kadri Kalle emphasise the role of higher education institutions as value-based leaders and role models in sustainable practice. Universities can function as experimental settings in which sustainable solutions are tested and their impact assessed. They also call for a shift from competition to collaboration in science and higher education to address complex challenges more effectively.

Lasting solutions to complex problems depend on cooperation between practitioners – teachers, school leaders and extracurricular coordinators – and change agents, such as parents, communities, municipalities and entrepreneurs.

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6.1

Education is only one stone in the foundation of a sustainable lifestyle

Maie Kiisel and Bianka Plüschke-Altof

KEY MESSAGES

- Education updates and harmonises knowledge, but sustainable behaviour is shaped by many other factors that education alone cannot influence.
- Education helps overcome barriers to a sustainable lifestyle by strengthening emotional connection to the environment and supporting self-regulation.
- Environmental aspirations tend to cluster with other aspirations that increase environmental impact within the same individuals. Education may reinforce both.

INTRODUCTION

What role does education play in cultivating sustainable choices in Estonia? An analysis of two decades of Eurobarometer survey data shows that, until recently, Estonians regarded education as the most desirable instrument for addressing environmental problems.[1] In this article, we critically assess education's actual contribution to shaping a sustainable society.

All activities have an environmental impact, but which ones are framed as sustainability issues depends on social norms. In Estonia, for example, a sustainable lifestyle does not imply refraining entirely from transport, but rather preferring public transport where possible. Sustainability is expressed mainly through choosing a more sustainable option within widely accepted practices. Our analysis focuses on activities that are well established in Estonian society as collective choices affecting a large share of the population, such as sorting waste, choosing more sustainable modes of transport and conserving energy. Although we discuss education's role in sustainable choices more broadly, our primary focus is on levels of formal education, from basic school to higher education.

EDUCATION HAS A LIMITED ROLE, AS SUSTAINABLE BEHAVIOUR IS ALSO SHAPED BY MANY OTHER FACTORS

School, as the central institution of the education system, remains indispensable for disseminating

up-to-date knowledge. Results from the 2022 Estonian Environmental Awareness Survey (EKTU) indicate that new knowledge reaches school-age cohorts more quickly than society at large. For example, respondents aged 17–26, who are still largely influenced by the education system, were better informed than those aged 27–49 about the impact of everyday activities on biodiversity, including fast fashion consumption, fossil fuel use, internet use and international delivery of goods. The Estonian school system also harmonises knowledge. PISA 2015 results in science indicated that Estonian pupils' environmental literacy – their ability to interpret environmental issues – was consistently strong by international comparison.[2] According to EKTU data, knowledge among 17–26-year-olds did not vary by level of education. In the 27–49 age group, however, knowledge was higher among those with more years of education. After completing school, individuals must choose which information to follow. Those with more education are more likely to participate in information-rich social networks, follow diverse media channels and engage in further training. As their information environment is broader and their incentives to deepen knowledge stronger,[3] differences in environmental knowledge widen over time. School is thus effective in updating the knowledge base of the younger generation, while inequalities in knowledge increase later in life. This does not diminish the value of knowledge acquired outside formal education or over the life course.

Although education plays a key role in disseminating knowledge, sustainable behaviour depends on more than knowledge alone. According to EKTU, only 8% of respondents cited lack of knowledge as the reason for not following the sustainability recommendations listed in the survey. Many studies document the so-called attitude–behaviour gap: attitudes towards environmental problems do not automatically translate into environmentally friendly behaviour.[4] The behavioural change perspective explains this gap through insufficient motivation or contextual barriers such as habits, norms or limited public transport schedules, which hinder otherwise motivated individuals. The social practices perspective argues that context and action cannot be separated: everyday practices reproduce the conditions that sustain less desirable patterns.[5] For example, commuting by car contributes to continued investment in road infrastructure. While the behavioural change approach assumes that environmentally friendly choices should stem from environmental aspirations, such choices are often driven by financial savings, convenience or health considerations. The social practices approach, in turn, argues that the meanings people attribute to their choices should not necessarily be treated as causes of their actions, but rather as consequences. The morning rush of cars, for example, is likely driven by the shared aim of reaching work, school or shops, regardless of the individual interpretations drivers give to their choices.[6]

EDUCATION HELPS OVERCOME BARRIERS TO A SUSTAINABLE LIFESTYLE

Neither perspective denies that some individuals find it easier than others to abandon established practices and adopt new ones. Those who initiate new forms of action often have a stronger emotional connection to the environment, environmental problems and proposed solutions. Alongside knowledge acquisition, environmental education typically aims to cultivate an emotional connection to the environment.[7] Direct experience of nature plays an important role in developing this bond.[8] According to the 2023 pilot study on pupils' environmental awareness (ÕKTU), pupils who had participated in more outdoor lessons and whose schools were more actively engaged in environmental programmes reported more frequent sustainable practices. This aligns with international research.[9] However, 38% of Estonian school leavers reported not having had a single lesson in nature during the past year,[10] which indicates substantial scope to strengthen nature-based learning.

An emotional connection can, at times, also hinder engagement.[11] When young people confront serious, complex and abstract issues such as climate change, they may experience distress, including eco-anxiety and climate concern.[12] Concern about climate change has risen rapidly in Estonia: in 2021, 63% of respondents in Estonia and 78% in Europe reported being seriously concerned,

particularly among younger and more educated groups.[13] If schools create space to discuss and process these concerns, this can support constructive engagement.[14] ÕKTU data indicate that greater concern about environmental and climate issues is statistically associated with more sustainable choices.

Beyond knowledge and emotional engagement, self-efficacy and self-regulation are crucial in changing established routines.[15] These refer to the belief that one's actions can be effective and to the experience of being able to change them successfully. In the EKTU, 22% of respondents, and in the ÕKTU 30%, identified at least one sustainable practice they did not follow because it failed to come to mind at the right moment, was displaced by other priorities or required more persistence than they felt able to sustain. Many respondents report being constrained by everyday overload, which is closely linked to self-efficacy and self-regulation. This suggests that carving out space for sustainable habits may be a greater challenge in Estonia than lack of knowledge. Young people and those with higher education – that is, individuals more likely to remain within the education system – appear less affected by everyday overload. Young people aged 17–26 are often still in education, with fewer structural constraints, while those with higher education may have greater capacity to integrate additional practices, including sustainable ones, into their lives.[16] Education also supports the internalisation and reinterpretation of norms. Evidence from a young adult development study[17] suggests that those who remain longer within the education system are better able to cope with later societal expectations, including those linked to sustainability norms.

SUSTAINABLE PRACTICES ARE SHAPED MORE BY SOCIETY THAN BY EDUCATION

It must be recognised that social groups engaged in education do not necessarily practise sustainability more consistently than others (Table 6.1.1). Among pupils (Grades 9–12), participation in sustainable practices is markedly lower than among young adults, despite pupils' more up-to-date environmental knowledge.[18]

One reason why knowledge does not translate into action is that, compared with adults, children have limited autonomy. Many relevant decisions are made on their behalf. Young people rarely carry responsibility within the household, such as organising waste sorting or managing energy use.

Table 6.1.1 Sustainable practices among pupils, youth and adults

	Grades 9 and 12	17–26-year-olds	27-to-49-year-olds
Sorting household waste	58%	77%	80%
Choosing more sustainable transport over the car	46%	73%	48%
Separately collecting hazardous waste	39%	71%	75%
Economical use of electricity and heating	49%	80%	71%

SOURCE: Students' Environmental Awareness Pilot Study 2023,[19] Estonian Environmental Awareness Survey 2022[20]

NOTE. The table shows the share of respondents who report engaging in the listed sustainable practices 'often'. The adult group consists primarily of individuals active in the labour market.

They live within environments shaped by parental choices, school policies and broader societal arrangements, including place of residence, transport systems, traffic organisation, school environmental management and food provision. The transition from school age to young adulthood – visible as a sharp increase in sustainable action – coincides with the stage at which young people first gain greater control over their own lives. At school age, behaviour depends less on intrinsic motivation and more on the structured context of family and school. Their competences and skills are still developing and depend largely on external incentives and challenges.[21] Unfortunately, pupils encounter relatively few sustainability-related challenges.

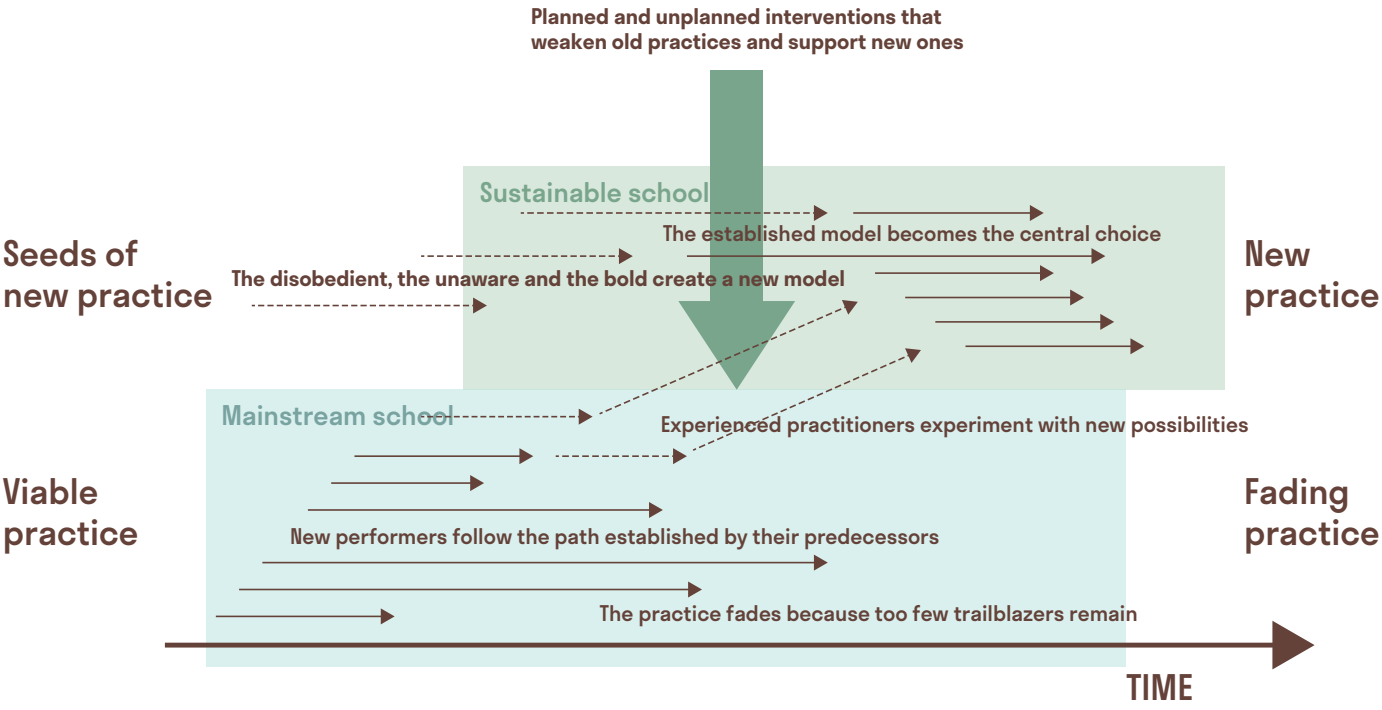
From the social practices perspective, young people are novices who acquire practical wisdom – that is, self-regulation skills – not so much through rational and intellectual processes, as behavioural theorists would assume,[22] but by observing and imitating experienced others.[23] These predecessors, in turn, quickly correct novices when they fail to follow established practices. Figuratively, a child enters traffic at a parent's side. By following the parent's example, the child builds the necessary movements into bodily memory (balancing on a bicycle or setting off at a green light), learns how to interpret the activity (for example, that a bicycle sign marks a cycle path and that traffic keeps to the right), adopts the objects associated with it (handlebars, pedals and fuel tap), masters forms of signalling (horn, hand signal or nod) and grasps the structure of the activity (its frequency, timing, sequence, interweaving and interruption).[24] Each collective behavioural pattern endures only as long as new novices are willing to learn and sustain it (see Figure 6.1.1). Where environmentally sustainable practices are not embodied at home or at school, it is unrealistic to expect pupils to challenge environmentally harmful behaviours that they are likely to perceive as normal at this stage of development.

The behavioural change perspective starts from the premise that good intentions are hindered by a flawed system, which policy documents often reduce to rules, prices, infrastructure and similar factors.[25] According to the EKTU and ÕKTU surveys (Table 6.1.2), respondents in Estonia most frequently identify legal constraints (for example, restrictions on redistributing food nearing its expiry date), economic logic (it is cheaper to buy new than to repair), and complexity or high costs (such as design work or insulating a house) as barriers. Fewer respondents point to constraints arising from the need to organise their lives around the expectations and norms of school, the workplace or close relationships. When sustainable choices demand additional effort, they can create a sense of struggling against an unfavourable system.

The social practices perspective does not separate sustainable aspirations from the system. On the contrary, by pursuing their ambitions, individuals contribute to weaving ever more of the social fabric that reduces opportunities for environmental protection. Environmental impact does not arise in isolation but through activities, such as visiting friends, searching for recipes online or engaging in hobbies, and not primarily through individual actions but through collective routines or practices embedded in resource use and pollution, reproduced across society. For example, a recipe choice may reinforce deforestation decisions in rainforests and increase the carbon emissions of ships transporting exotic fruit.

Although educational attainment and environmental aspirations often coincide, higher educational attainment is also associated with higher income – and with higher levels of consumption.[26] Sustainability principles may attach more readily to highly educated individuals, but so do environmentally intensive activities such as travel, visits to theatre, cinema and museums, sport, diverse lifestyle products, media and print consumption, and technological devices (see Figure 6.1.2).[27] From a social practice perspective, education opens access to patterns of social participation linked to greater economic well-being and less visible forms of consumption, reinforced by a sense of effective self-regulation. Reducing environmental impact would therefore require relinquishing opportunities for which education and income prepare individuals but whose environmental consequences remain largely imperceptible. Accordingly, the social

Figure 6.1.1 Social practice theory interpretation of the emergence of sustainable practices



SOURCE: figure by the authors

Table 6.1.2 Perceived barriers to sustainable practices among pupils, youth and adults

	Grades 9 and 12	17–26-year-olds	27-to-49-year-olds
Lack of knowledge and skills	38%	47%	31%
Lack of support from family and friends	20%	43%	34%
Lack of support from place of residence, work or school	27%	40%	39%
Environmentally sustainable choices are costly	40%	72%	65%
Lack of support from society/ legislation and economic incentives	42%	60%	59%

SOURCE: Students' Environmental Awareness Pilot Study 2023,[28] Estonian Environmental Awareness Survey 2022[29]

NOTE. The table shows the share of respondents who report that these factors 'rather' or 'definitely' hinder their engagement in sustainable practices.

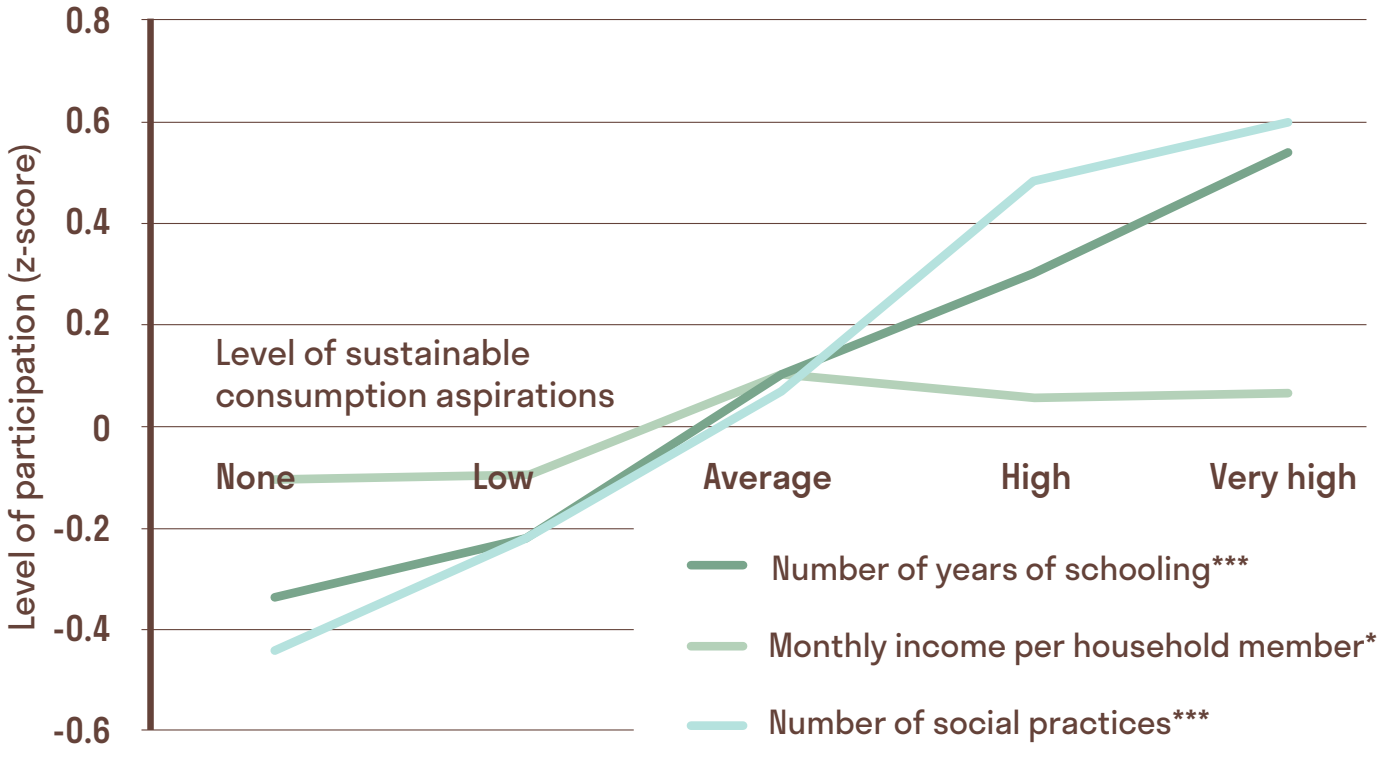
practices approach focuses less on what occurs in people's minds and more on how the practices that structure society might be reshaped.

SUMMARY

Education plays several roles in shaping sustainable choices. It disseminates knowledge that has been relatively recently produced within the scientific community and translated into learning materials. Later in life, access to up-to-date knowledge becomes more uneven. Education can also give emotional meaning to environmental knowledge, helping people value what is at risk and cope with uncertainty by offering ways to move beyond anxiety. Through the learning environment, education can help instil sustainability-related habits that should likewise be practised outside the education system.[31] Education also develops transferable skills relevant to sustainability, including the ability to engage with social norms and decide whether to follow or challenge them.

At the same time, education opens access to patterns of social participation that increase society's pressure on nature. A central task is therefore to prepare promoters of sustainability, including through lifelong learning.[32] According to the EKTU survey, individuals with higher education are more likely to draw others' attention to the need for environmental protection.

Figure 6.1.2 The relationship between sustainable consumption aspirations, education, income and participation in social practices



SOURCE: *Mina. Maailm. Meedia 2014*[30]

NOTE. The graph shows the relationship between sustainable consumption aspirations (on a scale from 'none' to 'very high') and education, income and participation in social practices, based on the 2014 study *Mina. Maailm. Meedia 2014*. Sustainable consumption aspirations are measured as a composite indicator combining self-assessed environmental awareness, waste sorting and avoidance, reduced consumption, preference for ecological products, and purchase of organic food. Social practices include travel abroad and within Estonia, participation in sport and social life, consumerism and involvement in major events and civic activities. For the graph, three variables – education, income and participation in social practices – were standardised using z-scores onto a common scale (–1 to +1), indicating relative distance from the mean (+ above average, – below average). Asterisks denote statistical significance: *** indicates $p \leq 0.001$, * indicates $p \leq 0.05$, reflecting a weaker and less reliable association.

In Estonia, several programmes have recently been launched to equip decision-makers to address environmental crises and identify key decision points for change. Green skills courses have been added to vocational and higher education curricula, teachers are being trained (for example through the ABC of Climate Awareness programme), and new curricula and micro-credentials are being developed to enable those already active in the labour market to reflect on their workplace's role in shaping a sustainable world.

Alongside learning outcomes, environmental education research is returning to the practice of education itself,[33] which is not separate from broader social patterns. Examining societal interdependencies therefore requires looking inside the 'black box' of schools: designing learning processes together with practitioners – teachers, school leaders and extracurricular coordinators – and with change agents, such as parents, communities, local government actors and entrepreneurs, in order to mitigate tensions between education and sustainability.[34] Even so, the impact of education ultimately depends on the extent to which society as a whole is prepared to embrace change.

REFLECTION

Grete Arro

Kalevi Kull, Professor of Biosemiotics at the University of Tartu, has suggested that nature has an irresistible urge to increase beauty, and only humans are capable of resisting it.

This reflection begins from the same puzzle: why are humans capable of resisting the perfection and beauty of nature, and doing so with such force? How many people notice beauty in the fitting together of natural elements – for example, in a 'dead' tree trunk as a habitat, or in birdsong on an April morning? One can presumably stand beside such a trunk for a long time and speak about it – that is, see beauty in diversity – only if one knows and understands that diversity, if one has truly learned it and if the underlying pattern of life, invisible to the eye, is present in one's inner world. For this reason, it is worth distinguishing once again between education and knowledge. Paraphrasing Kristjan Zobel: we consider a person educated if they take an interest in economics and politics, keep up with cultural events and engage with history. Yet understanding how complex systems of living and non-living nature function, learning to know nature, or taking an interest in how forest soil forms, what birds experience during logging in the nesting season or what role alder stands or willows play in ecosystems are rarely regarded as markers of an educated person.[35]

Education does not equate to ecological literacy. The article opens at least two directions for further reflection. First, do people possess in-depth knowledge of the living environment and of the environmental impacts of human activity, acknowledging that measuring such knowledge is complex? Second, if they do, is this knowledge structured in their thinking as complex systems or in some other way? Thinking in terms of complex systems requires suspending habitual linear causality and simple cause-and-effect reasoning and instead recognising properties such as feedback loops, time lags, emergence, hierarchy, accumulation, trade-offs, non-linearity, self-organisation and disproportionate effects.

Learning to understand complex systems requires an approach different from conventional instruction. It is a slow process and unlikely to occur without deliberately adapted teaching. The ability to think in terms of complex systems is often acquired by subject specialists, who may not recognise that they have learned differently

from others, nor know how to articulate complex systems in ways that distinguish them from everyday reasoning. Otherwise, we tend to attribute to complex systems properties and 'behaviours' they do not in fact possess. A future line of inquiry might therefore ask whether individuals who think in terms of complex systems differ from others in environmentally responsible behaviour. Would they form a distinct group in this respect? If this hypothesis were confirmed, it would become possible to draw a clearer distinction between education and ecological literacy and to consider how the latter might be specifically supported.

Umwelt and social practices – which came first? The article postulates that the social practices surrounding us are at least as important in guiding environmentally responsible behaviour as what people know. This is undoubtedly true. It may further be argued that social practices also express our knowledge – what is present in our umwelt and what is absent from it. We do not act in relation to what lies outside our umwelt; we act in relation to what it contains. Social practices and knowledge can therefore be seen as complementary rather than opposing phenomena. From the agent's perspective, social practices are generally highly functional: behaviour rests on knowledge, but this does not imply knowledge of all possible consequences of one's actions, including environmental impacts. This raises the question of how social practices might change without people's own readiness. Can change be expected to occur in a top-down or externally directed manner if individuals do not experience it as meaningful from their own perspective? Meaning – the core of autonomous motivation – is among the strongest predictors of environmentally responsible behaviour. However, meaning cannot arise without some form of knowledge, whether accurate or mistaken, about the phenomenon in question. While it is reasonable to agree that, at a simplified level, many people are informed about environmental problems, the GreenComp framework[36] suggests that two further competences may be crucial: the ability to imagine alternative futures and the capacity to act for sustainability – for example, by initiating systemic change and engaging others. Without sustained practice of these skills during schooling, it may be difficult later to move from awareness to transforming social practices. It is telling that the European Union's environmental education framework has explicitly identified these competences. It is also true that shifts towards environmental responsibility may not be welcomed by certain interest groups.

Being in nature or attuning to nature? Spending time in nature is widely valued in society. Recent research suggests, however, that this may not optimally support a deep connection with nature, which is a precondition for environmental responsibility. A forward-looking implication of the article therefore concerns connectedness with nature and whether education can support it. Few studies[37] have examined the connectedness of Estonians – often described as a forest people – with nature. International research increasingly indicates that nature connectedness – identifying oneself as part of nature and perceiving one's relationship with it in this way – predicts both well-being and environmentally responsible behaviour more strongly than mere nature contact – that is, the extent of exposure to nature. In other words, simply spending time in nature may not generate connection; what matters is what one does there. Studies point to an important distinction between being in nature and actively noticing and appreciating it. The latter predicts stronger connectedness, which in turn predicts well-being and environmental responsibility.[38] How much time do Estonians actually spend in nature in daily life and across the seasons, and when they do, what psychological meaning and impact does the specific activity they engage in there carry? Research suggests that taking macro photographs of moss, distinguishing the call of a leaf warbler or seeking out the flower of wild ginger has a different meaning from situations in which nature serves merely as a backdrop or resource and the focus lies elsewhere. Active and attentive noticing of nature, and gratitude towards it, are not externally observable and may not even be discussed, whereas being in nature with a mushroom basket, a disc golf set or skis appears more readily justified. It is therefore pertinent to ask: in what sense do we relate to nature, and do activities undertaken in nature even have the potential to strengthen feelings of connectedness? Environmental education

programmes that guide children and young people to focus on and notice nature – such as those developed by Asta Tuusti and colleagues – may represent a step in this direction. It is important to understand that active noticing is not merely the use of the senses, which operate in any environment, but attentive observation involves a conscious decision about what to observe and why, based on prior knowledge. Conscious noticing is the first step that may lead to subsequent processes, such as valuing perceived beauty, interpreting what is seen, and experiencing emotions such as gratitude and admiration.

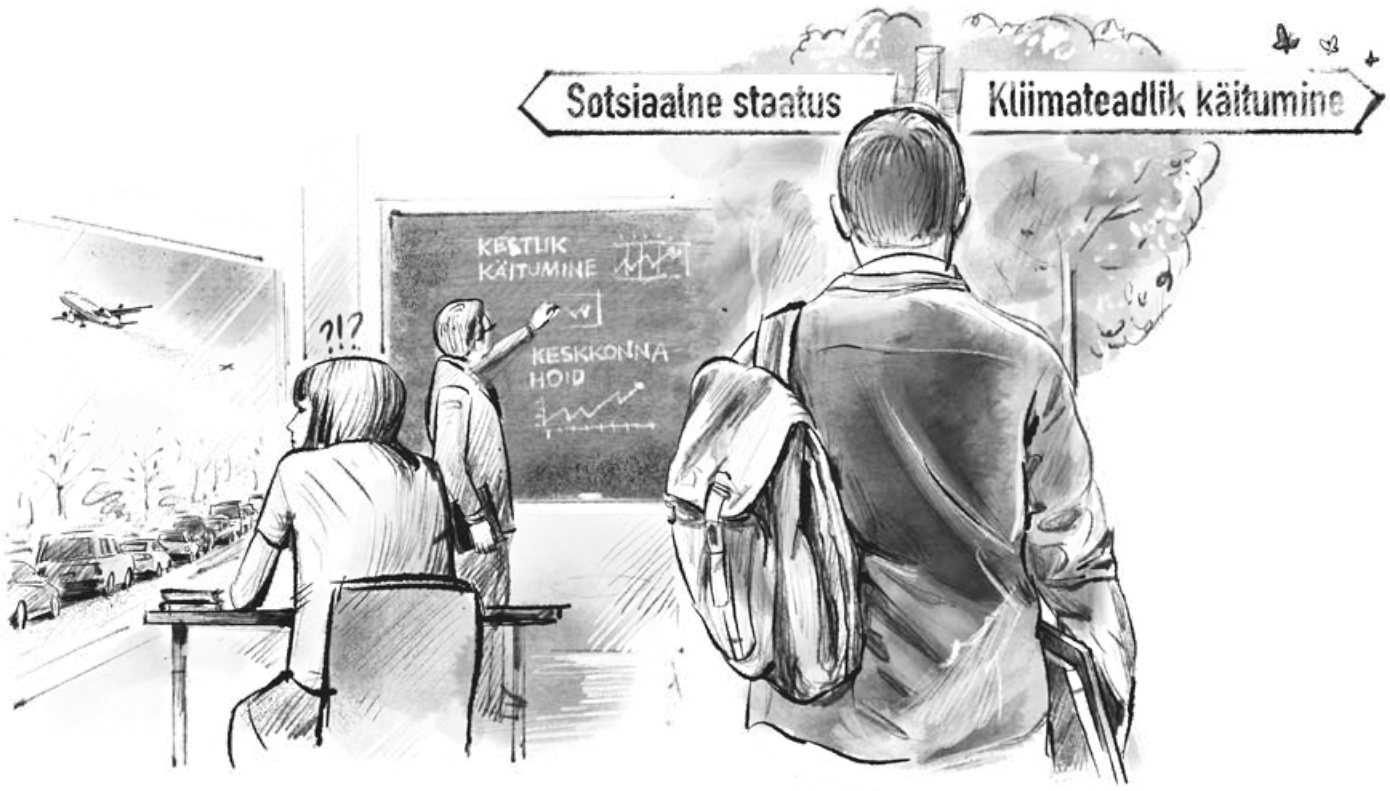
In conclusion, one can only agree with the authors: education is part of culture and society, not a phenomenon separate from them. It is difficult to imagine sustainable education within an unsustainable society. At the same time, education can serve as a lever for cultural and societal change. An educated person is not necessarily guided by sustainable ways of thinking and acting, but it would be mistaken to infer from this that education hinders sustainability. Education is a necessary but insufficient condition, and examining only these two variables risks drawing misleading conclusions. Among those who are currently advancing the real world towards sustainability – both through individual practices and through steps that support systemic change – individuals with higher education are more likely to be represented. History offers examples of cultures that have consciously and successfully redirected or slowed their development in certain directions. At the level of the individual, self-restraint is likewise conceivable. Decisions to move towards a more sustainable culture have, at times in history – for example, in Japan during the Edo period, when society was far from ideal under a feudal-military dictatorship – also followed from observing and understanding natural processes and the human impacts upon them.

The question is what would lead us most quickly to a collective decision to change course. Research suggests that contemporary education has offered learners relatively few effective practices in this regard. If the education system were to provide daily opportunities to develop even these three capacities – understanding complex systems (including humans as part of them), the ability to imagine and initiate change, and connectedness with nature through active noticing – what kind of society might emerge? Might insights be drawn from cultures that have had the capacity to damage their ecosystems but have not done so?[39]

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6.2

Local schools and sustainable mobility as prerequisites for independent school travel

Helen Poltimäe, Age Poom, Anto Aasa, Martin Haamer and Eha Nurk

KEY MESSAGES

- About half of Estonian pupils attend school in a different settlement unit from where they live, which limits their ability to travel to school independently.
- Regional differences in public transport provision and segregation within the school network create unequal opportunities for independent school travel.
- Many pupils travel to school by car, but improving the availability and social acceptance of public transport would support children's independent mobility.

INTRODUCTION

Estonia is characterised by high car dependency: the number of vehicles per capita is among the highest in the European Union, and car use continues to increase.[1] In 1997, there were 306 passenger cars per 1,000 inhabitants in Estonia; by 2024, this figure had risen to 635. In 1997, 28% of people travelled to work by car, compared with 59% in 2024. Over the same period, the share of people walking to work declined from 30% to 14%, and the share using public transport from 34% to 18%.[2] Over the past 25 years, car ownership and use have thus doubled, while the use of sustainable modes of transport has fallen by a similar margin. Here, sustainable modes of transport refer to public transport, walking and cycling, as these have a significantly smaller environmental footprint and greater health benefits than travelling by car.

The rise in car use can partly be explained by urban sprawl, which has increased the distance between home and workplace and led people

to live in areas where public transport is either unavailable or not competitive with the car, owing to infrequent departures or routes that do not meet individual needs. It is also linked to rising prosperity, a culture and lifestyle that favour car use and increased parental control.

Although commuting patterns among working adults are relatively well documented in Estonia, there is very limited data on how children travel to school. Does the broader trend of motorisation also shape pupils' mobility habits? Daily school-choice-driven mobility is influenced by school choice and the location of home and school, parents' mobility preferences, levels of parental control and perceived safety, social norms and practices, the availability and organisation of public transport, traffic culture and safety, and other factors. This article examines patterns of school-choice-driven mobility in Estonia and the extent to which sustainable modes of transport are used. Understanding pupils' daily mobility is important not only for addressing current sustainability and child health challenges but also from a longer-term perspective, as present mobility habits shape future behaviour.

CHILDREN'S DAILY MOBILITY CHOICES ARE SHAPED BY PARENTS, THE ENVIRONMENT AND THE SCHOOL NETWORK

Schoolchildren's daily mobility largely consists of routine travel between home and school. A central issue is whether pupils can travel independently. Independent school travel is closely linked to sustainable mobility. Over short distances, children can walk or cycle. Over longer distances, independence depends on access to public transport. Using public transport usually involves walking to and from stops, meaning

Data and methodology. We analysed school mobility – that is, commuting between pupils' homes and schools – using three datasets: Statistics Estonia data on commuting between pupils' homes and schools (2020),[3] the Estonian Residents' Mobility Survey 2021[4] conducted by the Transport Administration and the Estonian Student Growth Study (COSI) 2022[5] conducted by the Estonian Institute for Health Development.

The analysis of the Statistics Estonia dataset was conducted within the framework of the national spatial plan 'Estonia 2050' and its synthesis study on settlement development scenarios.[6] Origin–destination matrices based on the location of home and school by settlement unit relied on Population Register data. In Tallinn and Kohtla-Järve, city districts are treated as settlement units. Commuting results are presented by urban regions – that is, commuting centres and their surrounding functional areas. Functional areas were identified based on commuting flows to the local centre, distinguishing the immediate zone, transition zone and peripheral zone (where respectively > 30%, 15–30% or < 15% of the working-age population commute to work in the local centre).

For the analysis of pupils' modes of travel, we used data from the Estonian Residents' Mobility Survey.[7] We examined school journey distance and modes of travel among respondents identified as pupils (N = 754). In the travel diaries, origin and destination were recorded at the level of settlement units. If a journey comprised several stages using different modes of transport, the mode covering the longest distance was recorded as the overall mode of travel. Where distance was not reported, it was calculated as the distance between the centroids of the origin and destination settlement units.

We also used data from the 2022 Estonian Student Growth Study[8] conducted by the Institute for Health Development. In this survey, parents of pupils in Grades 1, 4 and 7 (N = 4,225) were asked about the mode of travel between home and school, the distance to school and the reasons why the child does not travel to school on foot or by other non-motorised means.

that these journeys entail more physical activity than travelling by car.[9] An active school journey supports children's physical activity,[10] and research increasingly explores its links with mental health.[11] A study conducted in Estonia shows that more physically active children report being happier and more cheerful.[12] Despite these benefits, active school travel has declined in developed countries, including Estonia.[13]

Research typically distinguishes three levels influencing children's choice of travel mode: the child, the household and the environment.[14] At the child level, independent mobility is associated with gender (boys are more likely to travel independently) and age (older children are more likely to do so).[15] The child's own attitudes also matter, including whether travel is perceived as enjoyable and useful.[16] Parents' attitudes are equally important: whether they believe their child can manage the journey alone, how they view walking or cycling, how they perceive social norms, and how much control they wish to exercise over their children's activities.[17] Car ownership within the household further reduces the likelihood of independent and active school travel.[18]

Although higher levels of education and awareness are often assumed to lead to more environmentally responsible consumption behaviour and mobility choices,[19] awareness does not necessarily translate into sustainable daily behaviour.[20] Higher parental educational attainment therefore does not automatically encourage sustainable travel modes among children. Daily travel choices are not purely rational decisions based on weighing costs and benefits. Rather, they reflect socially acquired habits shaped by individual capacities and skills, the meanings attached to mobility, social relations and the physical environment and transport infrastructure.[21]

In the physical environment, journey length and duration, along with perceived safety, are particularly influential. Distance is the key determinant of active school travel.[22] Safety concerns relate both to traffic conditions and to the surrounding social environment. The longer the journey and the more unsafe traffic or surroundings are perceived to be, the less likely children are to walk or cycle to school.[23] Over longer distances, public transport becomes central. Its use depends on reliability, frequency, comfort, travel time and network coverage. The more it requires walking, waiting and transfers, the less attractive it becomes. Younger people generally use public transport and active modes more than older people, but families with young children tend to prefer the car.[24]

Some studies suggest that schoolchildren's travel mode is primarily shaped by the availability and quality of public transport.[25] Other research indicates that school admission policies may have an even stronger effect. If a child cannot obtain a place in a nearby school, car use may become unavoidable.[26] School choice is also linked to educational segregation: where the school network is stratified, parents often seek schools with pupils from similar socio-economic backgrounds or with a stronger reputation.[27] This frequently leads to enrolment in schools located further from home, which reduces opportunities for active and independent school travel.

In summary, children's travel choices are shaped by multiple interacting factors whose effects combine in context-specific ways (Figure 6.2.1). Mobility habits formed in childhood often persist into adulthood.

Understanding the daily school-choice-driven mobility of Estonian pupils is therefore important for reducing the environmental impact of transport, addressing the climate crisis, supporting children's physical activity and shaping future mobility patterns.

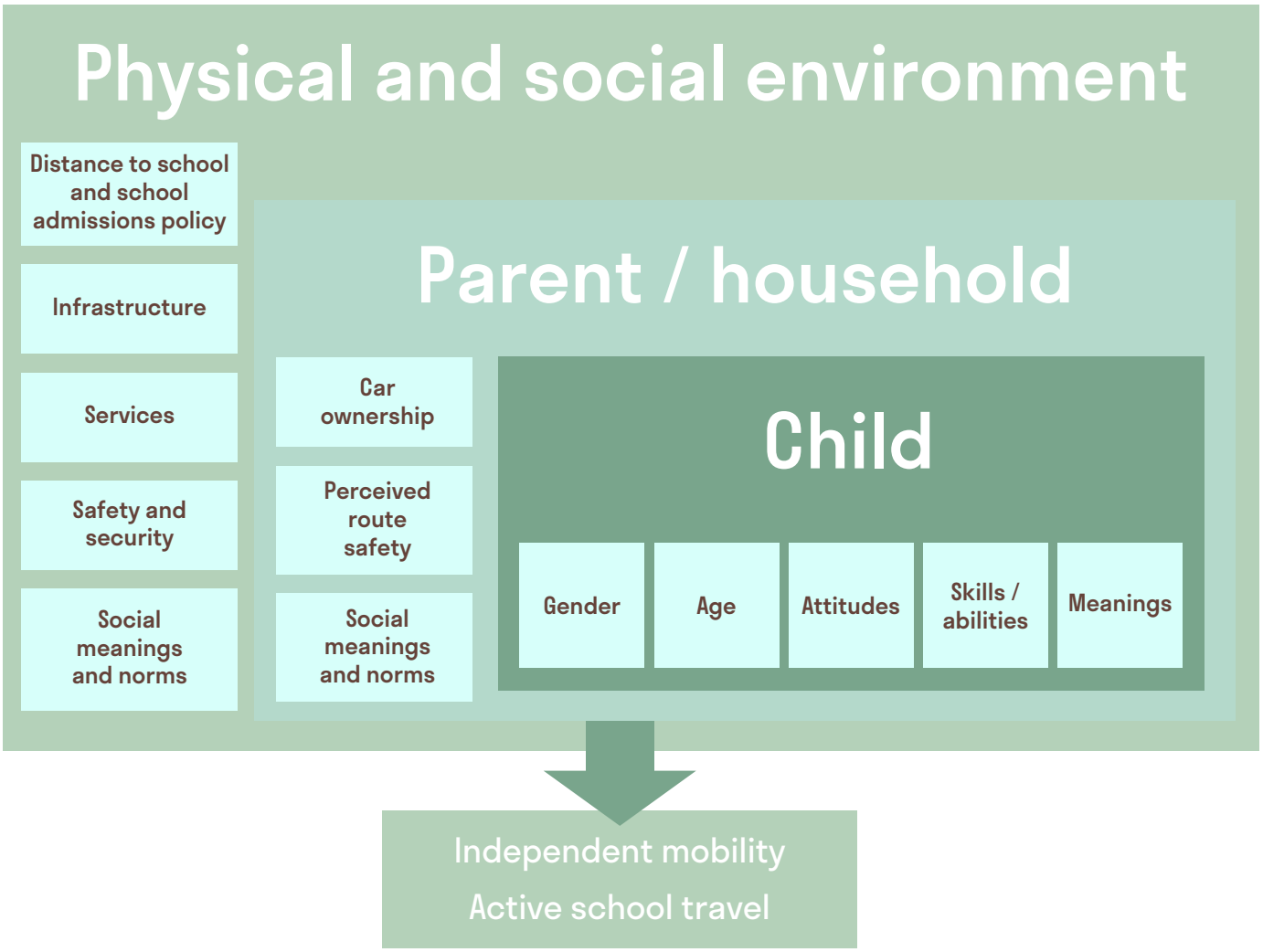
ABOUT HALF OF ESTONIAN PUPILS LIVE AND STUDY IN DIFFERENT SETTLEMENT UNITS, WHICH LIMITS THEIR INDEPENDENT SCHOOL TRAVEL

According to Statistics Estonia, in 2024 there were 66,700 children enrolled in pre-primary education, 136,200 pupils in basic education and 34,900 in upper secondary education. In addition, 23,200 pupils were enrolled in vocational education programmes based on or not requiring basic education. In total, around 261,000 pupils in

Estonia commute daily for educational purposes. Overall, 51.7% of pupils – from kindergarten to the completion of upper secondary or vocational education – attend an educational institution located in the same settlement unit as their residence (Figure 6.2.2). These can broadly be described as local institutions. The share is highest among pre-primary and basic school pupils (62% and 56%, respectively). Among upper secondary pupils, the proportion studying in the same settlement unit falls to 37%, and among vocational education pupils to 14%.

A further group commute up to 25 kilometres: 34% of pre-primary children, 38% of basic school pupils, 40% of upper secondary pupils and 31% of vocational education pupils. For pre-primary and basic school pupils whose journeys substantially exceed this distance, Population Register data may not accurately reflect actual residence, or the registered school address may differ from the location where teaching takes place. The upper secondary and vocational school networks are more geographically dispersed, and commuting distances are longer, making it harder to distinguish between genuinely long journeys and potential data inconsistencies. In addition, Population Register data do not capture residence in student dormitories.

Figure 6.2.1 Factors influencing children's independent mobility and active school travel



SOURCE: figure by the authors

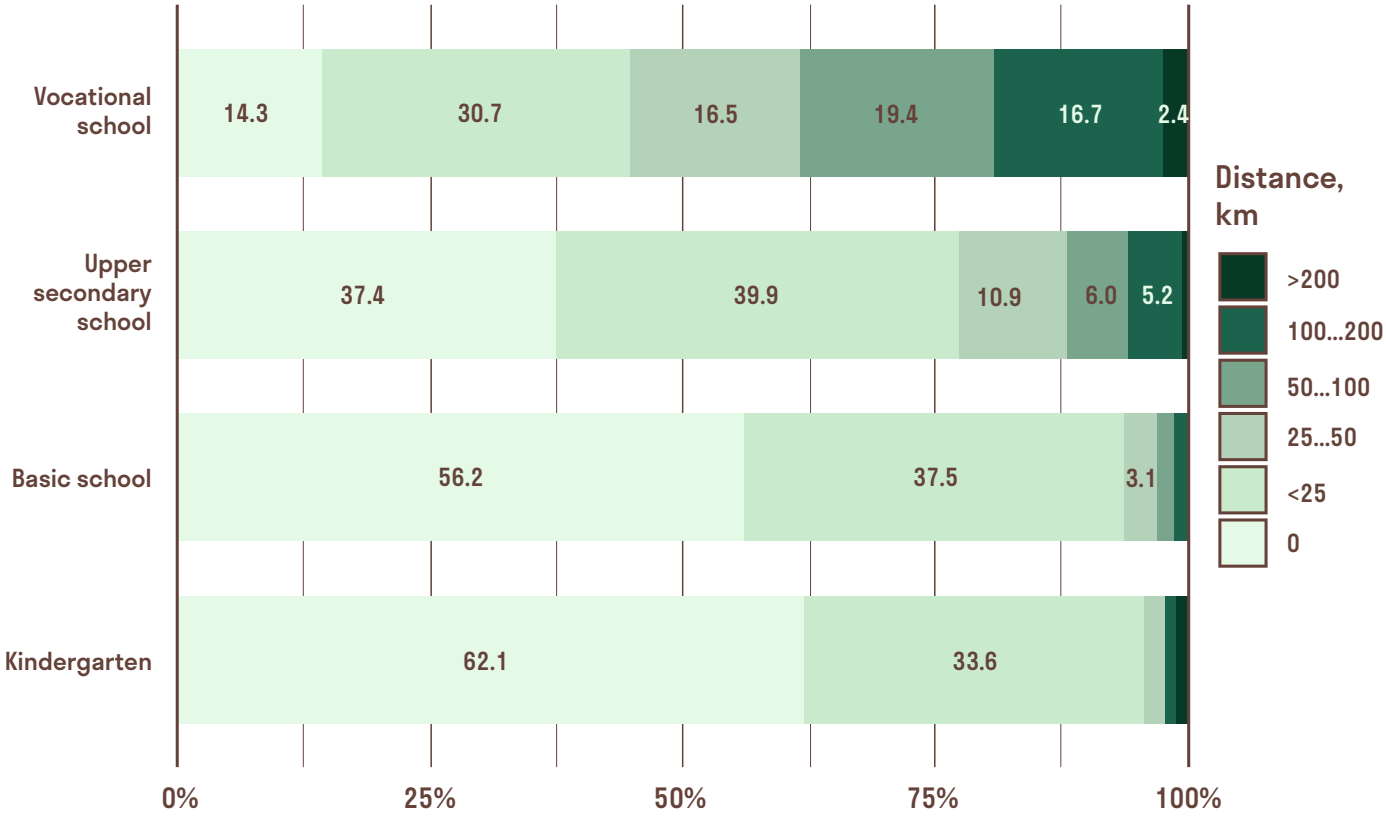
REGIONAL DIFFERENCES IN PUBLIC TRANSPORT AVAILABILITY AND SCHOOL NETWORK SEGREGATION CREATE INEQUALITIES IN SCHOOL TRAVEL

Daily school-choice-driven mobility broadly follows the logic of Estonia's system of local commuting centres and their functional areas. Local commuting centres are towns and cities that attract commuters seeking work and services from areas with fewer employment opportunities and a more limited service base. In the case of school-choice-driven mobility, kindergartens and schools function as centres, and their spatial distribution strongly shapes the daily mobility of pupils and associated adults. Figure 6.2.3 presents the spatial pattern of commuting for basic and upper secondary education. The network of kindergartens and basic schools largely mirrors Estonia's settlement structure and provides relatively even territorial coverage. Nonetheless, regional disparities are evident. In areas such as the larger islands, Lääne County, Pärnu County and Ida-Viru County, the network is less dense, meaning that children often travel longer distances to attend school.

The presence of a local educational institution does not guarantee that children attend it. Segregation within the Estonian education system is particularly visible in larger urban regions, where children often commute either from surrounding areas into the urban centre or from suburban districts into the city centre, even when a school is available closer to home.

Beyond major urban centres, a substantial share of school-choice-driven mobility is also directed towards smaller settlements. In vocational education, the mobility network is considerably sparser, reflecting the smaller number and

Figure 6.2.2 Distribution of daily school-choice-driven mobility distances (km) by type of educational institution, 2020



SOURCE: Statistics Estonia data[28]

NOTE. 0 km indicates studying in the same settlement unit.

more concentrated location of institutions. Unlike general education, vocational schools are typically located in the core areas of functional regions or their immediate surroundings. Notable exceptions include Sillamäe, Räpina, Vana-Vigala and Olustvere.

Marked differences in school-choice-driven mobility appear across urban centres and their functional areas (Table 6.2.1). The table shows the share of pupils studying in the same settlement unit as their residence and the length of the school journey, classified by place of residence in urban centres (from the capital to regional centres) or in functional area zones (see methodology box). At all levels of commuting centres, a higher share of pupils study in the same settlement unit and average school journeys are shorter than in surrounding functional areas. The highest proportion of pupils studying in the same settlement unit is found in regional centres (Tartu and Pärnu), at 93.4%. In Tallinn, 61.8% of pupils study in the same settlement unit (city district) as their residence. The lower the level of the commuting centre, the smaller the share of pupils within its functional area who study in the same settlement unit as their home. This reflects the density of the school network, which is greatest in the capital region and more limited in the functional areas of regional, county and local centres. It is also evident in commuting distances: average home-to-school distances are shortest in the capital region and longest among pupils living in the functional areas of local centres. Within each functional area, the average journey length increases from the centre towards the periphery. These patterns directly shape pupils' opportunities for independent mobility and active school travel within Estonia's school network.

MANY PUPILS TRAVEL TO SCHOOL BY CAR, BUT BETTER AVAILABILITY AND WIDER ACCEPTANCE OF PUBLIC TRANSPORT WOULD SUPPORT INDEPENDENT SCHOOL TRAVEL

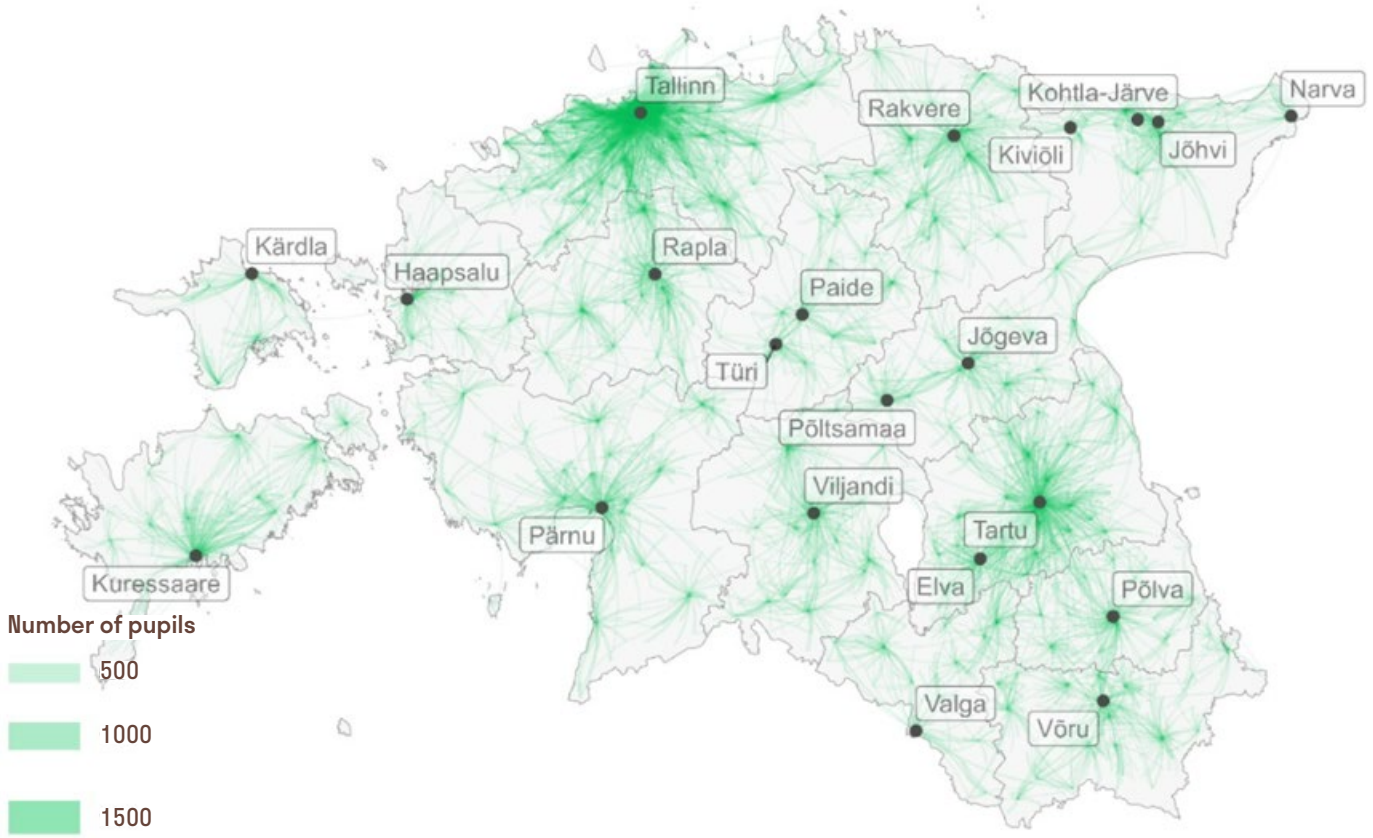
According to the 2021 Estonian Residents' Mobility Survey, 43% of pupils' school-choice-driven journeys were made by car, 30% on foot, 19% by public transport, and 8% by bicycle or scooter. In 52% of cases, travel took place within the same settlement unit. Figure 6.2.4 shows the distribution of journey distances by mode of transport. Walking and cycling were largely confined to journeys within the same settlement unit, but around half of school journeys made by car or public transport were also five kilometres or less.

Short car journeys offer the greatest potential to increase independent and active school travel by shifting to more sustainable modes. Over longer distances, public transport is often the only realistic alternative to the car. The survey shows that car use is more than twice as common as public transport use. However, it remains unclear to what extent public transport meets pupils' daily mobility needs, whether car use reflects preference or necessity, and to what degree residential choices consider children's opportunities for independent school travel.

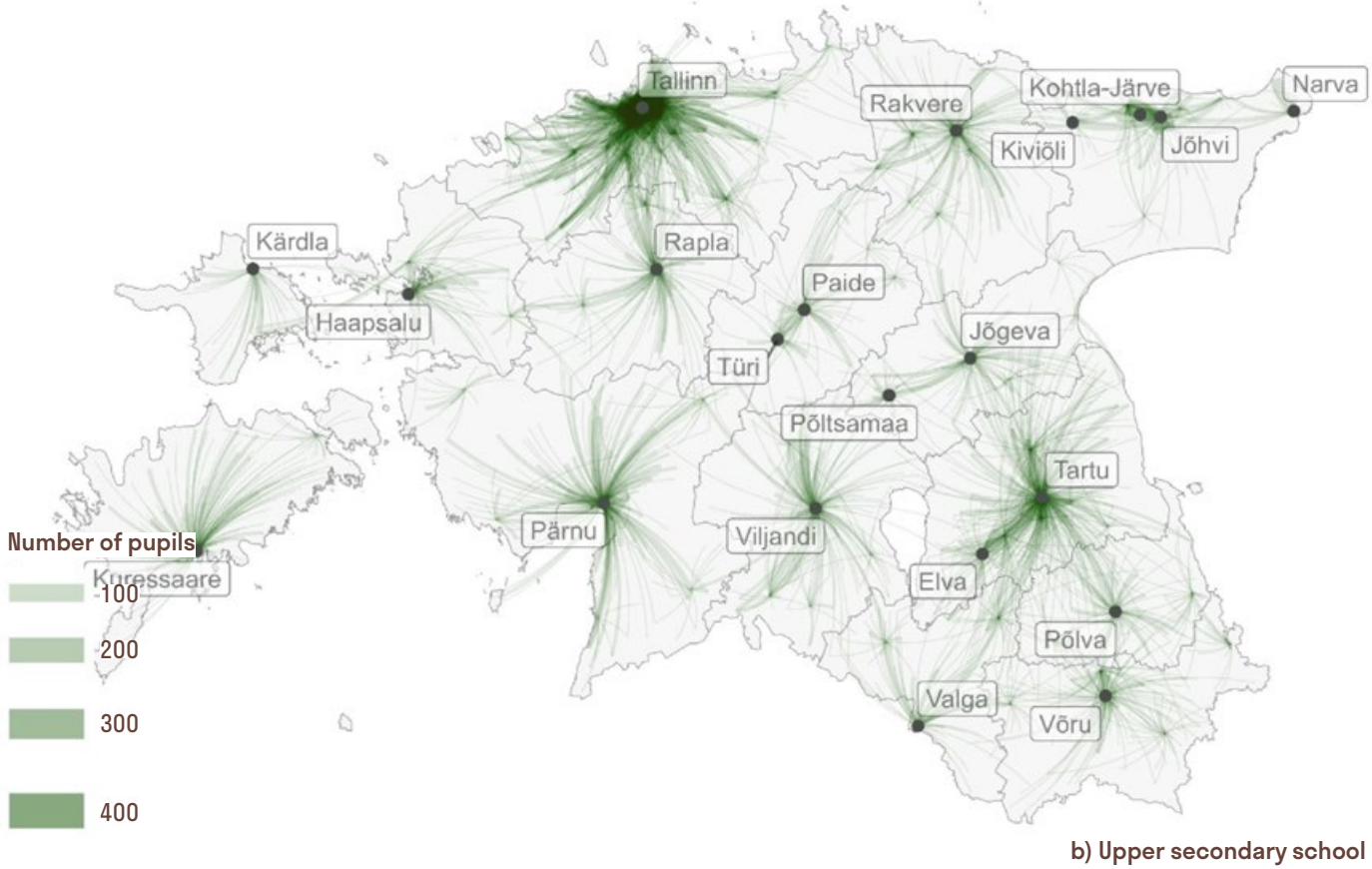
Further insight comes from the 2022 Estonian Student Growth Study.[31] Pupils generally walk or cycle to school when the distance is up to two kilometres, while longer journeys are made by car or public transport (Figure 6.2.5). Older pupils are less likely to be driven than younger ones. Car use is substantial on the journey to school – around 45% in Grade 1 and 30–35% in higher grades – but considerably lower on the return journey (25% in Grade 1 and 10–15% in higher grades). Morning trips are often combined with parents' commuting or other family travel, whereas after school about 20% of children who were driven in the morning return home independently. This indicates that alternatives and opportunities for independent mobility are available.

Among pupils who travel by motor vehicle, around 60% across the surveyed grades cite distance as the main reason.[32] The second most frequently cited reason is logistical fit with other family members' schedules and needs (34–43%), while comfort ranks third (around 25%). Expanding the availability and attractiveness of public transport could therefore reduce car use, support independent mobility and increase the uptake of sustainable modes. For this to happen, routes and timetables must enable independent school travel. The need for improvement is evident: for

Figure 6.2.3 Daily school-choice-driven mobility in Estonia, 2020



a) Basic school



b) Upper secondary school

SOURCE: Statistics Estonia data[29]

NOTE. The figures present journeys of less than 50 km.

about 15% of pupils, travelling by school bus or public transport takes an unreasonably long time, and a similar share rely on a car to attend after-school activities. Daily car use in school-choice-driven mobility has significant environmental, climate and health consequences, both now and in the future, as mobility habits formed in childhood often persist into adulthood.

BETTER EDUCATION, RESIDENCE AND MOBILITY DATA ARE NEEDED TO ANALYSE LINKS WITH SUSTAINABLE MOBILITY

Understanding pupils' actual mobility needs and habits requires more precise and accessible data. Current education, residence and mobility datasets do not provide a comprehensive picture. Pupils' mobility appears only in a few surveys conducted intermittently, which do not distinguish between seasons and lack detailed spatial information. Data collection practices can also distort findings. Registers do not differentiate

Table 6.2.1 Daily school-choice-driven mobility by functional areas of city regions, 2020

Centre type	Hinterland type	Total pupils	Share of pupils studying in the same settlement	Average journey to school, km
Capital city		75,184	61.8%	1.0
	immediate zone	35,867	34.1%	4.2
	transition zone	8,221	35.1%	8.5
	peripheral zone	4,486	35.0%	9.1
Regional centre		26,504	93.4%	0.9
	immediate zone	15,791	24.1%	5.1
	transition zone	5,779	28.4%	9.4
	peripheral zone	2,556	22.8%	11.5
County centre		16,920	79.6%	2.5
	immediate zone	8,871	12.3%	8.9
	transition zone	11,250	20.2%	10.6
	peripheral zone	5,878	30.5%	11.1
Regional centre		5,032	75.4%	3.5
	immediate zone	859	0.2%	9.8
	transition zone	2,263	13.5%	12.4
	peripheral zone	720	16.8	15.2
Total		226,177	52%	7.7

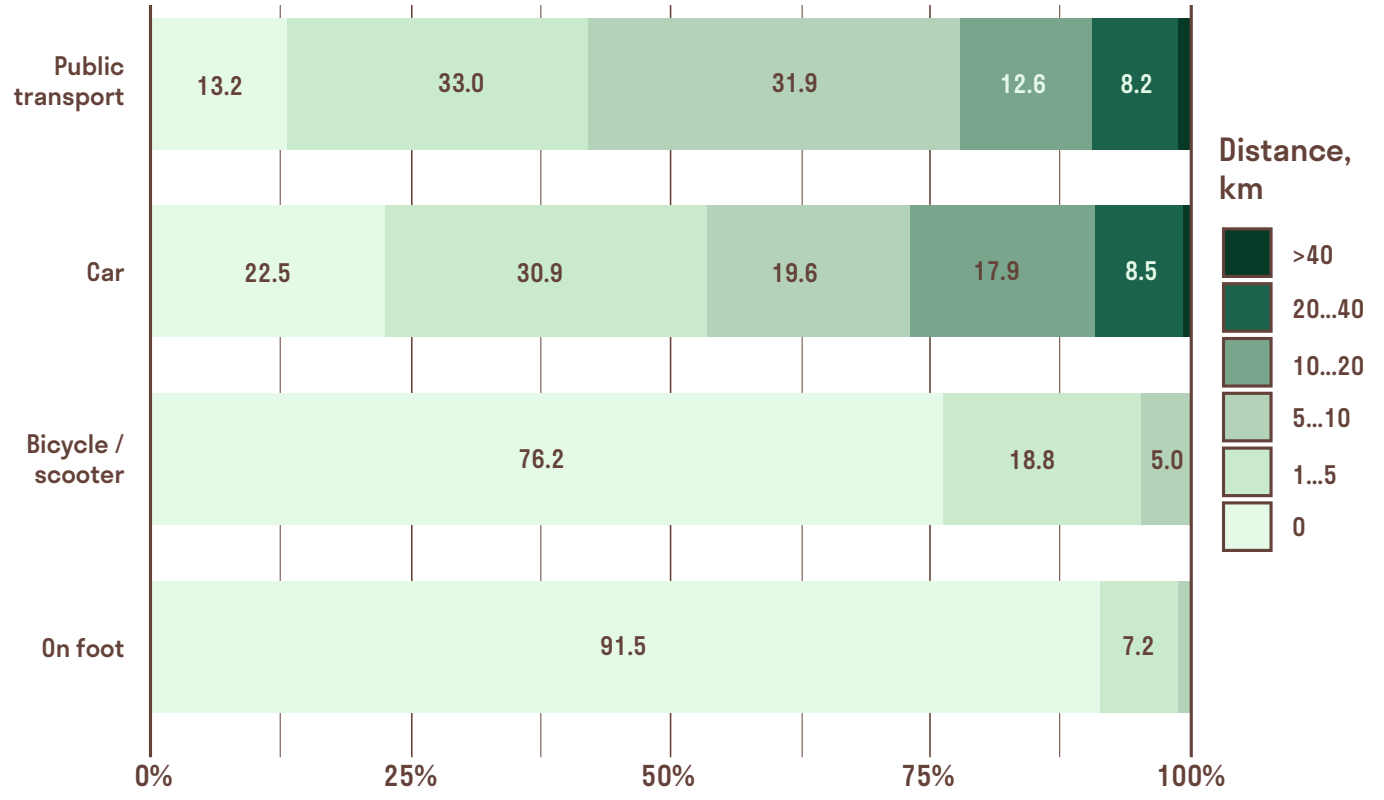
SOURCE: Statistics Estonia data[30]

NOTE. Settlement units are classified either as commuting centres or as zones within their hinterland, from the immediate zone to the peripheral zone. Capital – Tallinn; regional centres – Tartu, Pärnu; county centres – Haapsalu, Jõgeva, Jõhvi, Kuressaare, Paide, Põlva, Rakvere, Valga, Viljandi, Võru; local centres – Elva, Kiviõli, Kärdla, Põltsamaa, Rapla and Türi. Immediate zone: > 30% of the working population commute to the centre; transition zone: 15–30%; peripheral zone: < 15%.

between schools operating at multiple locations, vocational education data combine pupils enrolled on the basis of basic and upper secondary education, and the Population Register does not record the temporary addresses of pupils living in dormitories or rented accommodation. Among vocational education pupils, and increasingly among upper secondary pupils, living near the school during studies is common. Until adulthood, however, a child's official residence remains that of their parent or parents.

In summary, nearly half of Estonian pupils attend an educational institution in a different settlement unit from their place of residence. This pattern becomes more pronounced at higher levels of education. School choice is shaped not only by residence within Estonia's settlement structure and the availability of a local school but also by family preferences and segregation within the school network. Attending a local school increases the likelihood of independent and active travel, whereas segregation contributes to longer journeys and fewer opportunities to use sustainable modes. A substantial share of pupils are driven to school, citing distance, convenience and compatibility with family schedules. Public transport could strengthen independent mobility, and where local schools are available, active school travel should be promoted more consistently. Such habits benefit health and the environment, reduce traffic impacts, and shape mobility behaviour in adulthood.

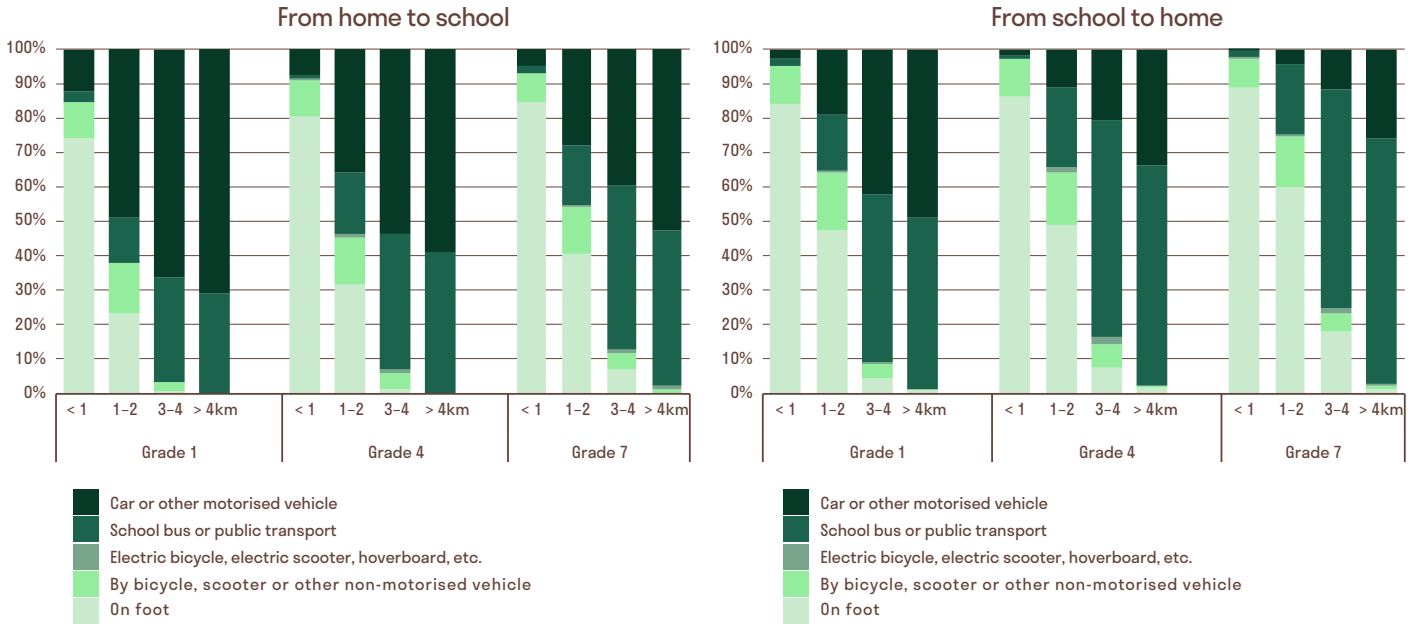
Figure 6.2.4 Distribution of daily school-choice-driven mobility by home–school distance and mode of transport



SOURCE: Estonian Transport Administration data[33]

NOTE. 0 km indicates studying in the same settlement unit.

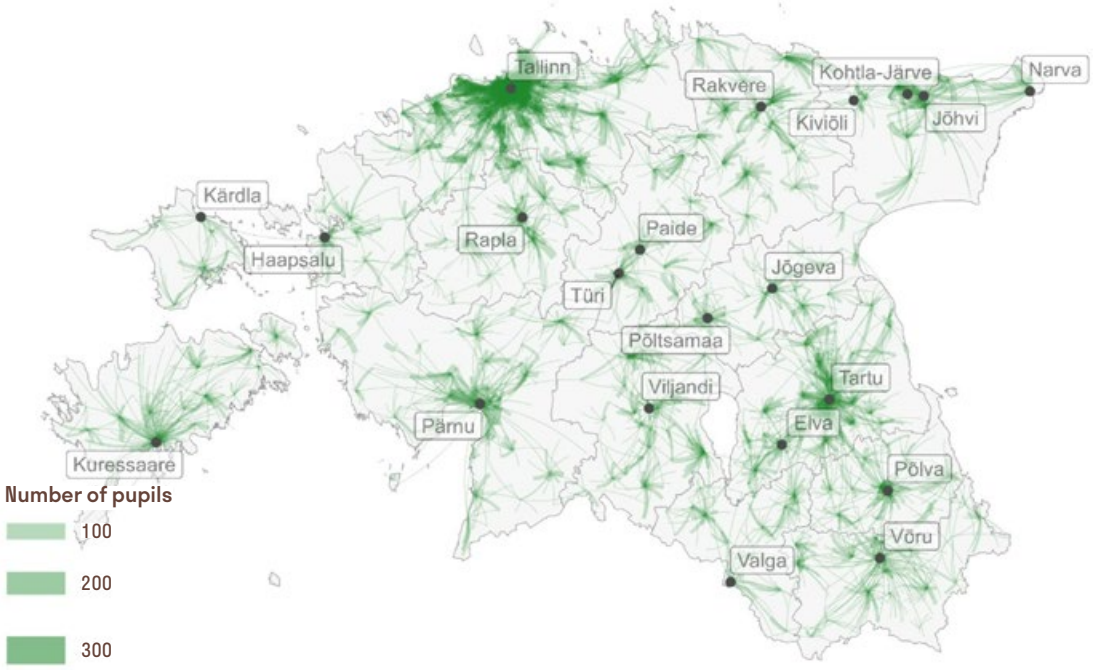
Figure 6.2.5 Modes of travel to and from school by distance and grade level



SOURCE: Estonian Institute for Health Development data[34]

APPENDIX

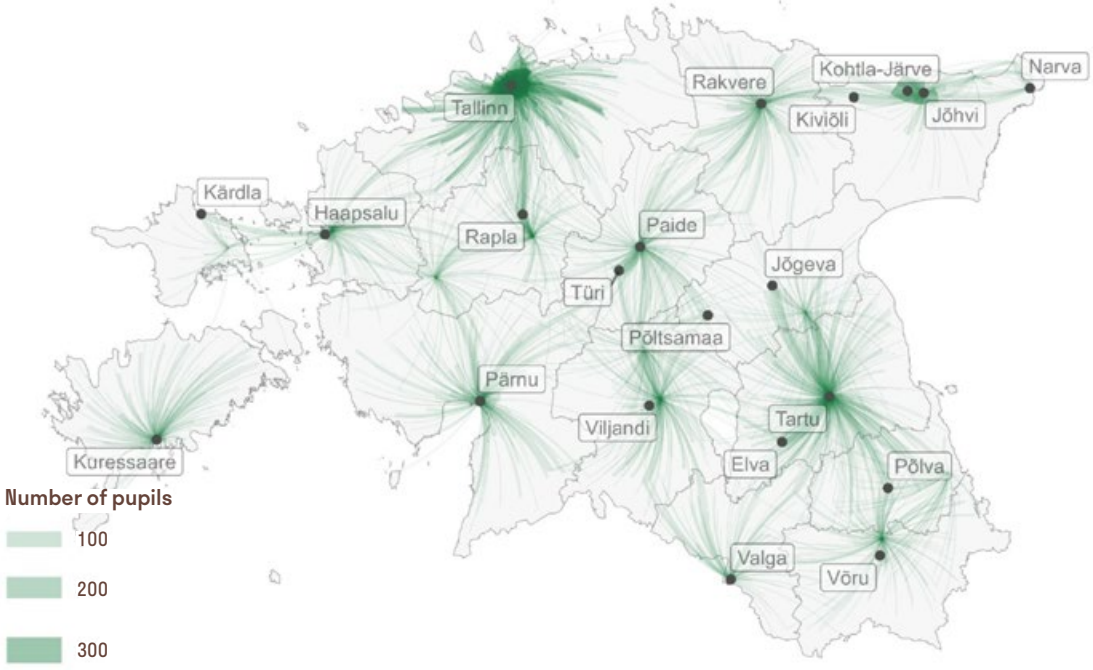
Figure 6.2.6 Daily school-choice-driven mobility associated with pre-primary education institutions, 2024



SOURCE: Statistics Estonia data[35]

NOTE. The figure presents journeys of less than 50 km.

Figure 6.2.7 Daily school-choice-driven mobility associated with vocational education institutions, 2020



SOURCE: Statistics Estonia data[36]

NOTE. The figure presents journeys of less than 50 km.

REFLECTION

Andero Uusberg

Part of Estonian children's insufficient physical activity may be linked to the journey to school. Physical activity benefits both physical[37] and mental[38] health. At any age, people tend to move when it generates more positive than negative feelings and when there is a practical reason to do so. These two motives suggest two main pathways for increasing mobility.

The first, which I will not discuss in detail, is to provide children with enjoyable experiences of movement. Joyful movement in childhood, especially when reinforced through organised sport, predicts healthier activity levels later in life.[39]

Mobility can also be supported for practical reasons, such as travelling between home, school and extracurricular activities. The more these journeys are made by car, the more time is lost that could otherwise contribute to the recommended 60 minutes of daily moderate-to-vigorous physical activity for children.[40] When designing spaces and regulations, it is therefore worth asking how they can better support self-powered mobility.[41]

Choosing how to travel to school resembles a multi-stage competition in which each mode accumulates points based on how well it meets a family's needs. The journey must be manageable, safe, quick and pleasant. At present, the car often wins. The question is how to redesign the system so that non-motorised mobility competes more successfully.

Proximity is central. When a school is within walking or cycling distance, independent mobility becomes realistic. This is another reason to value a consistently high-quality network of primary and basic schools. The fewer doubts parents have about the local school, the more likely children are to attend it and travel there independently.

Not all families, however, live within a few kilometres of a school. In such cases, it is important to strengthen non-motorised segments within partly motorised journeys. Public transport can play a key role, as it does not offer door-to-door travel in the way a car does. To make it a credible option for school travel, sustained investment is needed in frequency, speed, comfort and safety. Allowing bicycles on buses – for example, by installing bike racks – would further increase flexibility. Attitudes towards congestion might also shift. Congestion can function as a signal within a self-regulating system: as car travel becomes less convenient, public transport becomes relatively more attractive.

Even where car use continues, small changes can increase physical activity. If children are not dropped off directly at the school entrance but are instead set down a short distance away, extra steps become part of the school day. In less densely populated areas, streets around schools could be made car-free, creating space for both necessary and recreational movement. In denser urban areas, where closing entire streets is not feasible, removing parking and drop-off spaces near school gates can still encourage more active travel.

Extracurricular activities also generate substantial daily travel. One aim could be to develop walkable education campuses around schools, where sports facilities, music schools and activity centres are connected by safe routes for non-motorised mobility. In the long term, such campuses depend on planning decisions. In the short term, providers of extracurricular activities could be encouraged to prioritise premises located near schools.

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6.3

Educational institutions can bridge the gap between climate awareness and climate-responsible behaviour

Aet Annist, Piia Post and Jaanus Terasmaa

KEY MESSAGES

- Individuals with higher levels of education tend to be more climate-aware than other educational groups, but their behaviour and consumption patterns are shaped by higher incomes and related social expectations.
- In Estonia, the lifestyles and attitudes demonstrating limited climate concern are both reflected in and shaped by the wider institutional environment. In education, local government and business, the systematic dissemination of climate-related knowledge and the adoption of climate-responsible practices remain limited.
- Institutions, including educational institutions, can build communities that recognise the seriousness of the climate problem and strengthen climate-responsible behaviour.

INTRODUCTION

Although climate change has increased risks to life and property worldwide, heightening climate awareness, humanity has not brought the problem under control. Greenhouse gas emissions and energy consumption continue to rise. Possible explanations include the gap between awareness and behaviour, barriers that prevent informed individuals from becoming agents of change and the inertia of institutional environments.

To understand these dynamics, it is useful to distinguish climate responsibility from environmental responsibility. Beyond individual preferences, affection for nature or frugal habits, climate responsibility requires attention to the

environment in which knowledge is formed, the broader context – including the media and public arena in which these issues are framed – and the conflicts they generate. In Estonia, environmental responsibility enjoys a largely positive reputation, combining pride in the country's 'clean nature', the role of environmental activism in the late 1980s independence movement and the perception of the natural environment as a relatively uncontroversial domain. Environmental degradation is also more directly observable in people's everyday surroundings, which makes it easier to recognise.

The same cannot be said of climate change. As a relatively recent issue that may appear 'imported' rather than locally rooted, it is harder to grasp in Estonia's geographical context. Its effects have not yet become sufficiently observable here. Although climate change is clearly documented in scientific data, in practice it touches on sensitive areas of Estonian society, challenging the foundations of a relatively recently achieved welfare and consumer society. As European Investment Bank data show, Estonia is consequently among the most climate-sceptical societies in Europe.[1] Climate change has become an arena for disputes and conspiracy theories and, for some, a pseudo-issue that is even perceived as conflicting with environmental protection goals. The green transition – state policy aimed at preventing and mitigating climate change, with implications for specific sectors, institutions and regions – has generated doubt and mistrust, and its top-down character is often perceived as coercive.[2]

The Estonian Environmental Awareness Survey (EKTU 2024)[3] provides the basis for a more detailed analysis of environmental and climate responsibility,[4] which shows that, among socio-economic indicators, only education is strongly associated with environmental responsibility.[a] Climate responsibility,[b] by contrast, is strongly associated with education, social status and income. The data also indicate that climate responsibility is more unevenly distributed across social groups defined by differing views and attitudes than environmental responsibility.

One component of climate responsibility may be the appreciation of scientific knowledge. Where trust in science is weak or declining, climate change is more likely to be treated as a matter of belief rather than fact. Attitudes towards science are linked to education. In what follows, we examine whether climate-responsible behaviour, reported by individuals with higher education, presumably with knowledge and trust in climate science, is actually reflected in their consumption patterns, such as energy saving, reduced car use, limiting purchases and adopting a more climate-friendly diet. We consider both the impact of individual educational attainment on climate awareness and responsibility, and education as an institutional[c] environment, including its climate footprint, its own responsibility and its capacity to support knowledge-based behaviour.

CLIMATE AWARENESS AMONG THOSE WITH HIGHER EDUCATION DOES NOT TRANSLATE TO CLIMATE-RESPONSIBLE BEHAVIOUR

Data from recent decades and across societies indicate that higher educational attainment is associated with greater climate awareness. For example, in a European Investment Bank survey, respondents with higher education provided the highest number of correct answers about the nature and causes of climate change.[5] According to the Estonian Environmental Awareness Survey 2024, awareness and educational attainment are also strongly associated with self-reported assessments of behaviour,[6] reflecting both attitudes and the context in which behaviour is evaluated. However, educational attainment

a In EKTU 2024 (p. 10), the environmental responsibility factor includes participation in collective environmental activities, donations to environmental organisations, environmentally motivated political choices, discussing the need for environmental protection and drawing others' attention to it, preferring eco-labelled products and goods with reduced packaging, and avoiding products and services from companies that excessively harm the environment.

b In EKTU 2024 (p. 11), this factor includes reducing travel, car use, meat consumption and the use of single-use plastics.

c Here, the term 'institution' is used broadly to refer to organisations, public bodies and their modes of operation.

shows no association with readiness to conserve resources.[7] Although individuals with higher education report that their behaviour is environmentally and climate-responsible, this is not reflected in a greater willingness to reduce consumption.[d] Other studies outside the environmental field likewise indicate that those with higher education tend to consume more. In 2020, households headed by individuals with the highest level of education spent 1.5 times more on clothing and footwear than households headed by individuals with lower education, slightly more than twice as much on transport, nearly twice as much on leisure and more than 2.5 times as much on package travel.[8] These figures do not, however, capture the footprint of the goods purchased or whether fewer but more expensive items were bought overall.

Estimates of energy demand based on the amount of heated living space available to households by educational level show that more than 60 sq. m of heated space was available to 65% of respondents with higher education, 54% of those with vocational or specialised secondary education and 41% of those with upper secondary or lower education.[9] ,[e] Differences appear more closely associated with educational attainment than with income. The same study indicates that 12% of respondents with the lowest level of education and 7% of those with higher education believed they could substantially reduce their energy consumption; 42% of respondents with lower education and 48% of those with higher education stated that they could reduce it little or not at all.[10] These figures suggest that among those with higher education there are somewhat more individuals who consider themselves already sufficiently frugal or who believe that social or technical constraints limit further reductions in their living standards. Energy-saving efforts are also reflected in home insulation. Drawing on Eurobarometer data, Niitav notes that respondents with basic education insulated their homes slightly more often to reduce energy costs than those with higher education (40% compared with 34–37% in other educational groups) and installed solar panels significantly more often (16% compared with 3–4%).[11] As Niitav observes, these differences may be related to residence outside larger cities.[12]

The Estonian Transport Administration's mobility survey shows that individuals with higher education are more likely to own a car than those in other educational groups.[13] Among respondents with higher education, 52% travel by car on four or more days per week and only 15% do not use a car at all. The corresponding figures among those with basic education are 46% and 20%. In addition, 54% of respondents with higher education travel alone by car, compared with 43% among those with secondary education. Regular use of public transport (four or more times per week) is reported by 13% of respondents with higher education and 21% of those with basic education. Although those with higher education may report a preference for more sustainable modes of travel, their actual mobility patterns indicate more frequent car use, more solo driving and lower reliance on climate-responsible transport than other educational groups.

Meat consumption also serves as an indicator of environmentally responsible choices. Here too, households with higher educational attainment are slightly larger consumers, and their meat consumption increased more rapidly between 2010 and 2020 than among respondents with basic education.[14] Additional insight comes from data provided by the National Institute for Health Development on reported positive behavioural changes.[15] These show that respondents with higher education were least likely to have reduced their intake of animal fats in the preceding 12 months: 22% among those with higher education, compared with 25% among those with basic education and 28% among those with secondary education. Moreover, EKTU indicates that individuals with higher education

d This included the energy-efficient use of electricity and heating, purchasing second-hand clothing and consumer goods and products with a long lifespan, repairing items, consciously reducing consumption, and delivering hazardous waste to designated collection points.

e Although the educational groups are defined differently in this study, the comparison between respondents with higher education and other groups remains meaningful.

are less willing than other educational groups to consume reused products or reduce travel.[16] Both tendencies likely reflect lifestyle patterns that may be perceived as less feasible or less desirable to change among those with higher education.

Thus, the actual consumption patterns of those with higher education, as well as higher levels of climate awareness and climate concern, do not fully correspond to their self-reported behaviour. In explaining this, it is important to recognise that educational attainment has both socio-economic causes and consequences. In Estonia, educational level is closely associated with income, and individuals with higher education more likely belong to higher income deciles. Observed consumption patterns and preferences regarding reuse and travel suggest that higher income increases the likelihood of consumption. The most climate-friendly option – not consuming – tends to be triggered when income is constrained. Beyond income, the consumption behaviour of those with higher education is shaped by social status, which can encourage higher levels of consumption – to signal, maintain or affirm one's position,[17] to fulfil associated roles or simply because greater financial resources allow it. Higher income linked to higher education expands consumer choice,[18] including symbolic 'green' choices (such as avoiding plastic straws) that align with the preferences of an educated and environmentally aware social group. By contrast, avoiding air travel, buying reused goods, lowering home heating or consistently relying on public transport may risk being seen as extreme, invite scepticism from significant others or appear professionally difficult or impractical.

As long as higher income finds expression in material consumption, and belonging to higher income groups entails not only the possibility but also the social expectation to consume more, increased awareness alone will not lead many to reduce their consumption footprint. Greater climate awareness acquired through higher education does not, in itself, prevent climate-damaging consumption choices.

At the same time, EKTU indicates that individuals with higher education are more willing than others to discuss environmental issues within their families and to draw attention to the importance of environmental protection.[19] This suggests potential for those with higher education to act as agents of change. However, translating words into action may be particularly difficult in an environment where climate-responsible behaviour can affect prestige and social standing. Where the social context does not support such choices, substantial lifestyle changes may feel like a sharp departure from one's comfort zone and a risk to social position, especially when others do not make similar adjustments.

THE CLIMATE RESPONSIBILITY OF THOSE WITH HIGHER EDUCATION IS REFLECTED IN AND SHAPED BY THE INSTITUTIONAL ENVIRONMENT

Social expectations are shaped in part by the institutional environment – workplaces, schools and other organisations – which can support individuals in acting as agents of value and behavioural change. The three or four years spent in higher education also play a formative role in developing a scientific worldview and, with it, climate awareness. Studies on awareness suggest that the situation in this respect is relatively favourable. At the same time, institutional environments can serve as practice settings for the future – anticipatory spaces in which the conditions created for climate-aware daily life could complement awareness with practical experience and normalise climate-responsible behaviour.

Higher education institutions' climate responsibility and capacity to act as role models are reflected partly in their climate footprint. By the end of 2024, the University of Tartu, Tallinn University of Technology (TalTech), Tallinn University, the Estonian University of Life Sciences and the Estonian Academy of Arts had completed greenhouse gas emission assessments.[20] The largest shares of emissions stem from electricity and heating used in research and teaching infrastructure, transport (including member mobility, business travel and the transport of goods and services) and the consumption of goods and services. Comparison shows that institutions with less experimental research and teaching activity

in their buildings tend to have lower emissions. In 2022, greenhouse gas emissions per university member[f] were highest at TalTech (2.6 tonnes CO_2 equivalent), followed by the University of Tartu and the Estonian University of Life Sciences, and lowest at the Estonian Academy of Arts and Tallinn University (0.8 tonnes CO_2 equivalent). The latter has a high student-to-staff ratio and the smallest share of experimental research and teaching.[21]

A mobility survey conducted at the University of Tartu describes the climate responsibility of commuting.[22] It shows that 67% of responding students and 52% of staff predominantly use sustainable modes of transport – walking, cycling or public transport – to travel between their residence and university buildings. On the other hand, 14% of students and 31% of staff are frequent car users. Modal choice is influenced by the location of university buildings, transport infrastructure and available access options. Car use, for example, is particularly high among staff at the University of Tartu's Maarjamõisa campus. Significant progress remains to be made towards sustainable mobility. As of 2023, university properties provided nearly 1.5 times as many parking spaces for cars as for bicycles. Proposals to reduce parking spaces near university buildings are highly unpopular: the measure is supported by 51% of cyclists, nearly 30% of pedestrians and public transport users and only 11% of staff who drive. The ready availability of parking also reduces motivation among staff and some students to commute without a car.

Higher education institutions are expected to prepare specialists and leaders capable of managing systemic change and societal transformation, who understand the impact of their actions and their responsibilities.[23] Yet climate-aware higher education remains at an early stage in curricular terms. Green skills were incorporated into curricula only in 2023 through the Ministry of Education and Research programme 'Green skills to support the green transition of enterprises', launched to implement the European Green Deal. Although the programme defines both field-specific and transversal competences, the consortia and fields it covers do not include a substantial share of disciplines taught in universities and vocational higher education institutions. Large fields with high student numbers – such as health and well-being, ICT, services and education – are not included. Graduates in these areas therefore acquire only general green competences. This is particularly concerning in education, given the strong influence of schooling on future behaviour. Limited integration in the highly influential ICT field is also problematic.

Higher education has therefore not yet realised its potential role in disseminating knowledge. More importantly, higher education institutions have not developed into environments[24] that place environmental and climate considerations at the centre of everyday decisions or normalise climate-responsible practices such as using sustainable transport for commuting and business travel. In other words, green commitments gain credibility only when they are embedded in daily practice. Universities can serve as practice settings in which climate-responsible behaviour is routinely enacted and sufficiency-oriented attitudes cultivated – that is, consumption within ecologically sustainable limits – alongside leadership skills grounded in eudaimonic, climate-valuing principles rather than materialistic and hedonistic values.[25] In Estonian higher education institutions, such teaching is currently largely absent or confined to isolated courses or lectures. Yet developing the skills, attitudes and values required to respond to a changing climate is essential for society as a whole.[26]

Just as individuals do not act solely as aware or motivated agents but are shaped by their social environment,[27] educational institutions operate within a broader institutional framework that influences funding, priorities and prevailing attitudes. While this framework may be less visible in the case of universities, its significance becomes clearer when examining local governments and their role in shaping school environments. Only one fifth of educational institutions have

f University members include both staff and students.

joined the Green School programme, many of them smaller schools. Eighty per cent of school and kindergarten buildings hold a valid energy performance certificate, half of which are rated C class or higher. Vocational higher education institutions stand out for particularly low levels of certification. No municipality has ensured that all educational buildings possess energy performance certificates. As institutions administered by local governments, schools depend on municipal climate objectives. Only a few frontrunner municipalities treat this issue as a priority (see also Appendix, Figure 6.3.1).

A link with income is evident: larger and wealthier municipalities tend to address climate issues in more varied ways. There are, however, exceptions. Municipalities in Ida-Viru County, regardless of size, lag behind in environmental services despite serious regional environmental problems. This cannot be explained by a lack of resources, as municipalities in the county generally perform well financially. Yet not all local governments employ environmental specialists or provide environmental services. In these cases, the issue may not have become a priority, or limited administrative capacity may hinder attention to what is perceived as a 'luxury issue'.

At the individual level, awareness is shaped by education, which is associated with higher income and, in turn, higher consumption and less climate-responsible behaviour. The cases of Setomaa and Võrumaa (see 'An inspiring example'), however, suggest that at the institutional level income does not necessarily constrain climate-responsible and environmentally responsible practices. Institutional awareness may be more decisive than individual awareness in translating climate knowledge into action. Unlike individuals, institutions are influenced less by immediate social pressure and more by the broader structural context created by state policy and political recognition of climate issues.[28]

An inspiring example. Setomaa Municipality ranks near the bottom of the income scale among Estonian municipalities.[29] Despite its very limited revenue base, Setomaa employs an environmental specialist; its schools address environmental issues and implement organic food projects. An environmentally engaged local community has encouraged institutions to adopt more conscious practices.

INSTITUTIONS INTERACT WITH CLIMATE-RESPONSIBLE INTERPRETIVE AND AMPLIFICATION COMMUNITIES

For educational institutions to act as agents of behavioural change, communities of understanding must emerge among those who grasp the scientific basis of climate change and recognise the need for personal and societal transformation. The focus here is on communities grounded in a scientific understanding of climate issues. On this basis, amplification communities[g] may also develop, whose members disseminate sufficiency-oriented lifestyles through example and engage wider society in discussion of their rationale.

As an illustrative example of such a potential community, we consider a microdegree programme jointly delivered by two universities and focused on translating climate awareness into practice. Between 2023 and 2025, 94 participants completed the programme. The target group comprised senior and middle managers from organisations across sectors in Estonia, as well as other interested individuals. Participants ranged from small business owners to representatives of state and local government and from the financial sector to industrial enterprises. Self-assessments of environmentally responsible behaviour broadly resemble those of respondents with higher education in the EKTU study, although participants (n = 94) reported slightly higher levels of pro-environmental behaviour overall (see

g Amplification communities are groups that amplify and disseminate the messages of communities of understanding through their activities or communication.

also Appendix, Table 6.3.1). The most frequently mentioned climate-responsible actions included preferring long-lasting products and saving electricity and heating. Reducing travel had not been achieved, reflecting income and opportunity structures as well as the tendency to align lifestyle choices with expectations linked to social status rather than with climate awareness or a desire to serve as role models. At the same time, 65% of programme participants reported drawing others' attention to the need for environmental protection, compared with 39% of respondents with higher education in the EKTU study. This suggests their potential as an amplification community, even if, as a community of understanding, they do not consistently adopt all relevant behavioural changes.

Data from one recent cohort (n = 31) provide further insight into changes over the course of the programme. For several behaviours, self-assessments became more critical after completion. In group discussions, participants noted that the programme had prompted more realistic self-reflection. For example, the share reporting reduced travel declined from 19% to 14%; those describing themselves as consumers who repair items fell from 65% to 50%; and those reporting reduced meat consumption decreased from 23% to 18%. At the same time, some positive shifts were observed. A higher proportion reported often giving up car use in favour of other modes of transport (from 39% to 46%) and drawing others' attention to the need for environmental responsibility (from 55% to 68%). The share stating that, as voters, they consider politicians' environmental goals nearly doubled to 29%.

The programme's experience also clarifies how impact can be strengthened and climate-responsible behaviour embedded as a transversal competence. Climate responsibility cannot be institutionalised solely through a conventional top-down approach that creates a dedicated sustainability post or unit. Change may not reach institutional actors if decisions are taken without involving staff or members. Behavioural shifts and climate-aware working environments are more likely to develop when broad groups of employees are engaged, rather than when isolated individuals attend awareness training and are expected to transform their organisations alone. Discussions showed that even where companies employ sustainability managers, their efforts may have limited effect if not supported more widely. Environmental and climate awareness must be horizontal, cutting across departments and management levels. Two multinational companies represented in the programme reported success precisely because they involved multiple tiers of management. Leadership by example, mindset and commitment are crucial. Young et al. note that behavioural change occurs when employees understand why a practice is environmentally friendly or climate-friendly and follow it because it is embedded in organisational systems, culture and recognition structures.[30] Without institutional support, change is difficult to achieve. Individuals who share knowledge can form supportive communities of understanding capable of amplifying both climate awareness and climate-responsible behaviour, as well as the broader transformation required.

SUMMARY

Recognising that education is associated with climate awareness does not explain why generally well-educated societies have not adopted more climate-responsible behaviour. Although higher education tends to increase climate awareness, it is essential to examine whether this awareness translates into action and to identify the barriers that prevent even comparatively climate-aware populations from acting accordingly.

The data indicate that although respondents with higher education describe themselves as more climate responsible, they consume more goods and, by living in larger dwellings, use more energy. They consume somewhat more meat and drive more frequently, including alone. In relation to travel and product reuse, the self-reported behaviour of those with higher education is also less climate responsible than that of other educational groups. Awareness alone does not produce meaningful changes in lifestyle, habits or consumption patterns. A gap persists between knowledge and behaviour because climate knowledge competes with choices shaped by higher income, broader opportunities and social expectations grounded in material values, all of

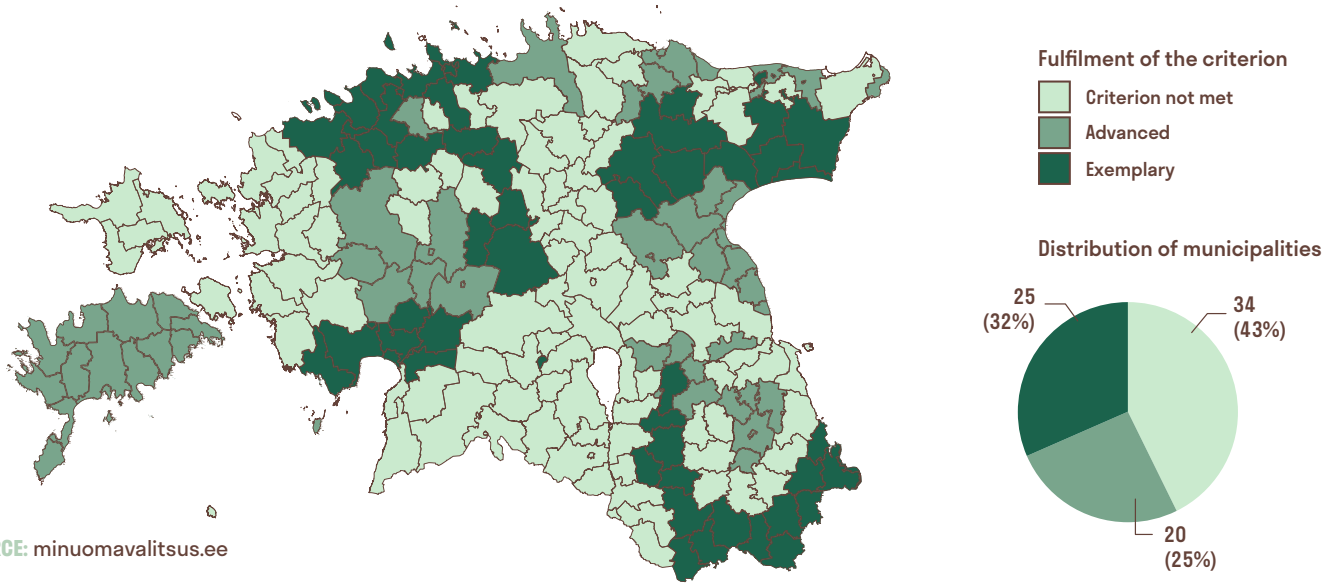
which increase the carbon footprint of those with higher education. From the perspective of mitigating climate change, behaviour matters more than awareness.

This directs attention to higher education institutions and their potential role in narrowing this gap. Institutional environments often reinforce prevailing norms, but in periods of transformation they can also act as accelerators of change, practice settings and role models. Their capacity to shape and guide behaviour remains insufficiently examined and insufficiently recognised within universities themselves. The evidence suggests that everyday decisions in higher education – for example, regarding transport and work organisation – are not yet guided by principles of climate responsibility. Nor is climate change typically addressed in an integrated way that combines climate science with its social dimensions; instead, the topic appears sporadically, confined to individual courses or lectures in selected fields.[31]

Addressing the gap between climate awareness and climate responsibility within higher education institutions, and creating opportunities to practise climate-responsible behaviour there, is therefore essential. In an environment that values a scientific worldview, communities of understanding can develop that support individuals at different levels of leadership and intervention in practising climate responsibility in daily life and in amplifying climate-conscious thinking through example and reasoned argument. Institutional environments can create conditions in which awareness translates into tangible change and in which sufficiency-oriented social preferences are supported and practised. For individuals, such practices may be difficult to sustain in everyday life, either because they lack the social leverage to influence others or because materialistic and hedonistic elements of social relations appear more pressing in daily social situations. Within a more climate-aware institutional setting, communities can emerge in which the links between climate knowledge and the broader socio-economic and political order, including power relations, become clearer. Under such conditions, the task of communicating climate knowledge widely is coupled with recognition that climate-damaging behaviour and its structural drivers can be transformed. Only then can society move from general awareness to concrete action, and from isolated informed individuals and small climate-responsible groups to collective change.

APPENDIX

Figure 6.3.1 **Distribution of municipalities by fulfilment of the criterion 'Principles of sustainable development in education', 2024**



SOURCE: minuomavalitsus.ee

Table 6.3.1 Comparison of responses between the full EKTU sample, EKTU respondents with higher education and graduates of the green transition microdegree programme

	Full EKTU sample (n = 1010)				Higher education (n = 306)				Microdegree (n = 94)			
	Often	Rarely	Never	Don't know	Often	Rarely	Never	Don't know	Often	Rarely	Never	Don't know
Buy long-lasting products	78	16	3	4	80	15	2	4	89	10	1	0
Use electricity and heating economically	77	17	4	2	85	10	3	2	77	14	6	3
Avoid disposable tableware and drinking straws	69	20	9	2	76	16	5	2	93	7	0	0
Prefer repairing existing items	51	37	9	3	59	33	5	3	57	38	3	1
Prefer walking, cycling or public transport	50	36	11	3	56	33	10	2	40	57	1	1
Reduce consumption deliberately	48	33	14	6	55	30	12	3	60	39	1	0
Avoid buying overpackaged products	45	33	14	8	52	30	11	7	66	28	4	2
Reduce travel deliberately	40	27	27	6	32	32	29	6	18	49	30	3
Buy second-hand clothing and consumer goods	40	39	20	1	42	34	24	0	35	50	15	0
Draw others' attention to the need for environmental protection	33	43	20	4	39	40	19	3	65	32	3	0
Consider environmental objectives when voting	17	33	37	12	21	35	34	10	24	50	18	7
Have reduced meat consumption	16	40	41	3	20	43	35	1	21	46	30	3
Participate in community activities related to environmental protection	5	42	50	3	6	43	49	2	13	68	19	0
Donate money to environmental protection organisations	2	24	70	4	2	27	68	2	5	40	48	6

SOURCE: table by the authors, based on EKTU 2024[32] and data on microdegree graduates

REFLECTION

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The gap between climate awareness and climate responsibility is particularly evident among those with higher education: although they possess stronger knowledge, they also have greater resources and are therefore less inclined to change their behaviour. Behavioural change is complex and does not depend solely on knowledge or on the presence of isolated options in the surrounding environment – a single meat-free dish on a café menu or a few bicycle stands in a car park. Climate-responsible choices must be meaningful from the individual's perspective, socially accepted, visible in everyday settings, and sufficiently convenient and simple.

Institutions play an important role in supporting behavioural change. Through their norms and opportunities, they form communities and systems within which people act daily. At the same time, higher education institutions are responsible not only for shaping the everyday environment of students and staff but also for cultivating scientific thinking and drawing attention to the most pressing issues in society.

The complexity of strengthening climate responsibility is also evident in changes that require cooperation across fields and institutions. Transport choices, for example, depend not only on options provided by educational institutions but also on urban planning decisions, the proximity of daily services and the meanings attached to different modes of mobility in relation to well-being. Influencing such multi-level processes requires a significant contribution from universities, and considerably bolder steps than have so far been taken.

Universities as initiators of societal reflection. To support society's movement towards climate responsibility, the messages and conduct of university leadership, researchers and lecturers must be clearly forward-looking. They should reflect commitment to climate responsibility, engagement with current research, openness to innovation and a systemic approach, including a redefinition of prestige and well-being.

Universities as laboratories for climate responsibility. Research conducted at universities on climate responsibility should lead to practical experiments and interventions within the institutions themselves to identify solutions that most effectively support behavioural change. Such interventions should be monitored, enabling a more evidence-based approach to managing change.

Cooperation among universities instead of comparison. Addressing a complex problem requires cooperation across scientific disciplines and educational institutions. Cooperation should not take the form of competition over the smallest environmental footprint but rather of joint reflection on fundamental questions. How do all our researchers contribute to advancing climate responsibility in society? How can collaboration across fields be supported and what flexibility can be offered?

In conclusion, we may ask how educational institutions can become flagships of climate responsibility rather than followers. How can change in education be accelerated? How can institutions lead in experimentation while remaining systematic and grounded in research?

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6.4

Supporting sustainability in education requires changes not only in content but also in teaching methods

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KEY MESSAGES

- In Estonian education, sustainability is addressed in diverse and cross-cutting ways, with emphasis on its links with research-informed approaches, values, everyday life and other relevant areas.
- In Estonia, there is insufficient research – including intervention studies – on the impact of how sustainability is taught in general education, environmental education or citizen science. We therefore do not know how effectively sustainability competence is taught, nor do we systematically develop teaching methods on a research-informed basis. Although sustainability is addressed in both formal and non-formal education, this has not led to the desired changes in knowledge, values or behaviour.
- Sustainability competence should be understood as a general competence so that it can be taught in a more integrated way, engaging different dimensions of the psyche. Both environmental education and the expanding field of citizen science offer opportunities to support this approach.

INTRODUCTION

Never before in history has humanity come so close to exceeding the limits of renewal of resources essential for its existence. At the same time, we have never possessed such extensive knowledge about how people learn, what learning entails as a cognitive process and how the development of deep understanding can be supported on a research-informed basis. Sustainability relates

to learning and education in two ways: through the content that is taught and through the way learning itself takes place.

In what follows, we use the term 'sustainability (competence)' throughout. When referring to environmental awareness studies, we use the terms 'environmental responsibility' or 'environmental awareness'. In addition to examining how sustainability topics are addressed in general education, we also consider participation in environmental education programmes and citizen science. Both are increasingly common ways of addressing sustainability in Estonia, but their impact on sustainable thinking and action has not been systematically studied.

SUSTAINABILITY IS ADDRESSED IN DIVERSE WAYS IN ESTONIAN EDUCATION

In the national curriculum for basic schools, sustainability themes are articulated at several levels. First, they appear among the foundational values of basic education. Under societal values, environmental sustainability is emphasised, and it is stated that individuals with basic education contribute to the ecological development of Estonian society.

Second, sustainability is included among the general competences under cultural and value competences, which include the ability to perceive and value natural diversity and one's connection to nature. The expected competences at different stages of schooling indicate that by the end of the first stage, pupils act in ways that protect nature; by the end of the second stage, they value a sustainable lifestyle, are able to formulate scientific questions, obtain scientific information, behave appropriately in nature, and show interest in nature and its study; and by the end of the third stage, they understand the relationship between humans and the environment, act responsibly towards their living environment, and live and act in ways that conserve nature and the environment.

Third, sustainability is included among the cross-curricular themes,[a] notably 'Environment and sustainable development'. This theme aims to shape pupils into socially active, responsible and environmentally aware individuals who protect the environment and, valuing sustainability, are prepared to seek solutions to environmental and human development challenges.

Despite the cross-cutting presence of sustainability in the curriculum, the Estonian pilot study on pupils' environmental awareness (2024)[1] indicates that, across various dimensions, young people's environmental responsibility is lower than that of adults.[2] Since the sampled pupils should reflect the same overall population, this result may have several explanations. Theoretically, one might conclude either that children do not simply mirror their home environment or that they respond more honestly. This raises the question of whether sustainability competence is taught in a sufficiently comprehensive and systematic way to counter other societal influences.

Research has identified a range of affective, cognitive and attitudinal factors that predict sustainability-related competences, including behaviour. These include knowledge, systems thinking, self-efficacy, risk perception, perceived behavioural control, autonomous motivation, life aspirations, personal responsibility, behavioural intention, personal attitudes and social norms (see also Article 6.1).[3] Interventions that support the development of sustainability competence have also been extensively studied and systematised. In adult samples, these include information provision, inducing cognitive conflict, supporting commitment and goal-setting, feedback, social modelling and prompting, rewards and sanctions, and facilitating choices (nudging).[4] In child samples, effective approaches include environmental education, social influence, eco-schools (such as the Green School programme) and combinations thereof.[5] Both Estonian and international research suggests that a range of educational interventions can support sustainability-related competences. Estonia's

a These are cross-disciplinary themes of societal importance that support the integration of subjects and enhance pupils' opportunities to apply knowledge.

long-standing environmental education system, which provides learning experiences distinct from those of formal schooling, was established precisely to broaden and deepen sustainability themes in the general education curriculum.

A closer look at how sustainability is framed in the curriculum suggests that it cannot encompass all aspects examined in research, either in terms of content or teaching methods. However, certain themes that function as indirect influences could receive greater attention.

First, the teaching of sustainability competences could more explicitly address motivation related to environmental responsibility and self-regulation.[6] Participation in citizen science, for example, builds on individuals' intrinsic interest and motivation. International studies show that key motivations for engaging in citizen science include not only contributing to science but also recognising the intrinsic value of nature and wishing to support practical conservation efforts.[7] Estonian environmental awareness studies likewise indicate that autonomous motivation – the sense that environmental protection is personally important and aligned with one's values – is most strongly associated with sustainable behaviour. Pressuring individuals in any form, such as inducing guilt, fostering excessive competition or promoting rushed and superficial learning, tends to undermine autonomous motivation and limit internally driven efforts to regulate behaviour sustainably.

Second, although deep, internalised knowledge forms the cornerstone of pro-environmental values, motivation and self-regulation, it is not the whole picture. Equally important are the so-called 'warm' affective dimensions of environmental responsibility – emotions arising from positive experiences in nature, such as fascination, excitement, a sense of connection to nature[8] and nature contact.[9] The first of these is particularly strengthened through active and mindful engagement with nature, rather than merely being present in it.[10] Negative experiences, such as indignation or sadness in response to environmental degradation,[11] are also significantly related to the sustainability of individual behaviour. Estonian datasets contain limited research on the extent to which the education system supports these 'warm' variables or recognises which learning practices the scientific literature identifies as conducive to their development.

Third, Estonian education appears to devote limited attention to pupils' epistemological beliefs – their understanding of the nature of knowledge and of how scientific inquiry works – even though these are important predictors of the acceptance of science-based practices in society.[12] Citizen science offers one possible avenue here, providing pupils with hands-on and minds-on experience in conducting research and reflecting on the research process (see 'Citizen science as an opportunity to strengthen scientific conceptual thinking', p. 303).

Fourth, the intrinsic value of nature also requires attention. Although it is mentioned under value competence in the curriculum, it remains unclear how this idea is addressed in general education and how it is supported in ways that cultivate the 'reverence for life' referred to there.

THERE IS INSUFFICIENT RESEARCH IN ESTONIA ON THE EFFECTIVENESS OF TEACHING SUSTAINABILITY COMPETENCE

There is limited evidence on the impact of efforts to develop sustainability competence within the Estonian education system. How has work undertaken in general education, as well as various interventions and programmes, influenced sustainability-related competences?

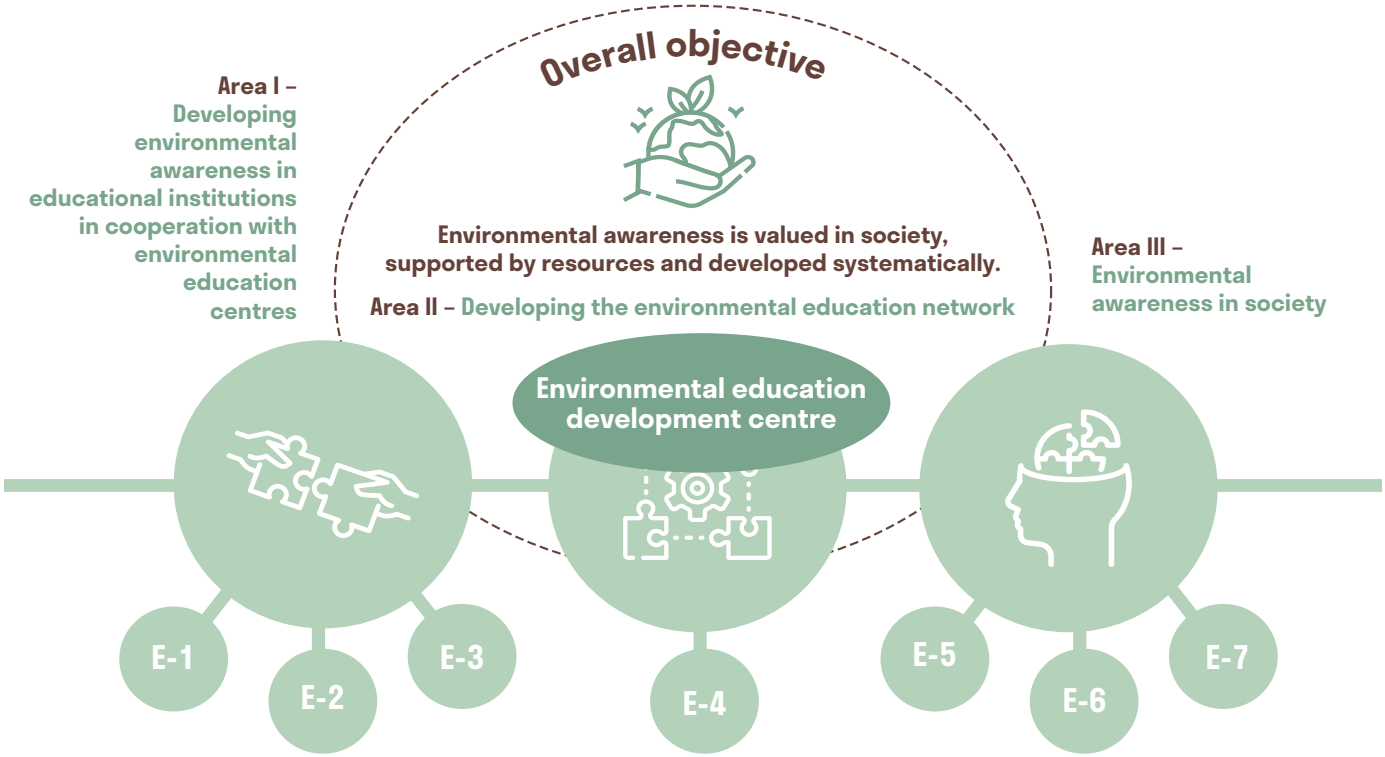
One possible explanation for the limited development of sustainability competence is that merely including sustainability topics in the curriculum is not enough. We must also ask how these topics are taught. The didactics of sustainability competence may require targeted research and development, as suggested by the European Union's research-informed sustainability competence framework, GreenComp.[13] GreenComp organises sustainability competences into four broad areas: 1) embodying sustainability values, 2) embracing complexity in sustainability, 3) envisioning sustainable futures and 4) acting for sustainability. Developing these

sub-competences likely requires more time and sustained engagement than pupils typically receive when addressing these topics in Estonian schools. One notable exception is Rakvere State Upper Secondary School, which has adopted a significantly deeper approach to teaching complex interrelated systems.[14]

What additional data would help us better understand how sustainability is taught? Based on existing evidence and research, what changes could be made in education to better support sustainable ways of thinking and living? Learning about sustainability likely requires drawing on research-informed knowledge about how to teach complex phenomena. Although education increasingly emphasises deep learning and constructivist approaches, pupils' awareness and use of deep learning strategies remain limited.[15] Superficial learning – in which pupils fail to develop a deep understanding of interconnected systems – is unlikely to generate meaningful motivation to live within the limits of nature's regenerative capacity or to recognise the intrinsic value of nature.

There is currently limited discussion in Estonian general education about how to teach complex systems such as ecosystems and biogeochemical cycles, even though research indicates that these require different approaches from phenomena that are directly perceptible.[16] Although studies on teaching such systems have been published in other countries,[17] the authors are not aware of any research examining Estonian teachers' knowledge or skills in this area. Nor have longitudinal or comparative intervention studies been conducted to assess the effectiveness of different methods for teaching complex systems, and there is no evidence on the extent to which

Figure 6.4.1 Action plan for environmental education and awareness 2023–2025



SOURCE: Asta Tuusti

NOTE. E-1 – Environmental themes based on sustainable development goals are integrated into curricula at all educational levels; E-2 – Educational institutions and environmental education centres operate in environmentally responsible ways; E-3 – Educational institutions and environmental education centres act as community leaders in environmental and sustainable development issues; E-4 – A nationwide network of environmental education centres offering diverse programmes; E-5 – Children and young people have good opportunities to initiate and engage others in activities supporting sustainable development; E-6 – Community members are aware of the value of local nature, understand how their behaviour affects the living environment and are able to make environmentally responsible choices; E-7 – Society supports environmentally responsible behaviour. Source: Action plan for environmental education and awareness 2023–2025.[18]

One hundred years of supporting sustainability competence. In Estonia, environmental education is not merely an extracurricular activity in the conventional sense. The country has more than a century of experience in environmental education and in developing environmental education centres aimed at supporting nature learning and contact with nature for all children and young people. The system of out-of-school nature education grew out of two sources: the nature conservation system and natural history museums in Tallinn and at the University of Tartu.

In 1910, Estonia's first nature reserve was established on the Vaika Islands. Its founder, Artur Toom, was also among the first in Estonia to promote nature education for children. The reserve later expanded and became Vilsandi National Park. In 1952, the Estonian Young Naturalists' Station was founded as a voluntary initiative, laying the foundations for today's Tartu and Pärnu Nature Houses. In 1962, Jaan Eilart began developing nature study trails that linked outdoor learning with conservation and became central to nature education. The contemporary model of environmental education programmes took shape in the 1990s at Sagadi Nature School, where teachers organised summer camps focused on studying nature. Subsequent programmes were designed not only to provide extracurricular activities for children who chose to participate but also to support the national curriculum for all pupils. These programmes, centred on learning in authentic environments, continue to develop.

Today, 70% of pupils visit a nature education centre at least once a year. This is likely too infrequent to support the sustained development of sustainability competence. Research on memory suggests that even a high-quality but brief programme cannot produce lasting learning if reflection on the topic is limited to a single occasion. The move towards greater systematisation and research-informed development is illustrated by the first action plan for environmental education and awareness adopted in 2018 (see Figure 6.4.1). A quality assurance system has since been developed in cooperation between the Ministry of Climate, environmental education experts and universities, including a competence model for instructors, a self-evaluation framework and comprehensive guidance materials.[19]

Assessing impact ideally requires randomised controlled designs with multiple measurement points. To date, however, no studies have examined the impact of environmental education on environmental awareness using such methods.

such methods are used in teaching sustainability topics in Estonian schools.

Although data from environmental awareness studies among the general population and pupils suggest that general education may not sufficiently support sustainability competence, the available evidence is limited and does not allow firm conclusions. While these studies show cross-sectional associations between environmentally responsible behaviour and various factors – some of which are shaped by the education system – they do not establish causality. To the authors' knowledge, changes in various aspects of environmental awareness have not been examined in longitudinal or intervention studies alongside other relevant variables.

UNDERSTANDING SUSTAINABILITY AS A GENERAL COMPETENCE AND FOCUSING ON THE TEACHING OF COMPLEX SYSTEMS WOULD SUPPORT A MORE INTEGRATED APPROACH

One possible future direction would be to treat sustainable thinking and action not merely as a thematic topic but as a general competence – a cross-disciplinary competence essential to personal growth – since, for individuals, it is likely to be as existentially significant as other general competences. Like other general competences, sustainability competence should be understood as a combination of knowledge, skills, behaviours,

motivation, emotions, values and self-regulation. In research on environmental awareness, psychological perspectives have increasingly complemented sociological ones.[20] This shift also highlights an important distinction: although individual knowledge about environmental issues is often associated with the level of formal education, the two are not the same. Knowledge is domain-specific, and higher education in one field does not necessarily entail an understanding of complexity in another.

Research on thinking indicates that knowledge about phenomena that are not directly perceptible – such as ecosystems, climate systems or biogeochemical cycles – may be constructed in qualitatively different ways. This insight is particularly relevant for sustainability, since sustainable ways of living require an understanding of interconnected systems. Over a few centuries, contemporary society achieved social and economic prosperity at the cost of exceeding environmental and planetary limits, a fact recognised only recently. At the same time, some societies do not exceed their ecological limits, even though they could. Living beyond nature's regenerative capacity is therefore not a universal human condition but a culture-specific phenomenon. It is characteristic of our society that its functioning is rarely understood within the framework of natural processes.

At least three modes of thinking about non-perceptible phenomena can be distinguished.[21] First, complex phenomena may be understood through everyday conceptions or misconceptions, with inferences drawn from ordinary experience or analogy (for example, 'global warming is caused by a greenhouse-like layer in the atmosphere' or 'if CO_2 emissions stopped, warming would immediately cease'). Second, thinking may be based on scientific conceptions, meaning that intuitive judgements are inhibited by representations based on scientific understanding (for example, 'global warming results from an increased concentration of molecules in the atmosphere that trap heat energy' or 'climate warming is an inertial process'). Third, systemic concepts-level thinking is possible, whereby a person can reason within multiple scientific conceptual systems at once and understand their interactions ('the climate system is a dynamic whole formed by the interaction of multiple spheres'). Systemic concepts-level thinking involves understanding how system components relate to one another, how the system develops and functions dynamically, and what emergent phenomena arise; thinking in systemic concepts also means that considering one aspect of the system activates related aspects in the mind (for example, 'continued degradation of the biosphere brings the climate system closer to tipping points').

Failure to recognise these differences in modes of thinking may itself contribute to sustainability crises. For thinking in a given domain to become scientifically grounded, learning must proceed at a pace that supports conceptual development and explicitly addresses common misconceptions – cognitive traps embedded in everyday reasoning. In fast-paced learning environments, the underlying nature of phenomena often remains superficially understood in everyday terms,[22] and this superficial understanding may go unnoticed by both learners and teachers. It is therefore not merely the possession of facts but the structure of knowledge that determines the depth of understanding in environmental matters.

Although a comprehensive account of how to teach complex systems and support systemic concept-level thinking would require detailed explanation, several guiding principles can be outlined. All learning – and especially the learning of systems characterised by feedback loops, non-linearity, emergence, interdependence, self-organisation, cumulative effects and time delays – requires learning environments in which pupils construct knowledge with teacher guidance,[23] become aware of their implicit misconceptions[24] or knowledge gaps and, ideally, engage in deliberately designed 'productive errors'.[25]

Such instruction may include:

- solving problems that learners cannot yet independently resolve, even with effort;
- predict–explain–observe–revise–explain task sequences;[26]
- constructing complex models independently;[27] or

- using agent-based models and simulations that help learners understand the functioning of individual system components and the system as a whole, the interrelations among components and system outputs,[28] while also reducing cognitive load.

It is equally important that the properties of complex systems are made explicit and discussed during learning. In other words, interactivity and the co-construction of knowledge are integral to effective learning. A shared feature of these approaches is sustained dialogue and discussion, without which conceptual change is unlikely. These methods are particularly effective for complex topics – though not necessarily for simpler ones – and especially for themes that are not readily grasped through everyday experience or that run counter to common intuitions. Here, improved outcomes refer to more accurate conceptual understanding of the phenomenon or process in question and a stronger ability to transfer this knowledge to new contexts.

SUMMARY

The concept of sustainability can be seen as one of the central intellectual axes of education. Ecological sustainability – like the preservation of our linguistic space – could be regarded as a foundational value shaping how we perceive and interpret the world, something to be consciously sustained rather than taken for granted. A next step in supporting sustainability competence in curricula and schooling would be to recognise it as a core general competence rather than merely a cross-cutting theme that may remain peripheral within subject teaching. For example, history in general education is rarely taught in connection with ecological dimensions that are inseparable from sustainability. Such a shift would open broader discussion on the nature, development and research of sustainability competence.

A second direction would be to support sustainability learning explicitly through the teaching of system-level thinking. Understanding sustainability involves not only acquiring a more complex knowledge base but also developing different modes of thinking, greater awareness and regulation of one's own thought processes, and learning approaches that are based on research-informed teaching of interconnected systems. Equally important are deep, emotionally engaged and attentive experiences in nature, alongside learning to recognise the intrinsic value and dignity of nature. Without an affective dimension, sustainability competence remains incomplete.

Third, for various reasons, sustainability education in Estonia has not yet, in any context, been subjected to systematic evaluation of its impact. Initiatives in general education, environmental education and citizen science require robust research designs – ideally including randomised controlled studies – as an integral component. This presupposes the development or adaptation of reliable assessment tools, ranging from observation protocols and scales to instruments that measure conceptual change in understanding complex systems. For example, it has been suggested that museum education in Estonia may currently be more innovative than formal education. This remains a hypothesis until comparative studies assess long-term, transferable knowledge gains and sustained behavioural change across different methods.

Citizen science as an opportunity to strengthen scientific conceptual thinking. Citizen science refers to the involvement of the public in research, specifically the formulation of hypotheses, conduct of research, collection of scientific data or data analysis in which members of the public, as individuals or groups, participate.[29] Most citizen science projects are led by researchers, and volunteers often contribute primarily through data collection. Some initiatives, however, involve volunteers in defining research questions, analysing data or even initiating projects.[30] Many conceptualisations emphasise the educational dimension.[31] Studies indicate that participation most strongly affects knowledge and attitudes, less frequently skills and more rarely behaviour, such as engagement in conservation or lifestyle change.[32]

The societal benefits of citizen science may be scientific, educational and more broadly social. A pan-European study assessing the contribution of citizen science projects to the Sustainable Development Goals found that quality education ranked second and climate action third among their impacts.[33] On the western coast of the United States, coastal bird observers showed increased knowledge and stronger connections to both community and environment, which were associated with more sustainable behaviour.[34] In the Netherlands, citizen scientists reported valuing nature experiences and the emotional satisfaction they provided.[35] Although comparable studies of Estonian initiatives, such as bird monitoring or the nature observation marathon, are lacking, similar effects on sustainable behaviour can reasonably be expected.

Currently, citizen science in Estonia primarily supports non-formal education (Table 6.4.1) by motivating participants to acquire knowledge and skills. Interest-based engagement in areas such as bird observation or astronomy may prompt deeper learning in languages, natural sciences or technology. Participation in organisations such as the Estonian Ornithological Society also develops social and leadership skills. Because such activities are often sustained over time, citizen science can provide a durable form of learning. In formal education, however, links with citizen science remain more fragmented, but international research has identified four profiles describing how pupils contribute to scientific work.[36] In Estonia, environmental projects play an important role in schools, although integrating them into the rhythm of schoolwork can be challenging (Table 6.4.1). For example, the nature observation mini-marathon was adjusted to school timetables, which increased participation. Teacher support and training are crucial for integrating citizen science into formal education. Pupils' research projects represent one of the strongest formats for meaningful scientific contribution. Table 6.4.1 presents examples of educational and scientific benefits, illustrating how citizen science can support the development of scientific conceptual thinking.

Table 6.4.1 The role of citizen science in society: examples from Estonian initiatives

Initiative	Methodology	Target group	Benefit to society	Educational benefit	Scientific benefit
Nature observations marathon, University of Tartu	Modified BioBlitz	Nature enthusiasts more broadly, including pupils	Improving society's digital capability, awareness of biodiversity	Non-formal digital skills and nature education	Large-scale collection of high-quality observation data
Winter garden birdwatch, Estonian Ornithological Society	Internationally standardised observation	Birdwatchers	Recruiting new citizen scientists through a popular activity	Non-formal nature education	Collection of specific, standardised observation data
Summer garden bird diary, Estonian Ornithological Society	Random observations in a defined area	Birdwatchers, gardeners	Recruiting new citizen scientists through a popular activity	Non-formal nature education	Limited
Estonia is looking for glow-worms, University of Tartu, Estonian Fund for Nature	Scientific survey	Nature enthusiasts	Popularising science	Non-formal nature education	Input into specific research
Baltic Sea Project observations, UNESCO Associated Schools Network	Nature and environmental observation protocols	Schools, pupils	Practising international cooperation, awareness of Baltic Sea environmental problems	Teaching scientific methodology in schools, formal nature education	Limited
Vaibla bird station	Bird ringing, data storage and sharing	Birdwatchers, pupils	Collection of specific data for national monitoring (practical benefit)	Acquisition of expert skills and knowledge (informal education), formal nature education	Bird measurement and observation data for scientific research

SOURCE: table by the authors

REFLECTION

Liisa Puusepp and Mihkel Kangur

We live in an era in which automated data collection systems – satellite data, environmental sensors, databases tracking developments in the economy, society and culture – make it possible to monitor the slow but relentless destabilisation of the current social order. The problem is no longer a lack of information, or doubts about the quality of data describing the functioning of the interconnected systems on which our wellbeing and survival depend. The real challenge lies in understanding how these large systems – ecological, economic, social and cultural – interact. By integrating subject areas through genuinely interdisciplinary learning, we can offer young people a clearer sense of the interconnectedness of the world and provide tools for seeking solutions to improve the current situation.

The article points out that focusing on interdisciplinary teaching requires more time and commitment. Many schools have set an example by moving towards integrated teaching in the first stage of basic education. For reasons that are less clear, this approach is rarely continued in later stages. In upper secondary education, interdisciplinary teaching remains exceptional, for a variety of reasons.

- In the national curricula for general education, cross-curricular integration is addressed only at the level of principle, which is insufficient for learners to develop an understanding of interconnected systems.
- Interdisciplinary teaching is also hindered by the volume of content, its outdated elements and the excessive level of detail in national curricula. If schools wish to implement integrated approaches – allocating more time so that pupils can develop a systemic understanding of key aspects of sustainability – something else must inevitably be reduced. Some curriculum topics will receive more limited treatment. This can create tension for teachers, who may feel they are not fulfilling expectations if they cannot cover everything that is prescribed. Understandably, this leads to reluctance to invest in interdisciplinary approaches.
- Substantial deviation from national curricula can only occur with the responsibility and support of school leadership. If leaders lack understanding of or confidence in the effectiveness of interdisciplinary teaching, and if teachers are not supported, it is generally not feasible to organise learning in this way.
- Teacher education also lacks a substantial component focused on understanding interconnected systems. Although these themes appear in course descriptions and are addressed in practical exercises, the treatment often remains superficial and confined to individual topics. Most teachers have not themselves experienced integrated learning of this kind, and the same is true of many school leaders.

'Sustainability' is often associated primarily with environmental problems. In schools, this may translate into activities such as litter collection, fashion projects made from waste materials or tree-planting days. This article, too, addresses sustainability largely within the framework of environmental education and the natural sciences. From that perspective, it is indeed possible to state that sustainability themes are present in both formal and non-formal education in Estonia.

Reliance on environmental education is understandable, as the need for the concept of sustainability emerged from concerns about nature. It is now widely recognised that many natural resources once considered renewable have been significantly depleted and that humanity has exceeded planetary boundaries in critical respects. Because the absence of moral

limits in resource use and the lack of experiential awareness of the integrity of social and ecological systems characterise only some societies, this is not a biological phenomenon that is inherently difficult to change, but a cultural one, and human history offers at least a few positive examples of cultural transformation, making it reasonable to invest effort in changing the current trajectory.

A starting point would be to ensure that sustainability is not confined to environmental education and the natural sciences. Current national curricula and education programmes can easily convey the impression that the environment is something external to us – a source of resources and a sink for waste. Natural science themes should therefore be connected with economic, social and cultural dimensions and linked to the design and implementation of future-oriented solutions. Further challenges and opportunities for improvement remain.

- The national curriculum stipulates that schools visit environmental education centres at least once a year. Some schools do so more frequently, though in general visits remain limited. Such infrequent and brief contact with the ecological dimensions of sustainability is insufficient to develop competences related to a comprehensive understanding of sustainability.
- Cultivating sustainability competence as a transversal competence clearly supports the principles of education for sustainable development. A central role is played by the individual who helps learners make sense of their experiences and who embodies values that support sustainability competence. Many teachers currently working in schools completed their studies at a time when the environmental crises that gave rise to the sustainability agenda were not widely recognised, and it remains unclear to what extent they themselves possess sustainability-related transversal competences. Even where they do, school conditions – including leadership approaches – may not support the development of these competences in practice.

One avenue for supporting sustainability competence and scientific conceptual thinking is citizen science. In recent years, new networks and data collection initiatives have emerged. However, citizen science in Estonia still lacks clear and consistent feedback mechanisms that would meaningfully reflect participants' contributions and support reflection on their activities. This limits its potential impact on sustainable behaviour.

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7.0 Introduction

Education as the foundation of a safe society

Mario Truu and Rajar Miller

KEY MESSAGES

- **A longer educational pathway, provided on equal terms for all, helps prevent offending.** The state has a duty to provide education that accommodates pupils with different abilities and ensures equal opportunities for development. However, the current regulatory framework is at times overly general and leaves the boundaries of schools' responsibilities unclear. This creates unequal conditions for young people in accessing education and continuing their studies. A pupil's ability to cope at school influences the kind of education they receive and how far they progress. The higher the level of education attained, the lower the risk of offending in adulthood.

- **A safe and supportive school environment significantly reduces the risk of deviant behaviour among young people.** The risk is higher among pupils who attend schools perceived as disorganised – schools where theft, fighting, vandalism and substance use are more common. Young people who feel safe at school and have strong bonds with it are nearly one third less likely to commit an offence than those whose ties to school are weaker.

- **Adolescent offending often occurs immediately after school hours – equally accessible extracurricular education would help address this problem.** On school days, adolescents most frequently commit offences between 14:00 and 20:00, when lessons have just ended, young people spend more time together and adult supervision is limited. Extracurricular education can effectively prevent adolescent offending if it is easily accessible to as many young people as possible during this risk period.

INTRODUCTION

Education carries a far-reaching responsibility: to support pupils' development into law-abiding members of society. Section 2(3)2) of the Estonian Education Act provides that the purpose of education is to shape individuals who respect and abide by the law.

This objective is directed at preventing deviant behaviour among both children and adults. The more effectively education fulfils this aim, the more it can influence young people's behaviour and the fewer resources are likely to be required to address the consequences of offending. The five articles in this chapter are framed by the view that education is a cornerstone of Estonia's security. The course and quality of education have a tangible impact on the prevalence of risk behaviour among school-age young people and adults.

The chapter begins by examining weaknesses in the Estonian school system, including in addressing the needs of vulnerable children and preventing deviant behaviour. It outlines the current approach to dealing with juvenile offenders. Based on recent data, the chapter analyses the types of offences committed by school-age young people in Estonia, the ages at which they occur and the times of day when they are most frequent. It also examines how educational attainment may affect offending in adulthood and the course of related criminal proceedings. The findings enable a more considered assessment of how to prevent youth deviance more effectively and thereby strengthen security in Estonia.

SCHOOLS CARRY GREAT EXPECTATIONS, BUT NOT SOLE RESPONSIBILITY

In their article, Aigi Kivioja and Ülle Madise point to the importance of the state's obligation to provide education suited to pupils with different abilities and to ensure equal opportunities for development. Their analysis shows that the current regulatory framework is, in places, too general and leaves the scope of schools' responsibilities unclear – for example, in organising support services for children in need and regulating smartphone use. Academic workload may also vary considerably between schools, including in the volume of homework. School life must be regulated clearly enough to ensure consistent rules and equal opportunities for every child to fulfil compulsory education requirements and progress in education.

Schools are increasingly expected to do more: alongside teaching, they are also expected to prevent and address social problems. Andra Reinomägi and Ingrid Saarepuu emphasise that children in need must be identified early and supported promptly in order to prevent harmful consequences both for the child and for society. Effective prevention of offending begins long before the first contact with the justice system and depends, among other factors, on close cooperation between education and social welfare services. Children in need must be supported where they are, whether at school or at home; what matters most is that intervention is not delayed. Although schools play a central role, they cannot meet these expectations without strong cross-sector cooperation, clearly defined responsibilities and well-functioning support structures.

RISK BEHAVIOUR DEPENDS ON YOUNG PEOPLE'S SENSE OF BELONGING

Anna Markina's article shows that youth risk behaviour increases sharply when pupils do not feel supported at school and experience exclusion or insecurity. A school environment that provides a sense of safety significantly reduces the risk of deviant behaviour among minors. Young people who feel safe at school and have strong bonds with it are around one third less likely to commit an offence than those with weaker school attachment. Weak attachment is reported particularly by basic school pupils, especially those whose first language is Russian and children from families with fewer resources. The article also shows that nearly one fifth of young people in Estonia experience cyberviolence. The most common forms include threats, hate speech and the non-consensual distribution of intimate images. The highest-risk group again consists of basic school pupils, particularly Russian-speaking

pupils from economically vulnerable families. Boys more often commit offences related to cyberviolence, while victims are predominantly girls. Much of young people's communication now takes place in virtual environments, and school has become one of the principal physical spaces for interaction during the day. This further increases the importance of schools in shaping young people's behaviour. Much of young people's communication now takes place in virtual environments, and school has become one of the principal physical spaces for interaction during the day. This further increases the importance of schools in shaping young people's behaviour.

ADOLESCENT OFFENDING PEAKS AFTER SCHOOL ON SCHOOL DAYS, BETWEEN 14:00 AND 20:00

The article by Eneli Kindsiko, Mario Truu and Rajar Miller provides the first systematic overview of the days and times when school-age young people in Estonia most frequently commit offences. Adolescent offences occur most often on school days, particularly on Fridays, with the main risk window falling between 14:00 and 20:00. By then, lessons have just ended, young people are spending time together, and adult supervision is often limited – for example, because parents are still at work. During this period, non-formal education could structure adolescents' daily routines and offer meaningful, appealing opportunities for self-realisation that take account of their social needs while also helping to prevent potential offences.

Adolescents, however, participate least in extracurricular education: among 16–19-year-olds, only around one quarter take part in organised extracurricular activities. The problem is compounded by the fact that children from lower-income families have more limited access to extracurricular activities and, at the same time, face a higher risk of dropping out of school and coming into conflict with the law. Extracurricular education can effectively prevent adolescent offending if it is made easily accessible to as many young people as possible during the 14:00–20:00 period on school days. In this sense, extracurricular education is not merely a way of occupying free time but a socially cost-effective preventive measure. Research has shown that every euro invested in youth sport, and particularly in extracurricular activities for at-risk youth, may yield savings to society of up to 44 euros.[1] This is another illustration of how strengthening public safety is directly and inseparably linked to education and youth policy: non-formal education may be one of the most effective means of reducing youth deviant behaviour.

INTERRUPTED EDUCATIONAL PATHWAYS ARE COSTLY FOR SOCIETY

In their article, Andri Ahven and Ingrid Saarepuu examine whether a young person's educational pathway influences their likelihood of leading a law-abiding life in adulthood. They conclude that education beyond basic education significantly reduces the risk of offending in adulthood. This risk is highest among men with low levels of education, particularly in violent and property offences. Individuals with lower educational attainment are also at greater risk of becoming victims of domestic violence. Among persons with higher education, not only is the likelihood of offending substantially lower but the probability of being referred to court is also lower, as prosecutors are more likely to consider court proceedings unnecessary. This means that the higher the level of education, the lower the burden on the criminal justice system and the lower the cost to the state. At the same time, certain less frequent and more specific offences, such as corruption or tax crimes, may become more likely as education levels rise, since they require specific knowledge or access to positions of authority.

The fact that educating individuals is considerably less costly for society than dealing with offenders later in life is illustrated by the following comparison. In the 2023/24 academic year, the average annual public expenditure per pupil in general education schools in Estonia was €6,071.[2] By contrast, the average cost of maintaining one prisoner is €3,027 per month, or €36,324 per year, and the average cost per probationer is €130 per month, or €1,560 per year.[3] Thus, educating a child is, on average, six times less expensive for the state than keeping an offender in prison.

HOW DO WE MOVE FORWARD?

Political choices in allocating resources. In their reflections, Ivo Visak, Madis Kallas and Raul Kadaste all point, in different ways, to a shortage of resources in both education and social welfare – whether in unequal access to support services and extracurricular activities or in difficulties participating in everyday learning. Recurring themes include the lack of support specialists, uneven levels of competence among professionals working with children, limited resources for teachers to address the concerns of children and young people preventively, and parents' varying capacity to support their children, depending on municipal context and socio-economic background. These challenges must be addressed primarily at the political level – mainly nationally, but in some cases also at the municipal level. Additional resources are needed to alleviate shortages of educational and support staff, raise professional standards and strengthen preventive capacity. At the same time, municipalities should be supported through compensatory measures and targeted subsidies to ensure more equal access to existing services.

Translating values education from paper into practice. A second major challenge concerns entrenched attitudes and mindsets, as noted by Ivo Visak, Raul Kadaste, Gerli Brifk and Jürgen Rakaselg. The contemporary curriculum not only allows but explicitly expects schools to engage in values education alongside traditional academic instruction. In practice, however, established norms within schools and society are often at odds with these expectations, and the persistence of such discrepancies is frequently defended by reference to school and teacher autonomy. In addition to grades, factual knowledge and standardised test results, greater attention should be paid to formative values and soft skills, so that prevention does not remain merely a formal commitment on paper.

Making parental education preventive. The root causes of risk behaviour among children and young people, and the possibilities for prevention, almost always extend beyond the school environment – into the home, kindergarten or extracurricular settings, as emphasised by Gerli Brifk, Madis Kallas and Raul Kadaste. While the expectations placed on schools and education professionals have changed over recent decades, support for parents must also reflect contemporary knowledge about child development and prevention. This may involve evidence-based programmes to support young people already exhibiting risk behaviour, as well as sustained, structured cooperation between families and educational institutions. Existing approaches should be systematised and shifted from reactive responses towards preventive action.

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7.1

Pupils' needs are a reality schools must address

Aigi Kivioja and Ülle Madise

KEY MESSAGES

- The state must ensure that every child receives the best education suited to their abilities and talents.
- Inclusive comprehensive schools must be able to support pupils with different abilities.
- A child with support needs can fulfil compulsory school attendance only through effective cooperation between the education and social welfare sectors.
- Problems must be identified as early as possible and addressed immediately, including through creative solutions where standard approaches do not work.
- Schools need autonomy in organising school life and teaching, but uniform legal requirements and rules are also necessary to protect learners.

INTRODUCTION

Under the Estonian Constitution, children must attend school and study, parents must support their children in fulfilling compulsory school attendance, and the state and local governments must maintain a sufficient number of tuition-free schools. Responsibility for ensuring that a child develops into a responsible citizen and a good person rests with the home, the school and society as a whole. This article outlines what laws and regulations prescribe for all schools alike and how much discretion children, parents and schools have in educational matters. It also considers what happens when a child encounters difficulties at school or fails to fulfil compulsory school attendance.

THE STATE MUST ENSURE THAT EVERY CHILD RECEIVES A GOOD EDUCATION

The Estonian Constitution (Section 37(1)) and international law[1] require every child to attend school for the period prescribed by law. School education should support the fullest development of the child's personality and

abilities, the formation of identity and a sense of belonging, and respect for human rights and nature.[2] Estonian legislation thus provides that both basic schools and upper secondary schools have an educational and formative function.[3]

A low level of education and the resulting constraints on self-realisation are among the main causes of young people's exclusion and risk of poverty.[4] Basic education alone is no longer sufficient for successful participation in the labour market or private life.

The Estonian Education Strategy 2021–2035 sets the objective that, by 2035, 90% of 20–24-year-olds will have attained at least upper secondary education.[5] In line with this objective, the Riigikogu decided that, from 1 September 2025, compulsory education would no longer be limited to basic school. According to Section 101(1) of the Education Act, compulsory education involves the obligation to participate in basic, secondary or vocational education and training and to acquire the knowledge, skills and competences necessary for one's development. Under subsection (2), compulsory education applies to any child residing in Estonia, including children who are foreign nationals or of undetermined citizenship, who have reached the age of seven before 1 October of the current year. Children remain subject to compulsory education until the age of 18. The requirement is deemed fulfilled before the age of 18 if the child has completed upper secondary or vocational education.

There is no reason to doubt that extending compulsory education is the right direction and essential in contemporary society. However, the question of how to ensure that children actually attend school – or, more precisely, arrive there in the first place – must be addressed. Extending compulsory education does not in itself guarantee educational attainment if existing bottlenecks and obstacles related to school attendance and retention are not resolved.

The Ministry of Education and Research's 2023 report indicates that although the overall dropout rate in the third stage of basic school remained unchanged compared with the previous year (0.3%), dropout among girls increased.[6] The analysis notes that as the number of pupils is currently growing, the number who do not complete basic school in full-time study has also increased.[7] The Chancellor of Justice has likewise encountered cases in which pupils have been absent from school for hundreds of hours, difficulties with attendance have persisted for a long time and schools acknowledge that there is no solution to the problem.

The law assigns several responsibilities to the child's legal representative to ensure fulfilment of compulsory education. These include creating the conditions at home that enable the child to study and the prerequisites for participation in education (Education Act, Section 102(1)1), monitoring the child's progress and informing the school in the event of problems (Education Act, Section 102(1)1). A pupil who has been absent from school without valid reason must be supported by the school in an appropriate manner, and solutions must be sought, such as identifying the need for additional support or an individual curriculum (Basic Schools and Upper Secondary Schools Act, Section 36(3) and (4)).

Appropriate solutions must be sought within the school, but this must be done in cooperation with others responsible for the child's well-being. If the school is unable to ensure that the child fulfils compulsory school attendance, the local authority of the pupil's place of residence must be involved in resolving the problem. Municipalities organise both child protection and social welfare services for their residents. Thus, the school, in cooperation with the municipality (which is generally also the owner of the school), must identify the reasons for the child's absence and find suitable measures. The Child Protection Act (Section 8(1)) also provides for cooperation in safeguarding the rights and well-being of the child.

Understandably, responsibility does not rest entirely with the teacher, including the class teacher. Nor is the teacher required to act as case coordinator where problems with fulfilling compulsory school attendance are long-term. By law, the head of the school must appoint a coordinator for the education of pupils with special educational needs, whose task is to organise the internal teamwork necessary to support learning and development and to coordinate participation

in inter-agency cooperation outside the school (Basic Schools and Upper Secondary Schools Act, Section 46(2)). The head or owner of the school must also designate a person responsible for organising the exchange of information related to compulsory education with the municipal government (Basic Schools and Upper Secondary Schools Act, Section 36(6)). The school may additionally appoint one or more staff members to support pupils and to monitor and organise their learning activities. Schools may also provide a support person, such as an assistant teacher or social worker, to a pupil who is at risk of not attending school. If the pupil has not arrived at school, the support person's task is to call the pupil or go to their home and liaise further with the child protection worker. Assistance must be based on appropriateness and effectiveness and on the child's actual need for support.[8] Of course, the school is not required to organise child protection or social welfare services in place of the municipality, but it must ensure that problems are identified and that efforts are made to find solutions. Child protection workers have noted that cases involving children in need of assistance reach them too late, when the difficulties faced by the child and family are already severe.[9] In their view, healthcare and education professionals in particular should report children in need of assistance more actively.[10]

THE ESTONIAN SCHOOL SYSTEM IS BASED ON THE PRINCIPLE OF AN INCLUSIVE COMPREHENSIVE SCHOOL

Each country establishes its education system based on its constitution and its social and cultural traditions. In Estonia, responsibility for the school network is shared between the state and municipalities. The state and local authorities are required to maintain a sufficient number of educational institutions, and tuition fees must not be charged in public general education schools. Private schools may also be established in accordance with the law.

The closure of small rural schools, the separation of upper secondary education from basic schools, the establishment of state upper secondary schools and the state's role in supporting private schools continue to generate social tensions. The question of whether the gradual abolition of a segregated school system and the transition to Estonian-language instruction are consistent with children's rights has been resolved by the Supreme Court.[11] The court found that neither the constitution nor international law binding on Estonia grants an individual the right to require the state to provide basic education in a language other than Estonian.

Parents often ask how to understand the constitutional provision that gives them a decisive say in choosing their child's education. The answer may not always be readily accepted: a parent cannot demand the establishment of a school that they consider most suitable for their child, permission for the child to study exclusively at home or in English, or the right to opt out of certain compulsory subjects. Under the constitution and international law, parents have the right to make choices within the existing school system.[12]

For many years, the impact of pupils' socio-economic background on learning outcomes in Estonia was lower than the OECD average.[13] Unfortunately, this advantage is diminishing or has already been lost.[14] Compared with the previous PISA survey in 2018, the proportion of socio-economically disadvantaged pupils performing below the baseline level increased by 8.5 percentage points. It has also been found that educational stratification has persisted for considerably longer.[15] The situation is reversed when it comes to top performers. Only 6% of pupils from less affluent families are able to cope with the most complex tasks, whereas nearly a quarter of pupils from more affluent families are top performers.

Demand for so-called elite schools has not declined.[16] Educational researchers and child psychologists confirm that entrance tests for first grade generally do not identify children with higher cognitive ability, but instead reflect the extent of home support and pre-school preparation. It is difficult to find a legal justification for basic schools that select pupils through testing: neither the Basic Schools and Upper Secondary Schools Act nor the national curriculum for basic schools

provides for specialised curricula at this level; schools may shape their profile and fields of study within the national curriculum, but this does not create a basis for selective admission. There is therefore no basis for treating certain schools differently on the grounds of the choices they have made.

Every basic school in Estonia must be good enough to provide each child with the best education suited to their abilities. Children should therefore have equal educational opportunities regardless of their place of residence, mother tongue or home background. The aim of the comprehensive basic school is to create opportunities for every pupil in every school, considering their different abilities, interests and backgrounds. Pupils with higher ability must be given sufficiently complex and challenging additional tasks, while those experiencing difficulties must receive support and adjustments.

If a pupil shows signs of giftedness, the school must provide an individual curriculum and, where necessary, additional instruction by subject teachers or other specialists through educational programmes or institutions (Basic Schools and Upper Secondary Schools Act, Section 37(4)). Unfortunately, the system established by the legislator does not function particularly effectively.[17] Over the years, the greatest difficulties have concerned the organisation of education in accordance with children's needs: support services have been inadequately arranged and special classes, including smaller classes, have not been established.[18]

The Chancellor of Justice's casework has shown that the creation of a learning environment that meets pupils' needs is hindered, among other factors, by excessively large classes. The larger the class, the more difficult it is for a single teacher to take account of pupils' different needs and adapt instruction.[19] It is also more difficult to monitor pupils and identify problems.

The maximum class size in basic school is 24 pupils (Basic Schools and Upper Secondary Schools Act, Section 26(1)). By law, the owner of the school may, in exceptional circumstances, at the proposal of the head of the school and with the approval of the board of trustees, increase the number of pupils beyond this limit for one academic year in a specific class, provided that all health protection and safety requirements are met (Basic Schools and Upper Secondary Schools Act, Section 26(3)). Unfortunately, in several schools the exception has become the rule, and class sizes consistently exceed the statutory limit.[20]

Several cases examined by the Chancellor of Justice have shown that adapting instruction – for example, by forming a smaller class for pupils with special educational needs – is not possible because all school premises are already in use. When assigning a school on the basis of a child's place of residence, the local authority, as the owner of the school, must consider the school's actual capacity and needs, including the possibility of forming smaller classes if necessary. The aim of inclusive education is commendable, but shortages of teachers and other specialists, combined with limited space, tend to undermine the rights of all pupils.

Excessively large classes and the overuse of school premises to the limits of capacity also damage the image of the comprehensive school and increase educational stratification. A child may be enrolled in a private school with smaller classes, but given the tuition fees generally charged by private schools,[21] this option is accessible primarily to higher-income families. Private schools have the right to select pupils, and in practice there have been cases where, if problems arise – for example, if a child develops special educational needs – the school terminates the contract or declines to renew the annual contract. There have also been unusual cases in which parents have chosen a Christian private school for their child, only to find that the religious instruction included in the school curriculum does not align with their worldview. The Chancellor of Justice has had to respond to the question of whether parents have the right to demand that their child be exempted from studying that subject.

PUPILS' AND TEACHERS' RIGHTS AT SCHOOL: WHERE DOES FREEDOM END AND OBLIGATION BEGIN?

Numerous rights and obligations of pupils and teachers are laid down in laws and regulations. The

way these are implemented largely determines a pupil's academic progress and willingness to attend school.

Laws and regulations are, and must be, abstract to some extent. National legislation cannot regulate in detail everything that takes place in schools. Schools and teachers inevitably retain discretion in deciding how to organise specific matters. Nevertheless, decisions that are significant for the realisation of the fundamental right to education must be taken by the Riigikogu, and the scope for delegating such decisions is limited (Constitution, Section 3(1)).[22] Basic schools and upper secondary schools do not have constitutionally guaranteed autonomy in the same way as universities do (Constitution, Section 38(2)). The Chancellor of Justice casework shows that schools, owners of schools and parents often have markedly different understandings of how to implement the general guidelines set out in legislation.

There are numerous examples of rights and obligations on which pupils and parents have struggled to obtain clarity. We highlight those that have remained unresolved for years.

CHALLENGES IN SCHOOL LIFE: HOMEWORK, RESITS AND SMART DEVICES

One of the most long-standing and complex issues concerns study load.[23] More specifically, the problem lies in the large volume of homework and the clustering of tests within a short period, usually a single week. It is primarily pupils who turn to the Chancellor of Justice with concerns about the organisation of tests.[24]

The Basic Schools and Upper Secondary Schools Act (Section 25(4)) provides that, in planning and implementing instruction, schools must ensure that a pupil's study load is age-appropriate and manageable, allowing time for rest and leisure activities. Schools must therefore ensure that teachers take this rule into account when planning instruction. Achieving a lawful study load is possible only if teachers cooperate closely with one another when planning teaching. As pupils of different ages have varying abilities and skills, it may reasonably be asked whether more detailed rules on study load could be established.

Although this is a complex task, study load and assessment cannot be left entirely to individual schools without national regulation. In an ideal situation, this might be feasible, but petitions submitted to the Chancellor of Justice and meetings with pupils show that, where no clearer limits are set beyond the general requirement that study must be manageable, overload is likely to arise. Achieving a reasonable study load may also require a reduction in the volume of instruction, a matter that has been discussed for years. Society has reached a common understanding of the optimal working time necessary to safeguard employees' well-being, and limits on overtime have been established. This principle is accepted in relation to teachers, who should not have to perform work-related tasks in their free time. Nevertheless, for years the situation has persisted in which, at least in some schools or school stages, pupils are expected to complete homework at the expense of their rest time, including at weekends, and this is regarded as entirely normal.

A pupil's study load and overall performance at school are also affected by the organisation of resits. This may appear to be a minor aspect of school life, but from the perspective of pupils and parents it is not. Section 21(7) of the national curriculum for basic schools provides that if a written or practical assignment, oral response or presentation, or practical activity or its outcome has been graded 'poor' or 'weak', or no grade has been awarded, the pupil must be given the opportunity to retake the assessment or complete an additional assignment. The procedure for resits and follow-up tasks is laid down in the school curriculum. Over the years, problems have arisen where schools restrict pupils' right to retake assessments by adopting rules that limit this right – for example, by specifying that certain tasks cannot be retaken, or by providing for different grading arrangements for resits, such as by making it impossible to obtain the highest grade for a resit, regardless of performance. In addition, the time allowed for resits is often rather short. In such cases, more time may be needed: if a pupil has been absent for an extended period due to illness or another reason, or even without valid reason, it may not be realistic to expect them to

Excerpts from pupils' submissions to the Chancellor of Justice concerning tests:

'I saw an article about a biology teacher who breached the regulation on the organisation of studies by adding a test to a week in which pupils already had three tests scheduled. Our class also considered contacting you because we are very often given more than three tests a week as well: sometimes four, sometimes five, etc. This is very difficult and burdensome for all of us, and I believe our class is not the only one in this situation.'

'According to an extract from eKool, we have five tests next week (the extract is attached). Tests are also scheduled on Mondays and Fridays (the biology test has been incorrectly entered for Tuesday), even though these subjects are not taught only on Mondays or Fridays. What should I do if, when speaking to the teacher, the child is told that it is not the teacher's fault that the syllabus is so extensive? Refusing to take the test, however, leads to the teacher's displeasure, and I then have to take the test later outside lesson time (that is, next week after lessons, during a resit lesson). We are also told that the pupil is simply being difficult and insisting on their rights if they dare to refuse to take the test.'

'I am contacting you because I am concerned that there are too many tests in one week at school. Specifically, we have four tests in one week, two of them on the same day, and one is on a Monday, even though that subject is not taught only once a week.'

master the intervening material and complete all outstanding tasks within, for example, ten days. As the state has established the right to resit assessments but has set only minimal conditions for exercising that right, it may be asked whether more detailed and clearer rules should be established at national level to protect pupils' rights.

An important document for pupils' and teachers' rights and obligations is the school's internal rules. These are established by the head of the school and are binding on pupils and school staff (Basic Schools and Upper Secondary Schools Act, Section 68(1) and (2)). The internal rules must include provisions on notification of assessment (Section 29(4)), notification of absence from studies (Section 35(3)) and the use of surveillance equipment (Section 44(6)), as well as other matters provided by law. Schools have also laid down rules on dress, behaviour and other matters. Legislation does not provide guidance on the scope or substance of issues regulated at schools' discretion.

The internal rules may establish procedures for the use of items and substances that are not prohibited by law in schools but whose use the school nevertheless wishes to restrict (Section 44(1)3). If a pupil uses such items or substances in breach of the internal rules, the school may temporarily confiscate them (Section 58(3)6)). The law does not specify what such items or substances may be. Each school decides which items or substances are subject to restrictions and under what conditions they are permitted.

In practice, the use of smart devices in school has become a particular concern. The Chancellor of Justice has explained that the right granted to schools to temporarily confiscate a smart device or other item is consistent with the constitution.[25] A school cannot permit a pupil to disrupt a lesson by using a smart device in a way that prevents both the pupil and others from learning. Furthermore, the use of smart devices at school has been associated with reduced concentration and academic performance, health problems and cyberbullying.

If the use of smartphones in school concerns not only classroom discipline but also children's health, development and broader patterns of use, the question arises as to how differences in rules between schools can be justified. Under the constitution, freedom and the

responsibility that accompanies it are the rule, and restrictions are exceptions that require justification. Each restriction must pursue a constitutionally legitimate aim and be the most suitable and least restrictive means available, and compliance must be enforceable. Pupils from different schools interact with one another, and substantive exclusion from peer communication may adversely affect a child's rights. For these reasons, discussion of the need for uniform rules is justified, while still leaving teachers free to use smart devices in teaching. Learning to use artificial intelligence wisely, critically and ethically is possible only through the use of smart devices and computers.

The question of uniform rules has also arisen in other areas. For example, the regulation of religious symbols and related dress in schools should be addressed in a timely manner. At present, each school may regulate dress through its internal rules if it so wishes. Such regulation is generally based on aesthetic considerations, the fostering of a sense of community, the preservation of tradition and similar factors. However, clothing may also express worldview and religious beliefs. The state must ensure that instruction in public schools is impartial and neutral[26] and does not promote any particular religion, while each state also has the right, in designing school curricula and resolving organisational matters related to schools, to take account of its cultural and historical traditions.[27]

The internal rules may also establish measures to protect the mental and physical safety and health of pupils and teachers (Basic Schools and Upper Secondary Schools Act, Section 44). Relevant measures, such as directing pupils to distance learning, may restrict fundamental rights, including the right to education. It is therefore appropriate to consider to what extent such measures should be established by law or whether schools and owners of schools should at least be provided with more specific frameworks for introducing them.

Although attendance at upper secondary school is voluntary, it is questionable whether a pupil may be expelled for breaching the internal rules. The school's primary obligation is to support the pupil – the rules on providing support laid down in the Basic Schools and Upper Secondary Schools Act also apply at upper secondary level. As expulsion constitutes a significant restriction of the fundamental right to education, a pupil must not be expelled too readily or for every breach of the internal rules. By comparison, under the Universities Act (Section 17(5), (6) and (7)), a higher education institution may exclude a pupil from studies if the pupil has seriously breached the conditions and procedures of study, endangered other pupils or other persons through their conduct, or committed a serious offence against academic integrity.

SUMMARY

Although many pupils in Estonia continue to leave school successfully and feel satisfied with their education, too many still encounter difficulties or drop out altogether. Schools are sometimes expected to meet demands that exceed what they can realistically achieve, and the unfair categorisation of schools as 'good' or 'bad' adds to the pressure, often in practice dividing schools that can select pupils from those that cannot. Tensions are further heightened by the recurring tendency to assign ever new obligations to schools, including quasi-policing functions, and by inconsistent supervision of compliance with standards. However clear and fair the rules may be, they are of little use if they are not implemented in practice – for example, if there are not enough people able and willing to work with children. Too often, young people with serious concerns reach the support they need too late, when they have already been absent from school for a long time, relationships have deteriorated significantly, and their self-esteem or health has suffered. The need for support must be identified much earlier. Similarly, giftedness and other specific characteristics must be recognised as early as possible, and care must be taken to ensure that every child living in Estonia develops into the best version of themselves. Schools and teachers inevitably play an important role in this regard. Every child has the right to receive the best education suited to their abilities, regardless of their home language, health, parents' income or level of education.

REFLECTION

Ivo Visak

Systemic shortcomings. Does a young person studying in Kärdla have the same educational and extracurricular opportunities as a young person in Tallinn? As a school leader working in Saaremaa, I would very much like this to be the case, yet in reality access to diverse extracurricular activities and learning opportunities for gifted pupils – such as participation in university-based educational programmes at upper secondary level – is limited. This is understandable given geographical particularities, but the state, municipalities and the education system as a whole must create compensatory solutions – for example, by providing transport and accommodation support.

An even broader problem is the shortage of support services: there are not enough school psychologists, special education teachers or social pedagogues. Waiting lists for assistance, particularly in cases involving mental health disorders, are long. Support that is needed immediately is often available only after three months, which may endanger a pupil's mental and physical health. What is required is not only healthcare reform but also reform in education policy: all children must be guaranteed access to professional support, regardless of their family's financial means or place of residence.

It bears repeating that it is essential to invest in support specialists – special education teachers, educational psychologists and social workers – in order to provide assistance both to gifted pupils and to those experiencing difficulties.

The past teaches, the past lingers. Why do certain school practices persist even though it has been pointed out for decades that they are not healthy for teachers or pupils? For example, the accumulation of homework in the context of the AI leap is absurd: will teachers soon be assessing homework produced by pupils' artificial intelligence with the help of their own artificial intelligence? It would be more sensible to find ways to manage new technologies and harness them to support learning, under teachers' guidance.

We must accept that times have changed. A new generation is different and requires a different approach. Schools cannot assume that all pupils arrive with prior knowledge of certain learning styles, communication practices or behavioural norms. Although the primary task of the school is teaching, schools must still provide values education. Children who do not acquire the skills needed for life at home must gain them at school, with the support of caring and attentive teachers.



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7.2

Patterns and causes of juvenile offending: School, family and the digital environment

Anna Markina

KEY MESSAGES

- One in five young people in Estonia has committed an offence. The most common offences are shoplifting and sending hurtful messages on social media.
- One in five young people in Estonia has experienced cyberviolence. On social media, this includes threats, hate messages and the non-consensual sharing of intimate images.
- Young people who perceive their school environment as disorganised and violent are at greater risk of offending. Positive, strong bonds with school reduce the risk of deviant behaviour.
- A supportive family that monitors a child's behaviour reduces the child's risk of offending, while direct or indirect exposure to violence in the family increases the risk of deviant behaviour.

INTRODUCTION

One of the most consistently confirmed patterns in criminology is the relationship between age and crime: the proportion of young people who commit offences rises sharply in early adolescence, peaks in late adolescence or early adulthood, and then declines markedly with age. The traditional view regarded this age curve as a universal phenomenon,[1] arguing that the age distribution of offending is broadly similar regardless of historical period or cultural context. Subsequent studies, however, have shown that the peak of offending may vary by offence type[2] and culture.[3] Most individuals who offend during adolescence desist in adulthood,

but a small proportion continue throughout their lives, becoming chronic offenders.[4] In analysing the impact of environmental factors on juvenile deviant behaviour, this article draws on the risk and protective factors approach.[5] Risk factors may stem from the young person's own personality traits as well as from the family, peer group and school environment. In this article, we focus on two central environments in a child's life: the family and the school.

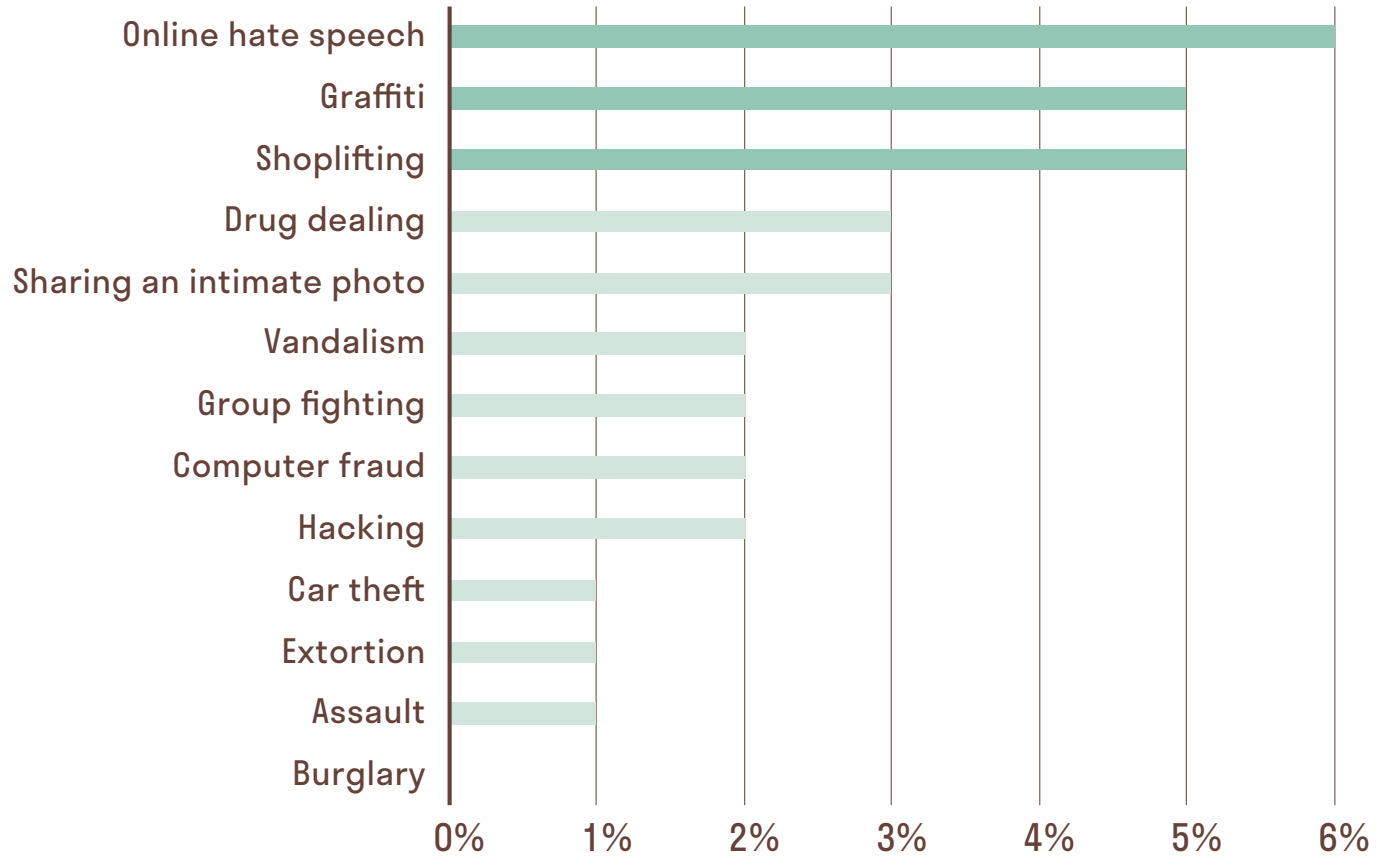
ONE IN FIVE YOUNG PEOPLE IN ESTONIA HAS COMMITTED AN OFFENCE

This article is based on an analysis of data from the International Self-Report Delinquency Study (ISRD4),[6] conducted in Estonia in spring 2023. We begin by examining how frequently pupils in grades 8–11 commit offences. Figure 7.2.1 presents the proportion of young people who, according to the survey, committed at least one offence during the preceding 12 months.

One fifth of the surveyed young people reported having committed at least one of the listed acts in the past 12 months. Excluding weapon carrying, the most common offences were shoplifting from a shop or store (5%), painting graffiti (5%), and sending hurtful messages or comments on social media about someone's race, ethnicity, nationality, religion, gender identity or sexual orientation (6%, also referred to as online hate speech). More serious offences, such as burglary with intent to steal, theft of a motorcycle or car and extortion, were rare – fewer than 1% of respondents admitted to having committed such acts.

We now examine more closely traditional offences such as shoplifting (Figure 7.2.2a) and drug selling (Figure 7.2.2b). Shoplifting is most prevalent in Harju and Ida-Viru counties (7%), while the proportion of perpetrators is lowest in Võru county (1%) and in Lääne-Viru, Viljandi and Rapla counties (3%). The data do not allow a full explanation of these inter-county differences. They may reflect

Figure 7.2.1 Prevalence of offences during the 12 months preceding the survey



SOURCE: figure by the authors based on ISRD4[7]

a combination of factors: leisure patterns, the popularity of youth centres and the availability of extracurricular education, both in terms of provision and affordability. Where young people lack opportunities to participate in structured activities outside school and shopping centres become the main venue for spending free time, the risk of shoplifting increases.[8] Self-reported involvement in drug selling is more evenly distributed across counties, varying between 2% and 4%.

The data indicate that both shoplifting and drug-related offences are significantly more common among young people whose families experience economic hardship. This may be explained by the instrumental nature of these offences: shoplifting may be a means of obtaining goods that cannot be afforded legally, and drug selling may serve as a way of earning pocket money.[9] Economic hardship is also associated with other risk factors for offending: family stress,[10] which may result in poorer family relationships and weaker supervision of the child's activities, limited opportunities to participate in extracurricular education[11] and a higher likelihood of becoming a victim of bullying.[12]

An analysis of shoplifting by age shows that among 14–16-year-olds,[a] around 6% reported having shoplifted in the past year. This proportion declines thereafter, falling to 4% among 17-year-old pupils in upper secondary school and 2% among adult pupils in upper secondary school. Among 16-year-olds, there appears to be no difference between those studying in basic school and those in upper secondary school, although it is noteworthy that shoplifting is likely to begin before the age of 14. Drug distribution follows a different pattern: the proportion of young people who have mediated drugs increases with age and peaks among 16-year-old basic school pupils. At the same time, the proportion is lower among 16-year-old pupils in upper secondary school, which may suggest that drug selling is more common among young people who do not proceed to upper secondary education. In later adolescence, drug selling begins to decline again.

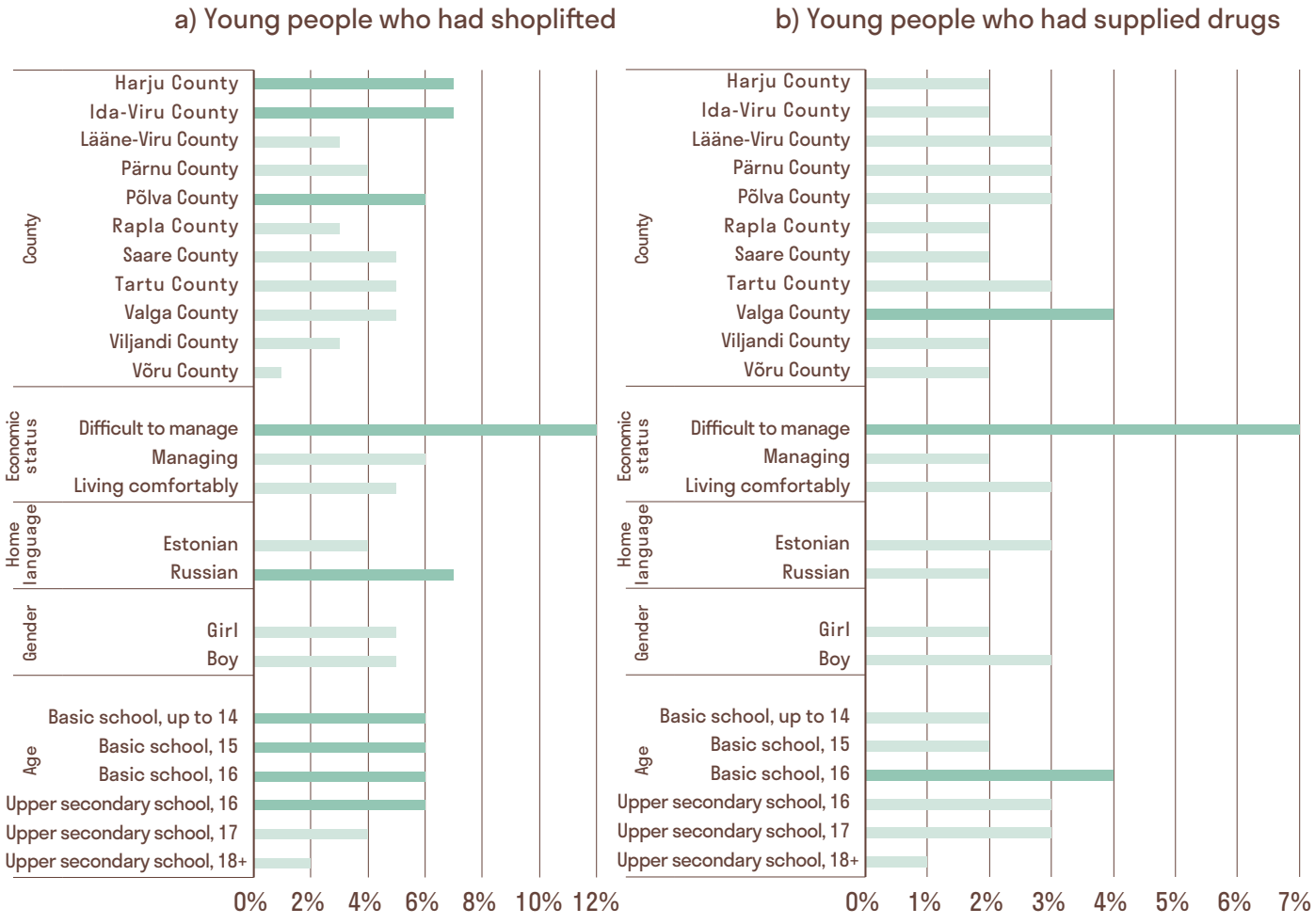
A comparison of offending rates between boys and girls reveals an interesting pattern: for all offences studied, offending in the past 12 months is more common among boys than among girls. There is one exception: in the case of shoplifting, there is no statistically significant difference between girls and boys, although the proportion is slightly higher among girls. This was not the case in 2006, when the ISRD study was first conducted in Estonia and property offences were more common among boys than girls.[13] According to ISRD3 data from 2013, the difference between boys and girls was no longer statistically significant, although the percentage of girls reporting shoplifting was somewhat lower.[14]

ONE IN FIVE YOUNG PEOPLE IN ESTONIA HAS EXPERIENCED CYBERVIOLENCE

In the 12 months preceding the survey, 19% of children had been victims of offences on social media. The most common experiences were threats (15%), hate messages (8%) and the non-consensual sharing of intimate photos or videos (4%) (Figure 7.2.3). One of the most common acts, reported by 6% of young people as having been committed in the preceding 12 months, was sending hurtful messages about someone's race, ethnicity, nationality, religion, gender identity, sexual orientation or similar characteristic. Eight per cent of respondents reported having received hate messages through social media. Basic school pupils were at the highest risk of encountering hate on social media, both as victims and as perpetrators. Gender also played a role: boys were more often perpetrators, while girls were more often victims. Russian-speaking

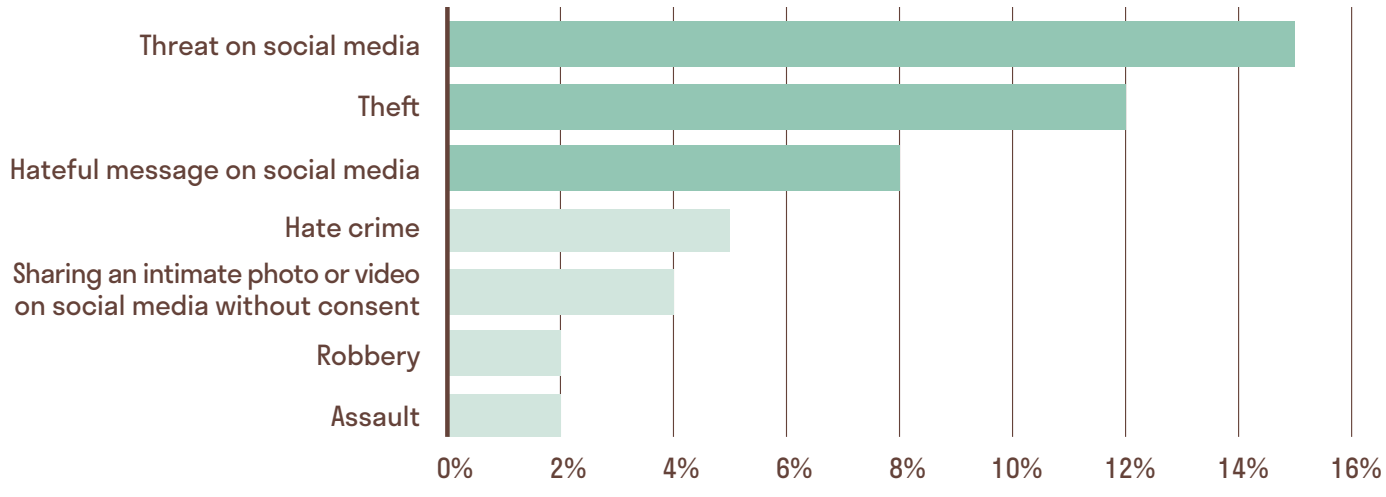
a The ISRD4 sample consisted mainly of 14–18-year-olds; a small number of grade 8 pupils were 13 years old and some pupils in upper secondary school were older than 18. In analysing age, it is important to take into account whether the respondent is in basic school or upper secondary school, as pupils in upper secondary school are generally those with better academic performance and discipline who plan to continue to higher education. Consequently, the groups differ not only by age but also by several background factors that may influence the prevalence of offending. When age groups are described, it is therefore specified whether the respondent is in basic school or upper secondary school.

Figure 7.2.2 Proportion of young people who shoplifted or sold drugs during the 12 months preceding the survey, by socio-demographic categories



SOURCE: figure by the authors based on ISRD4[15]

Figure 7.2.3 Proportion of young people who experienced specific offences during the 12 months preceding the survey



SOURCE: figure by the authors based on ISRD4[16]

young people faced a higher risk of victimisation. A family's economic position affected whether a young person became a victim, but not whether they committed such acts. Young people most frequently received hurtful messages about their appearance (44% of those who had received such messages), followed by comments concerning sexual orientation (13%) and family economic position (9%). Among respondents, 3% admitted having shared someone's intimate photo on social media without that person's consent, while 4% had themselves been victims of such an act. In 12% of cases involving the sharing of images or videos, the perpetrator was a current or former boyfriend or girlfriend. In most cases (89%), intimate images were circulated in closed group chats. Only 4% of such incidents were reported to the police. The sharing of intimate images was more common among basic school pupils, most often boys from Estonian-speaking families with relatively weaker economic positions. The typical victim was an Estonian-speaking girl in basic school, with family affluence not being a decisive factor. Only a small fraction of online offences reached the police: 4% of threats, 5% of cases involving the sharing of intimate images and 3% of hate messages were reported to the police by young people or their parents.

HOW STRONG AND POSITIVE ARE YOUNG PEOPLE'S BONDS WITH SCHOOL?

The school environment and a child's relationship with school play an important role in development and behaviour. According to social bond theory, strong attachment to school significantly reduces the likelihood of risk behaviour. Research has confirmed a link between a disorganised school environment and risk behaviour or vulnerability.

Deviant behaviour among young people disrupts the learning process, and failure at school is a well-established risk factor for offending.[17] Children displaying deviant behaviour often experience school failure in the form of low academic achievement, dropout and low social status. Although a direct causal link between academic performance and offending is not entirely clear, poor academic results influence behaviour, and early behavioural problems may lead to weaker academic outcomes. Maguin and Loeber[18] emphasise the relationship between academic success and deviant behaviour: better academic performance reduces offending, while poor results increase it. Academic failure and offending may reinforce one another in a vicious circle.

School does not merely transmit knowledge but also socialises pupils, helping young people acquire societal values, norms and patterns of behaviour.[19] Schools discipline pupils by reinforcing behavioural norms that help prevent deviant conduct. They also function as instruments of social control, reducing the risks of crime and antisocial behaviour[20] through both formal and informal mechanisms. Informal control includes bonds with teachers, coaches and peers, while formal control refers to the existence, clarity and enforcement of disciplinary rules at school, including the detection of and response to breaches.

When school as an institution is weak, it does not support the formation of social bonds that encourage law-abiding behaviour.

Risk factors for criminal behaviour operate cumulatively – the more risk factors are present in a young person's life, the greater the likelihood of antisocial or criminal development. Studies show that the total number of risk factors is often more important than their specific nature. Risk factors at different levels and in different domains, such as family, school and peers, increase the probability of antisocial behaviour, and when combined their impact becomes considerably stronger. A cumulative effect is also evident in relation to protective factors – the more protective factors present, the lower the likelihood of antisocial behaviour. Research indicates that the combined effect of protective factors may be more important than any single factor alone.[21] Supportive school leadership, committed and cooperative staff, consistent behaviour management and effective teaching have been found to help reduce the risk of youth offending.[22]

In the ISRD4 study, children were asked whether they like attending school, whether lessons are interesting and whether they would miss their

school if they had to move away (Figure 7.2.4). Approximately one third of young people consider lessons uninteresting, while one quarter find them interesting. Over one third report that they enjoy going to school, and a similar proportion hold the opposite view. The ISRD4 results show that nearly half of children would miss their current school if they had to change schools. This underscores the importance of social bonds formed at school: friendships and supportive relationships increase pupils' interest in school and improve their well-being. At the same time, particular attention should be given to schools where such a cohesive social foundation has not yet developed.

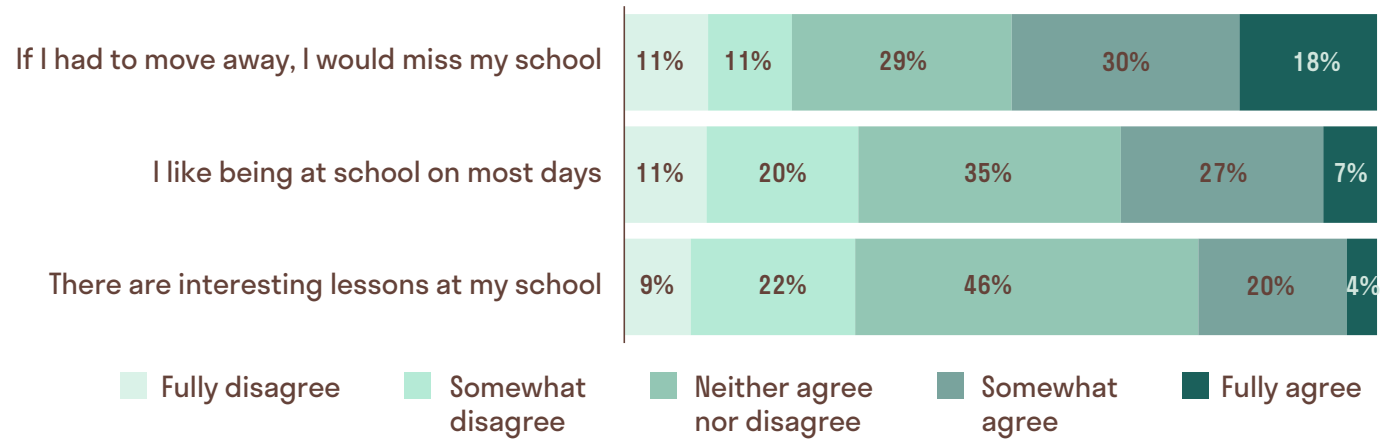
Pupils in upper secondary school report significantly stronger attachment to school than basic school pupils. This reflects both age differences and variations in the organisation of studies, as well as the fact that pupils in upper secondary school are more oriented towards continuing their education. Weak attachment to school is reported mainly by basic school pupils, particularly those from Russian-speaking and economically disadvantaged families. In contrast, young people from Estonian-speaking families with stronger economic support report a much stronger sense of belonging. When school as an institution does not reinforce law-abiding behaviour, it may be described as socially disorganised. This means that social bonds between pupils, teachers and school leadership are weak, rules are enforced inconsistently and support for pupils is limited. A lack of structure and support may weaken social control within the school and foster deviant behaviour.[23]

Research has identified links between school disorganisation and high turnover among pupils and staff, inconsistent disciplinary policies, insufficient resources and weak leadership.[24]

To characterise the physical school environment, the ISRD4 survey asked young people whether there were visible signs of disorganisation, such as many things being broken or vandalised. They were also asked about the prevalence of offences at their school, including theft, fights and drug use (Figure 7.2.5). Some 10% agreed that many things at their school were broken, 10% believed that there were frequent fights, 12% agreed that theft was common and 17% considered drug use to be prevalent. Pupils in upper secondary school were almost five times more likely than basic school pupils to perceive their school as well organised. Pupils from Russian-speaking families reported a stronger perception of school organisation than Estonian-speaking pupils.

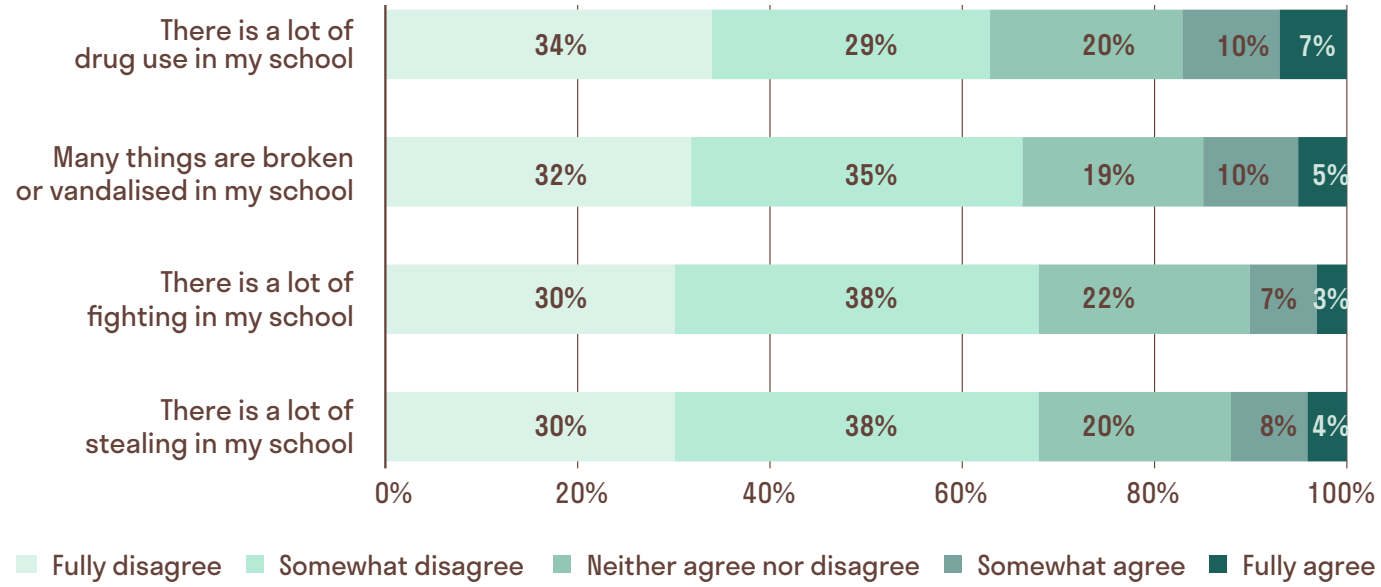
The ISRD4 survey clearly demonstrates the importance of school environment quality and school-related relationships for young people. Those with stronger bonds to their school are nearly one third less likely to commit offences

Figure 7.2.4 Distribution of pupils' responses regarding liking school



SOURCE: figure by the authors based on ISRD4[25]

Figure 7.2.5 Distribution of pupils' responses regarding problems prevalent at school (school disorganisation)



SOURCE: figure by the author based on ISRD4[26]

compared with those with the weakest school attachment. A disorganised school significantly increases the risk of offending. Young people attending the least organised schools commit offences 2.7 times more often than those in the most organised school environments. These findings highlight the need to pay greater attention to the quality of school life, as young people feel safer and are less prone to problem behaviour in well-organised and supportive schools.

HOW DO CHILDREN FEEL AT HOME?

The survey asked children to assess how well they get along with their parents, how often their parents provide emotional support and care, and whether they would feel very bad if they disappointed their parents. The analysis showed that boys experience a stronger bond with their parents than girls. Bonds are stronger in Estonian-speaking families than in Russian-speaking families. Family economic position is also an important factor in the development of strong bonds. Compared with families experiencing economic hardship, economically comfortable families are four times more likely to have strong family bonds, and families managing financially are twice as likely.

In terms of family composition, the strongest bonds with parents are formed in nuclear families where the child lives with two parents. Children in shared residence arrangements, living alternately with their mother and father, are less likely to develop strong bonds. The likelihood of strong attachment is also lower in single-parent families. In other family arrangements, such as living with relatives or grandparents, the probability of strong bonds is almost five times lower than among children living with two parents.

Parental monitoring plays an important role in shaping a child's behaviour. According to Hirschi and Gottfredson, parental control of behaviour is central to the development of self-control.[27] Stronger control refers to situations in which parents are well aware of their child's activities, monitor how they spend their time, and set clear boundaries and rules. The survey asked to what extent a parent or other adult at home knows where the child is, what they are doing and whom they are with when they go out, and whether adults know what the child does online.

Girls experience significantly stronger parental monitoring than boys. Boys are about half as likely to experience strong control. Children in Estonian-speaking families report stronger parental monitoring, while those in Russian-speaking families report weaker control. This may partly reflect cultural differences in parenting styles or in the level of rules and supervision within families. Parental monitoring is stronger in economically better-off families. Compared with families experiencing economic hardship, families living comfortably on their current income are almost twice as likely, and families managing financially about one and a half times as likely, to monitor their child's activities closely. In terms of family structure, the strongest monitoring is observed in nuclear families, where the child lives with two parents. In shared residence arrangements, where the child lives alternately with their mother and father, the likelihood of strong control is about half as high. Weaker control is also more common in single-parent families and other family arrangements, such as living with relatives or in residential care.

Children's behaviour and well-being may also be affected by difficult family relationships, including situations in which a child experiences psychological or physical violence within the family, either as a witness or as a victim, and situations involving parental substance abuse. Table 7.2.1 presents the proportion of children exposed to family-related problems by socio-demographic characteristics.

Parental attempts to control or direct a child's behaviour may sometimes cross boundaries, leading to the use of physical punishment. In the survey, physical punishment refers to situations in which a parent hits or pushes a child, even if this is presented as punishment for wrongdoing. Some 6% of children reported experiencing physical punishment in the 12 months preceding the survey. The analysis indicates that the child most at risk of experiencing parental physical punishment has the following characteristics: basic school age, female, from a Russian-speaking family and living in economic hardship. According to the data, pupils in upper secondary school were almost 50% less likely to experience parental physical punishment than basic school pupils. Boys were about half as likely as girls to be victims, and young people from Russian-speaking families faced almost twice the risk of those from Estonian-speaking families. The likelihood of experiencing physical punishment was highest among children from economically disadvantaged families. The more affluent the family, the lower the risk of physical punishment. Children from families living comfortably on their current income were about 70% less likely to experience physical punishment.

The survey also asked about parental physical abuse, defined as situations in which a parent severely beats the child or hits them with an object, including as punishment. In total, 2% of children had experienced parental physical abuse. The risk factors mirror those for physical punishment: Russian-speaking background, female gender, younger age and poor economic position. The strength of these risk factors differs somewhat. For example, the difference in risk between Russian-speaking and Estonian-speaking children is particularly pronounced and significantly greater than in the case of physical punishment. It should be noted that economic position is less strongly associated with physical abuse than with physical punishment, for which good economic status functions as a statistically significant protective factor.

SUMMARY

We have shown that a considerable proportion of pupils in grades 8–11 – one in five – have been involved in offences, whether as perpetrators, victims or both. These experiences are not confined to the physical environment but extend into cyberspace, where conflicts and harmful

Table 7.2.1 Proportion of children exposed to family-related problems

	Physical punishment	Physical abuse	Parents' alcohol/ drug problems	Physical fights between parents	Very serious arguments between parents	Parents' divorce or separation
All children	**6.1%**	**2.0%**	**18.9%**	**28.0%**	**53.3%**	**33.9%**
Education level						
Basic	7.1%	2.4%	18.6%	27.6%	50.8%	34.4%
Upper secondary	4.0%	1.2%	19.6%	28.9%	58.5%	33.5%
Sex						
Girls	7.8%	2.8%	24.6%	36.0%	60.6%	37.3%
Boys	4.1%	1.1%	12.2%	18.4%	45.1%	30.2%
Home language						
Estonian	4.7%	1.2%	17.7%	31.8%	54.4%	33.9%
Russian	9.3%	4.0%	22.2%	17.9%	50.8%	34.7%
Economic status						
Find it difficult to cope on current income	15.5%	5.9%	45.8%	52.8%	78.5%	53.7%
Manage on current income	6.8%	2.3%	24.5%	34.3%	60.9%	38.5%
Live comfortably on current income	4.8%	1.6%	13.0%	21.7%	46.7%	29.5%
Living arrangement						
With father and mother, or stepfather and stepmother	5.7%	1.9%	15.5%	24.7%	51.0%	20.3%
Partly with mother, partly with father	7.8%	2.3%	19.4%	39.4%	63.8%	84.8%
With only one parent	6.9%	2.4%	28.9%	36.9%	59.4%	75.9%
Other living arrangement	10.5%	1.9%	52.2%	49.6%	65.5%	60.2%

SOURCE: table by the authors based on ISRD4[28]

acts on social media are increasingly common. Incidents on social media rarely come to the attention of adults or law enforcement authorities, with the result that many victim experiences – particularly cases of psychological violence and threats – remain officially unrecorded and unsupported. Experiences of offending are shaped by multiple factors, including socio-economic background, the school environment and peer relationships. Young people from economically disadvantaged families and those lacking access to supportive, structured leisure activities are particularly vulnerable.

In recent years, young people's everyday interactions have increasingly moved online: leisure time that previously took place on the street, outdoors or on sports fields now largely occurs on social media and in virtual gaming environments. In this context, school has become almost the only physical meeting place, which makes its role in shaping behaviour even more important. Attention must therefore be paid to the school environment as a central factor in the prevention of youth offending. Schools characterised by weak organisation and fragile bonds with pupils constitute risk environments in which deviant behaviour is more likely to develop. Prevention should thus focus not only on the individual level, through interventions and social programmes, but also on supporting school as a social institution. Stronger relationships between teachers and pupils, a safe and stable learning environment and the involvement of pupils in school decision-making are potential protective factors against offending.

The role of the family in shaping young people's values and social skills must not be overlooked. The data suggest that unstable family life, economic hardship and weak parental supervision may contribute to young people's involvement in deviant behaviour. It is therefore important to support families early and systematically through both social and psychological services. The findings of this article support the argument that crime prevention cannot be the sole responsibility of law enforcement authorities but requires broad societal cooperation between education, social services and communities.



Data and methodology. ISRD4 (International Self-Report Delinquency Study, fourth wave) is an international study conducted in many countries, including Estonia. Its aim is to collect information on young people's offending, victimisation experiences, and attitudes towards laws and social norms. In Estonia, the target group comprised all 13–18-year-old pupils in grades 8–11 attending general education schools, excluding special schools and sanatorium schools. Data collection took place in Estonian general education schools between 5 April and 7 June 2023. A total of 62 schools and 383 classes participated. After data cleaning and the removal of unreliable responses, the analysis included data from 5,873 pupils.

The survey was funded through the European Economic Area and Norway Grants 2014–2021 under the project 'Establishment of specialised youth justice approach'. The research was conducted by researchers from the Department of Penal Law at the University of Tartu's School of Law.

Table 7.2.2 Description of the ISRD4 sample

Group		Number	Share
Age	Up to 14	1,011	17.2%
	15	1,968	33.5%
	16	1,346	22.9%
	17	961	16.4%
	18 or older	587	10.0%
Sex	Girls	2,969	52.3%
	Boys	2,710	47.7%
Home language	Estonia	4,142	71.4%
	Russian	1,661	28.6%
County	Harju County	1,330	22.6%
	Hiiu County	32	0.5%
	Ida-Viru County	1,217	20.7%
	Lääne-Viru County	474	8.1%
	Pärnu County	785	13.4%
	Põlva County	207	3.5%
	Rapla County	200	3.4%
	Saare County	354	6.0%
	Tartu County	662	11.3%
	Valga County	118	2.0%
	Viljandi County	298	5.1%
	Võru County	196	3.3%
Economic status	Find it difficult to cope on current income	278	4.9%
	Manage on current income	2,174	38.1%
	Live comfortably on current income	3,255	57.0%
All groups total		5,873	100.0%

SOURCE: table by the authors based on ISRD4

REFLECTION

Gerli Brifk

Preventing youth offending requires the involvement of all those surrounding the child, mutual cooperation and supportive relationships. This is a major challenge in a society where mental health problems are intensifying. Communication between young people, parents and teachers has become increasingly strained over time. There is much blame, misunderstanding, burnout, resignation and withdrawal.

What could be three supportive steps towards a safer society?

1. Changing attitudes and mindsets. A persistent view remains that what happens within the family is a private matter. There is also a widespread belief that young people inclined towards problem behaviour are themselves to blame and should be punished. Professionals working in the field understand that these are most often children in need of support, but the wider public does not. Young people are also stigmatised within the school environment, where teachers' level of awareness may be high, yet attitudes and mindsets do not always reflect this awareness.

2. Cooperation and trusting relationships. The school environment is a central factor in preventing youth offending, but its potential has not been sufficiently utilised. Schools could become places where young people wish to spend time even when they are not required to attend – for example, during holidays. This requires cooperative and supportive relationships among all parties. Schools cannot improve in isolation from changes within the community, including at municipal level, as the problems surrounding children are interconnected. Involving families and the wider community in school life is important, as it helps promote shared understanding and common goals.

Children may hesitate to burden those close to them with their worries and can therefore be left to face their concerns alone, even in otherwise supportive families. One possible solution would be to establish a national system of trusted persons.

Both in schools and in the wider community, the use of restorative justice methods[29] could help improve relationships. State-trained restorative justice volunteers could be made readily available and involved when needed.

3. A clearer focus on families with young children at risk. To ensure that children grow up in developmentally supportive environments, legislation could more firmly require parents to accept assistance, rather than leaving this entirely to their discretion. As an alternative to separating children from their families, parents could be directed, for a specified period, to participate with their children in supported services aimed at developing parenting skills. The early years are crucial for child development, as intensive brain development occurs and is directly shaped by the child's relationships. Infants are not capable of coping independently with stress-inducing situations and require a secure adult who provides physical closeness. A child who experiences neglect does not develop secure attachment to a caregiver. This is one of the main reasons why many children in residential care experience mental health problems, which in turn lead to behavioural disorders and difficulties in social interaction.

Difficulties originating at home often lead to problems with school attendance, and when young people do not find understanding in their immediate environment, they seek acceptance elsewhere. They may join groups where drug use and offending are prevalent. It is therefore essential to support families early and systematically through social and psychological services.

If crime prevention remains solely the responsibility of law enforcement authorities, its impact will be limited. Without investing more effectively in prevention, society will continue to respond retrospectively to accumulating problems, which is more time-consuming and costly.

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7.3

From punishment to prevention in youth offending

Andra Reinomägi and Ingrid Saarepuu

KEY MESSAGES

- The aim of criminal policy for children and young people is to keep them out of the criminal justice system, reduce offending and ensure age-appropriate treatment if they do enter the system.
- The principle of special treatment for children in the criminal justice system is based on their developmental characteristics and social immaturity. Minors who commit offences are subject to appropriate developmental and educational measures corresponding to their needs and risk level.
- The number of recorded crimes and misdemeanours committed by children fell significantly between 2018 and 2024.
- A large share of criminal proceedings involving minors are discontinued by the prosecutor's office. If the Prosecutor's Office finds that the child can be influenced without subjecting them to a sanction, the proceedings may be terminated and the child issued a warning. With the child's consent, the prosecutor may also impose obligations such as community service, treatment or participation in a social programme.
- Children's and young people's need for assistance must be identified as early as possible. Preventing their entry into the criminal justice system requires cooperation between education and social welfare systems to provide the necessary support to the child and family.

INTRODUCTION

The Fundamentals of Criminal Policy Until 2030[1] set the objective of a safe and just society in which few children and young people come into contact with the criminal justice system – one that is independent, effective, smart and supportive of victims. For children and young people, the policy aims to prevent entry into the criminal justice system, reduce offending and ensure age-appropriate treatment where they do enter the system.

The contemporary approach to juvenile offending recommends moving away from fines and detention towards a responsibility-based model that emphasises educational measures and teaches children responsibility. In resolving cases, priority should be given to non-punitive measures, such as reparation for harm, mediation between the parties or participation in social programmes.[2]

According to international recommendations, responses to juvenile offending must consider the minor's age, needs and rights.[3] The need for the special treatment of children arises from their developmental characteristics and social immaturity. Social factors require intervention by education and social welfare systems, while age-related causes of offending often diminish over time. The consequences of an offence should follow as swiftly as possible and be proportionate, efficient and oriented towards rehabilitation. In low-risk cases, the response should be minimal, while primary attention should be directed towards medium- and high-risk offenders. Responsibility for addressing the offence and finding solutions should rest primarily with the minor, the parents and the community. Where the child can be supported through the family, school, social welfare or other services, recourse to the justice system should be avoided. Responses should reflect the principles of restorative justice,[a] and the child must be given the opportunity to make amends. The child must be heard and involved in responding to the offence and finding solutions. Measures resulting in the deprivation of liberty should be avoided for children.[4]

THE REFORM OF SPECIAL TREATMENT OF CHILDREN SEEKS TO SUPPORT A LAW-ABIDING LIFE PATH

In addressing offences committed by children, it is essential to prevent further offending, help the young person understand the consequences and impact of their actions, and support them in remaining on a law-abiding path. Legislative amendments supporting the special treatment of minors,[5] based on the principles of special treatment of minors, entered into force in 2018. According to these principles, children and young people who commit offences should be subject to appropriate developmental and educational measures. The choice of intervention must be based on the child's needs and risk level, and intervention must be limited to the necessary minimum.[6] In 2018, the Estonian Penal Code was amended to provide that a child may be sentenced or sanctioned only if other measures are insufficient to prevent further offending (Penal Code, Section 56(3)). This means that before imposing punishment, the authority conducting the proceedings must always consider the possibility of applying non-punitive measures. This applies in both criminal and misdemeanour proceedings.[b] The environment in which children accused of offences are placed is also important. The Code of Criminal Procedure was

a Restorative justice is a method of conflict resolution that may be used alongside, or in some cases instead of, formal proceedings. It can help those involved come to terms with what happened, repair harm and move forward. Further information is available on the website of the Estonian Ministry of Justice and Digital Affairs: https://www.justdigi.ee/kuritegevus-ja-selle-ennetus/ohvrite-toetamine/kahjude-heastamine-ja-taastav-oigus.

b Under Section 87 of the Penal Code, various measures may be applied to a minor in misdemeanour and criminal cases: a warning, participation in a social programme, indemnification and remedy for damage caused by the criminal offence or misdemeanour, addiction or another treatment, mediation service, community service (depending on the offence), restriction of freedom of movement (combined with supervision of conduct in criminal cases), placement in a closed children's institution, and any other obligation voluntarily assumed by the person.

also amended to allow courts to place a minor in a closed child care institution instead of ordering pre-trial detention (Code of Criminal Procedure, Section 131(3²)).

When determining appropriate obligations in response to a criminal offence, account is taken of the legal classification of the act, the young person's attitude towards the offence, and, where relevant, previous offences and their nature. This means that even where two young people have committed exactly the same offence, the obligations or measures imposed may differ. Analyses show that fines are imposed far less often than before the reform, while warnings, referral to social programmes, coercive fines and other obligations are used more frequently.[7]

In Estonia, the age of criminal responsibility begins at 14. A person younger than this is automatically deemed incapable of guilt due to age and cannot be held criminally liable or punished. Acts committed by children under 14 are nevertheless investigated in order to clarify the circumstances.

Under the Child Protection Act, a child whose behaviour threatens their own or others' well-being is considered a child in need of assistance (Child Protection Act, Section 26). In such cases, child protection services are brought in to determine the causes of the behaviour and how to support the child. In complex cases, where the child's behaviour endangers their own life, health or development or that of others, and the risk cannot be mitigated by any less restrictive measure, the child may, at the request of the local government and by court order, be placed in a closed child care institution under Section 130² of the Social Welfare Act. The police, the prosecutor's office and probation officers may also apply to the court for placement in a closed child care institution as a measure under Section 87 of the Penal Code. Where a minor is committed in custody, the prosecutor may request that custody be replaced by placement in a closed child care institution under Section 131(3²) of the Code of Criminal Procedure.

Table 7.3.1 Number of children in closed child care institutions, 2018–2024

	2018	2019	2020	2021	2022	2023	2024
Total number of children	58	62	76	62	57	59	63
Including: - Under Social Welfare Act Sect. 130¹⁻⁵ (incl. Juvenile Sanctions Act[c] in 2018)	36	42	55	46	44	42	49
- As a measure under Child Protection Act Sect. 87	20	20	18	14	10	13	11
- As a substitute for arrest under Code of Criminal Procedure Sect. 131(3²)	2	0	3	2	3	4	3

SOURCE: Estonian Social Insurance Board

[c] Juvenile Sanctions Act (repealed).

Table 7.3.2 Number of children in prison at year-end, 2018–2024

	2018	2019	2020	2021	2022	2023	2024
Total number of children	14	15	5	5	3	1	3
Arrested	4	6	2	4	2	0	3
Convicted	10	9	3	1	1	1	0

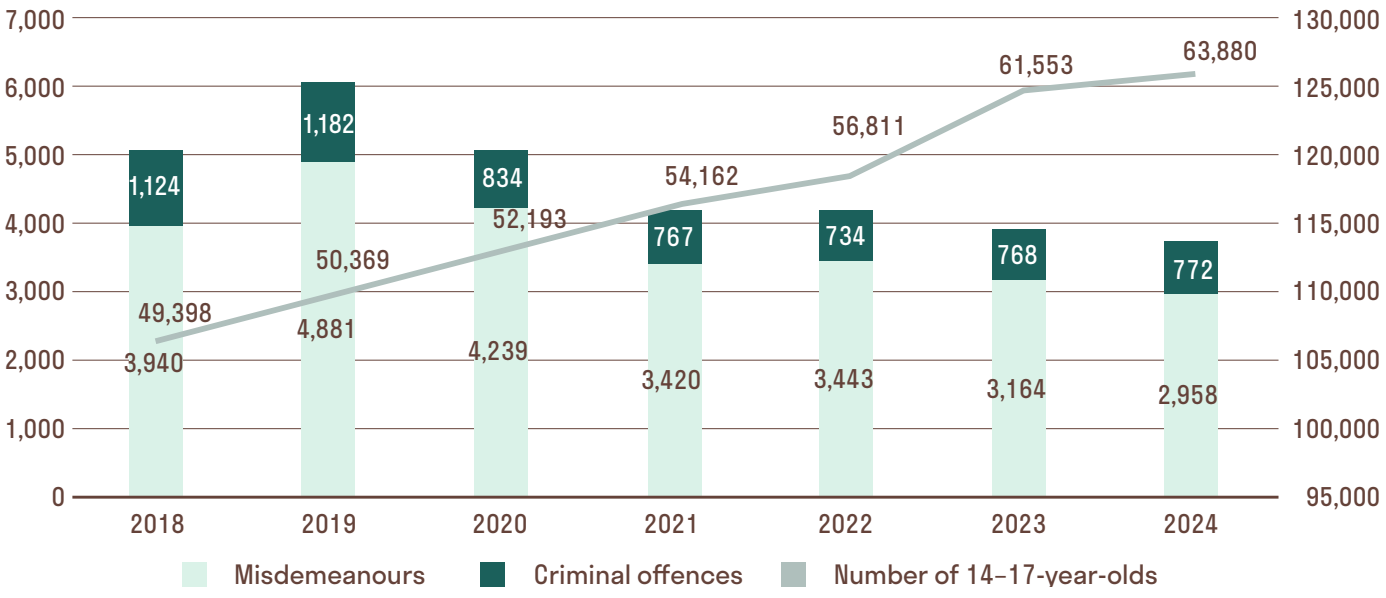
SOURCE: Estonian Ministry of Justice and Digital Affairs

A closed child care institution provides a safe environment and supports the child's psychological, emotional, social, educational and cognitive development. The aim is to help the child cope in an ordinary environment without engaging in behaviour that harms their own life, health or development or the life and health of others. In a closed child care institution, the child's sleep and waking patterns, as well as time spent studying or working and using screens, are regulated. Individual and group activities, physical exercise, balanced nutrition, leisure activities and support for recovery from trauma are provided. Children are given opportunities to experience success through activities suited to their abilities.[8] Upon leaving the institution, the child returns home and to their community, where cooperation with the child protection worker continues. Based on the child's needs, the child protection worker supports the child and family through case management and appropriate support measures.

According to data from the Estonian Social Insurance Board, the number of children in closed child care institutions has decreased slightly compared with 2020 (Table 7.3.1). This may be related to the increase in available places as well as to the impact of the Covid-19 crisis. The majority of children placed in such institutions are admitted under the Social Welfare Act, following an application by the local government and consultation with the Social Insurance Board. The number of children placed in a closed child care institution under Section 87 of the Penal Code, as a measure for a minor, or under Section 131(3²) of the Code of Criminal Procedure, as a substitute for detention, is significantly lower than the number placed there under the Social Welfare Act. In the years observed, an average of two to four children per year were placed in a closed child care institution as a substitute for detention. The number of children placed there as a sanction applicable to a minor has declined, which is consistent with the overall decrease in registered offences committed by minors (see Table 7.3.1 and Figure 7.3.1).

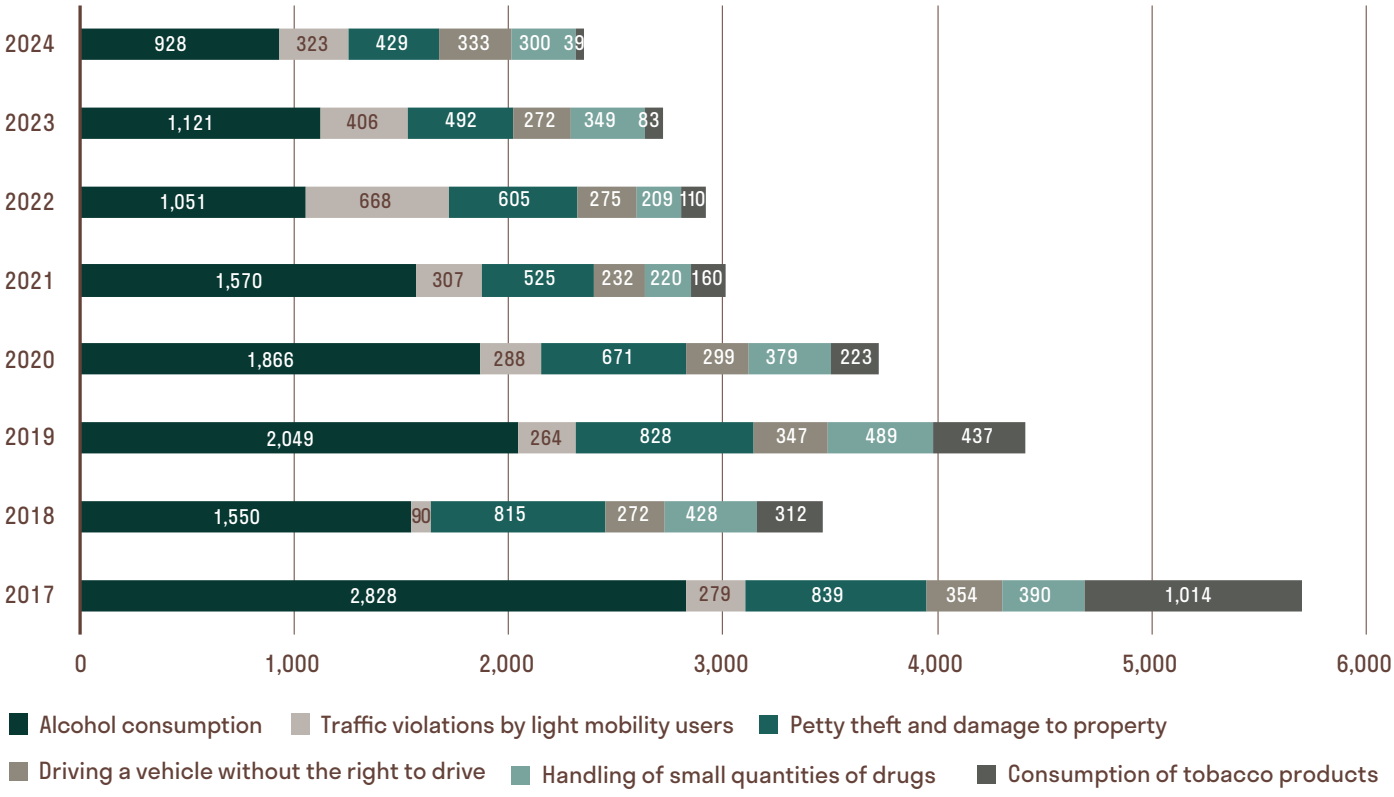
Over the seven-year period under review, the number of children in prison has also declined significantly (Table 7.3.2). Where possible, placement in a closed child care institution is preferred to imprisonment, as it provides more appropriate conditions for the special treatment of children. Children usually enter prison only in cases involving very serious or repeated crimes. If a child is nevertheless imprisoned, they can continue their education, participate in therapy and social rehabilitation programmes, and maintain contact with family and relatives. During imprisonment, efforts are made to improve the child's behaviour so that, on returning to society, they can lead a law-abiding life and have stronger coping skills. Family and community support are essential in this process. The court may release a convicted minor from punishment and place them under probation supervision, taking into account their level of moral and mental development and their ability to understand the unlawfulness of their act or to control their behaviour.

Figure 7.3.1 Registered offences committed by minors and the number of 14–17-year-olds, 2018–2023



SOURCE: Estonian Police and Border Guard Board, Statistics Estonia, Estonian Ministry of Justice and Digital Affairs

Figure 7.3.2 Most common registered misdemeanours committed by minors, 2017–2024



SOURCE: Estonian Police and Border Guard Board

CHILDREN'S OFFENCES: FROM ALCOHOL AND TRAFFIC VIOLATIONS TO VIOLENCE AND THEFT

Offences committed by minors are classified as misdemeanours or crimes. This overview draws on administrative data from the Estonian Police and Border Guard Board, covering reported offences in which the perpetrator was identified. Since 2018, the number of registered offences committed by minors has declined. In 2024, the total remained below 4,000, but the number of 14–17-year-olds increased over the period under review (Figure 7.3.1).

Most offences committed by minors are misdemeanours, accounting for 79% of the total in 2024. Between 2018 and 2024, the number of registered misdemeanours committed by minors fell 1.3-fold and the number of crimes 1.5-fold (Figure 7.3.1).

In most cases, children come to the attention of the police because of a single offence. In 2024, 75% of minors who committed a misdemeanour committed only one such offence during the year, while the rest committed two or more. The average age of minors who committed offences in 2024 was 16 for misdemeanours and 15 for crimes. Three quarters of those who committed misdemeanours were boys and one quarter girls. In the case of crimes, one to two out of ten perpetrators were girls and the rest boys.

The largest share of registered misdemeanours committed by minors involves alcohol consumption, minor theft and traffic violations by light electric vehicle users. Compared with previous years, driving without a licence increased in 2024, while the number of other registered misdemeanours declined (Figure 7.3.2).

Of the registered misdemeanours committed by girls in 2024, a large proportion involved alcohol consumption (48%), followed by traffic law violations (25%), and minor theft and property damage (13%). Drug-related misdemeanours accounted for one tenth of all registered misdemeanours committed by girls. Among boys, the largest share of registered misdemeanours in 2024 consisted of traffic law violations (42%) and alcohol consumption (26%), followed by minor theft and property damage (15%) and drug-related misdemeanours (10%) (Table 7.3.3).

Crimes committed by children generally fall into two categories: crimes against the person[d] and crimes against property.[e] In 2024, the largest

Table 7.3.3 Registered misdemeanours committed by minors in 2024, by boys and girls

	Boys	Girls
Traffic offences	42%	25%
Alcohol consumption	26%	48%
Petty theft and damage to property	15%	13%
Drug-related misdemeanours	10%	10%
Public order misdemeanours	3%	1%
Use of tobacco products	1%	1%
Other	3%	1%

SOURCE: Estonian Police and Border Guard Board

[d] Crimes against the person include violent crimes, sexual crimes, extortion and offences against minors.

[e] Crimes against property include unlawful appropriation and unlawful use of property.

share of crimes committed by minors consisted of violent crimes (47%) and unlawful appropriation of property (22%). Other types of crime, such as drug offences and public order offences, were registered considerably less frequently (see Table 7.3.4).

For both boys and girls, the most common crimes were violent crimes and unlawful appropriation of property, followed by unlawful use of property (Table 7.3.5).

Serious crimes against the person committed by children are registered only rarely (Table 7.3.6).

If criminal proceedings are not initiated or are terminated because the unlawful act was committed by a minor below the age of criminal responsibility, the investigative authority or prosecutor explains to the minor and their statutory representative the nature of the act that would have constituted a criminal offence and the grounds for terminating the proceedings. The investigative authority or the Prosecutor's Office may send a notification, and a copy of any materials of the criminal case that are deemed necessary, to the municipality in whose administrative territory the minor's residence is located (Code of Criminal Procedure, Section 201(1)).

If the Prosecutor's Office finds that a person who committed a crime at the age of at least 14 but under 18 can be influenced without subjecting them to a sanction or a corrective measure under Section 87 of the Penal Code, the Prosecutor's Office may terminate criminal proceedings, admonish the person and impose, with their

Table 7.3.4 Most common crimes committed by minors, 2018–2024

	2018	2019	2020	2021	2022	2023	2024
Physical abuse (Penal Code Sect. 121)	450	501	333	316	361	301	331
Theft (Penal Code Sect. 199)	351	341	273	252	183	185	172
Fraud (Penal Code Sect. 209) and computer fraud (Penal Code Sect. 213)	8	9	12	13	8	10	60
Threats (Penal Code Sect. 120)	34	44	24	23	25	37	32
Drug offences (Penal Code Sects. 183–184)	34	57	33	24	14	33	29
Unauthorised use of a thing (Penal Code Sect. 215)	41	24	34	11	22	29	12
Serious breach of public order (Penal Code Sect. 263)	61	55	29	25	19	18	17
Extortion (Penal Code Sect. 214)	10	14	9	5	7	11	8
Robbery (Penal Code Sect. 200)	23	9	17	8	16	10	12
Driving while intoxicated (Penal Code Sect. 424)	4	13	11	8	2	2	6

SOURCE: Estonian Ministry of Justice and Digital Affairs

Table 7.3.5 Registered crimes committed by minors in 2024, by girls and boys

	Girls	Boys
Violent crimes[a]	52%	41%
Unlawful appropriation of a thing	22%	28%
Offences against property[b]	2%	7%
Unauthorised use of a thing	2%	4%
Offences against minors[c]	1%	1%
Offences against public order	2%	3%
Drug offences	3%	4%
Handling of counterfeit payment instruments and securities	2%	2%
Sexual offences	1%	3%
Extortion	1%	1%
Falsification and damaging of documents	4%	1%
Traffic offences	1%	3%
Other	7%	2%

SOURCE: Estonian Ministry of Justice and Digital Affairs

NOTE. [a] Violent crimes include crimes against the person (excluding Penal Code, Sections 137–140 and 148–150), as well as robbery, aggravated breach of public order (Penal Code, Section 263) and violence against a representative of state authority or other person protecting public order (Penal Code, Section 274). [b] Fraud (Penal Code, Section 209) and computer-related fraud (Penal Code, Section 213). [c] Primarily non-consensual sharing of intimate photos and videos, as well as sexual solicitation of a child (Penal Code, Sections 178 and 179).

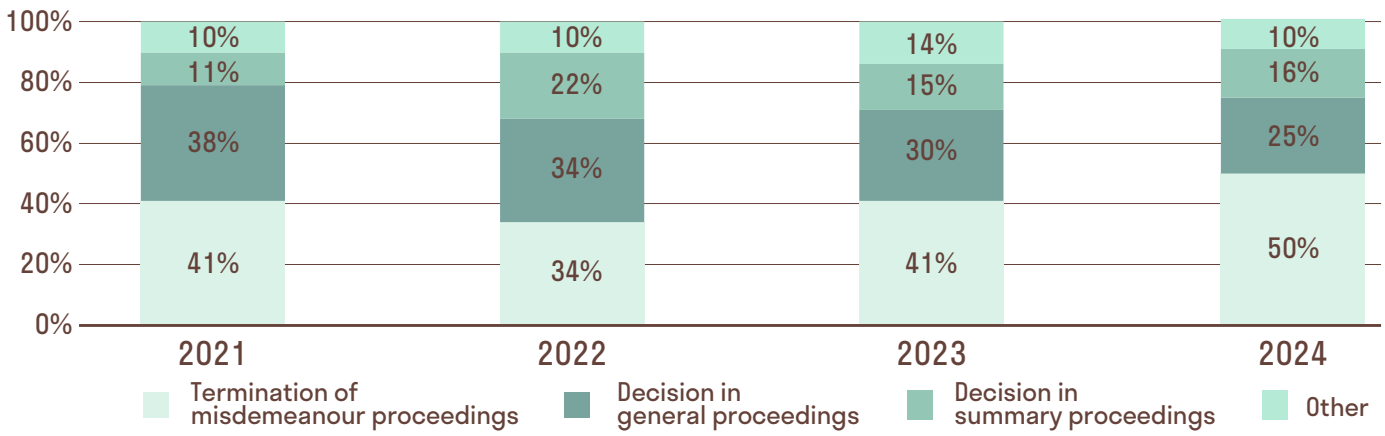
Table 7.3.6 Number of registered serious offences against the person committed by minors, 2018–2024

	2018	2019	2020	2021	2022	2023	2024
Manslaughter, including attempted manslaughter (Penal Code Sect. 113)	0	1	1	1	0	1	1
Murder, including attempted murder (Penal Code Sect. 114)	0	0	1	0	0	0	1
Causing serious damage to health (Penal Code Sect. 118)	5	3	3	1	1	1	2

SOURCE: Estonian Ministry of Justice and Digital Affairs

consent, if appropriate, statutory obligations (Code of Criminal Procedure, Section 201(2)).[f] The prosecutor sets a time limit for fulfilling the obligation, which must not exceed ten months. If the person fails to comply within the prescribed period, the prosecutor may resume criminal proceedings by order. Before the proceedings are terminated, the minor and their legal

Figure 7.3.3 Types of termination of misdemeanour proceedings, 2021–2024



SOURCE: Estonian Police and Border Guard Board

representative must be informed of the nature of the act and the grounds for termination. When terminating criminal proceedings in respect of a minor, the Prosecutor's Office may also send a notification and, where necessary, copies of relevant materials to the local government of the minor's place of residence.

According to 2023 data, the majority (76%) of cases involving crimes committed by minors were terminated by the Prosecutor's Office. 16% were resolved in court through settlement proceedings, and 4% resulted in an indictment (3% under abridged procedure and 1% under regular rules of procedure).

In misdemeanour cases, an out-of-court authority may decide not to initiate proceedings if it considers that an admonition is sufficient. If the authority finds that a person who committed a misdemeanour at the age of at least 14 but under 18 does not need to be subjected to a sanction or to a rehabilitation measure under Section 87(2) of the Penal Code, the authority may admonish the person, terminate the proceedings by order and, if the person is a child in need of assistance within the meaning of Section 26 of the Child Protection Act, send a notification regarding the child, and a copy of the requisite portion of the documents of the misdemeanour case to the municipality in whose administrative territory the child resides. In 2024, half of the misdemeanour proceedings initiated were terminated by order, one quarter were concluded by a decision under regular rules of procedure and 16% by a decision under abridged procedure (Figure 7.3.3).

THE EFFECTIVENESS OF OFFENCE PREVENTION DEPENDS ON COOPERATION BETWEEN SYSTEMS

In addressing offences committed by children, it is considered essential to prevent reoffending, help the child understand the consequences and impact of their actions, and support them in maintaining a law-abiding path. Referring to Article 37 of the UN Convention on the Rights of the Child and General Comment No 24 of the Committee on the Rights of the Child, Meeler and Todres emphasise that deprivation of liberty should be a measure of last resort within the justice system.[9] In their view, the justice system's responsibility towards children begins long before a child comes into contact with the criminal justice system, so every effort must be made to prevent children from coming into conflict with the law. This means promoting children's well-being, reducing risk factors associated with offending, identifying children in need of greater

[f] The statutory obligations include: (1) 10–60 hours of community service; (2) compensation or reparation for harm caused by the criminal offence; (3) participation in a social programme; (4) completion of a withdrawal course or other treatment; (5) participation in a mediation service; (6) the fulfilment of any other relevant obligation.

support and providing measures through which the family, school and community can support the child without involving the justice system. Where a child has already come into conflict with the law, measures should be applied that divert the child from the justice system and favour non-custodial responses over detention and punishment.[10] The reform of the special treatment of juvenile offenders introduced in Estonia in 2018 focuses precisely on this approach.

Data on children who have entered the criminal justice system show that those of criminally responsible age have generally reached the end of basic school or are of upper secondary school age. School is the environment where children spend much of their time with peers. When signs of learning difficulties or poor social skills are identified, the school is responsible, within its capacity, for providing support. At the same time, cooperation and information exchange with child protection services are essential, as they can support the child and family where necessary. Children themselves have noted that schools and child protection workers should cooperate more closely and that schools should identify concerns about a child's well-being and report them to child protection services.[11] In children's view, child protection workers should monitor families' coping capacity, make more home visits and speak directly with children.[12]

By law, both basic and upper secondary schools have an educational and developmental mandate. The learning environment must support pupils' development, and teachers are required to monitor pupils' progress and coping at school. The law provides for adapted instruction and specialist support where necessary. The school owner must ensure access to specialist support, and the head of the school is responsible for its implementation. Where a need for support is identified, parents are informed and the school organises a pedagogical and psychological assessment of the pupil. If necessary, cooperation with specialists from other sectors and additional assessments are recommended. Where the general support provided by the school does not achieve the intended developmental outcomes, enhanced or special support may be implemented on the recommendation of an external advisory team. To encourage pupils to comply with school rules, respect others and prevent situations that threaten safety, justified, appropriate and proportionate support and corrective measures may be applied. However, where a pupil's need for support stems from the home environment, support from the education system alone is insufficient, and the state is responsible for identifying the family's need for assistance and supporting parents in their parental role. Assistance may nevertheless come too late or prove inadequate, and if problems persist the child may end up in the criminal justice system.

It often emerges that a child facing difficulties lacks a safe home environment and may be exposed to violence, substance abuse or other adverse conditions. Children who embark on a criminal path have often grown up in disadvantaged circumstances and experienced trauma, including domestic violence and parental mental health problems. Child protection workers, judges and police officers are aware of this and seek to take it into account when applying measures. Whereas before the reform children were more often fined or sent to special schools or prison, child protection workers, police and prosecutors now focus more on the underlying causes of behaviour and provide educational support, such as referral to therapy or targeted programmes.[13] One option is to apply restorative justice practices, which focus not on punishment but on understanding the consequences of the offence and exploring ways to repair harm through agreement.

The purpose of these measures is to prevent children from committing further offences, and the surrounding environment plays a key role. Jonathan Todres and Shani M. King have noted that a lack of feelings of safety and closeness in childhood may cause lasting harm to mental health and affect functioning in adulthood.[14] Studies show that children who have a positive and trusting relationship with their parents are healthier, more active and generally more satisfied with their lives than those who lack supportive relationships at home.[15] As most offences committed by those under 18 are isolated incidents, appropriate measures can improve coping skills and support a law-abiding life. Research has also shown that the longer pupils remain in the education system, the lower the likelihood that they will engage in

criminal behaviour later in life.[16] It is therefore particularly important that children's needs are recognised within the education system and that, through cooperation between education and social welfare services, appropriate support is provided as early as possible. A minor who has committed an offence is a child in need of assistance; it is essential to understand the reasons for the offence, mitigate associated risk factors and strengthen protective factors that support law-abiding behaviour.

REFLECTION

Raul Kadaste

The article describes a shift in Estonia's justice system from punishing young people in difficulty to understanding, supporting and guiding them. Young people often face difficulties because of complex life circumstances that begin before they enter school. Prevention must therefore start where a child's development begins – at home and in early childhood education. Prevention is always less costly than dealing with consequences. How can we prevent even the first offence from occurring?

Prevention begins in early childhood education, not in school. Although the article focuses on school, it is clear that a child's developmental and social attitudes take shape much earlier. Early childhood education is not merely childcare but the first developmental environment outside the home. It is often there that the first signs of difficulties at home – neglect, violence or lack of security – become visible. Early childhood teachers must be able to recognise these signs. This requires smaller groups and more time for individual interaction with each child. Today's kindergarten groups of more than 20 children make such individual attention difficult.

Shortage of specialists – the system recognises children's need for support but cannot always provide it. Teachers are often the first to notice a child's need for support but may lack the skills or backing to respond effectively. There are not enough support specialists – psychologists, social pedagogues and counsellors. The issue is not only numbers but also working conditions and remuneration, which do not retain specialists in the system. Without adequate support, teachers may become exhausted and a child in need may go unnoticed until problems eventually manifest as offending.

Teacher workload and responsibility. Teacher shortages increase the workload of those who remain, reducing their capacity to notice or intervene. Responsibilities continue to expand – teaching, monitoring behaviour, documenting learning and providing emotional support. The result is burnout and a desire to leave the profession, which further exacerbates shortages. For teachers to notice and support pupils effectively, their role must be valued not only rhetorically but also in terms of pay and public recognition. A teacher is not a low-skilled service worker but a highly qualified professional.

The curriculum – fewer facts, more general competences. School cannot be limited to the transmission of knowledge. Young people need the skills to make informed choices, understand risks, think critically and communicate effectively. The current curriculum does not sufficiently enable teachers to focus on transversal competences, build trusting relationships and provide values education. Reducing the emphasis on factual content and creating more space for discussion would help develop the skills that support young people in avoiding conflict with the law.

While the article reflects a more understanding and prevention-oriented direction in the justice system, reform will not succeed unless the education and social welfare systems are also supportive. Prevention begins before problems become visible – often already in early childhood education. This requires specialists, teachers and an appropriate curriculum. We need more people who notice, know how to respond and are able to help.

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7.4

Extracurricular education as an investment in Estonia's security

Eneli Kindsiko, Mario Truu and Rajar Miller

KEY MESSAGES

- **The effective prevention of youth offending requires well-timed interventions, as different offences and age groups have distinct risk periods.** Violence peaks around midday, theft and traffic offences mainly occur after school, and substance-related offences concentrate late in the evening. Prevention strategies must consider when to intervene, which groups to target and which forms of risk behaviour to address.

- **Exclusion in school and in extracurricular education increases the likelihood of risk behaviour among the most vulnerable young people.** Children with special educational needs and those from low-income families are more likely to be excluded both in school and from extracurricular education. This double exclusion means they receive support from neither formal nor non-formal learning environments, which deepens learning difficulties and marginalisation and increases the risk of offending.

- **Adolescents face the highest risk of offending but participate least in extracurricular education.** Among 7–12-year-olds, offences are concentrated during school hours (8:00–14:00), whereas among 13–17-year-olds they occur mainly after school, during the period typically associated with extracurricular activities (14:00–20:00). Despite this, participation in extracurricular education is lowest among 13–17-year-olds, even though their offending patterns are more dispersed, their independence greater and their risk factors more diverse.

INTRODUCTION

The links between education and law-abiding behaviour are often deeper than they appear at first glance. Research shows that reforms in the education system introduced with positive or innovative aims can nonetheless have unintended adverse effects on levels of youth offending. For example, the introduction of a four-day school week has been associated with up to a 20% increase in property offences among pupils in upper secondary school, largely due to the additional unsupervised day without a structured routine.[1] An even more striking example concerns teachers' strikes: during strike periods, property offences committed by young people may rise by as much as 14%.[2]

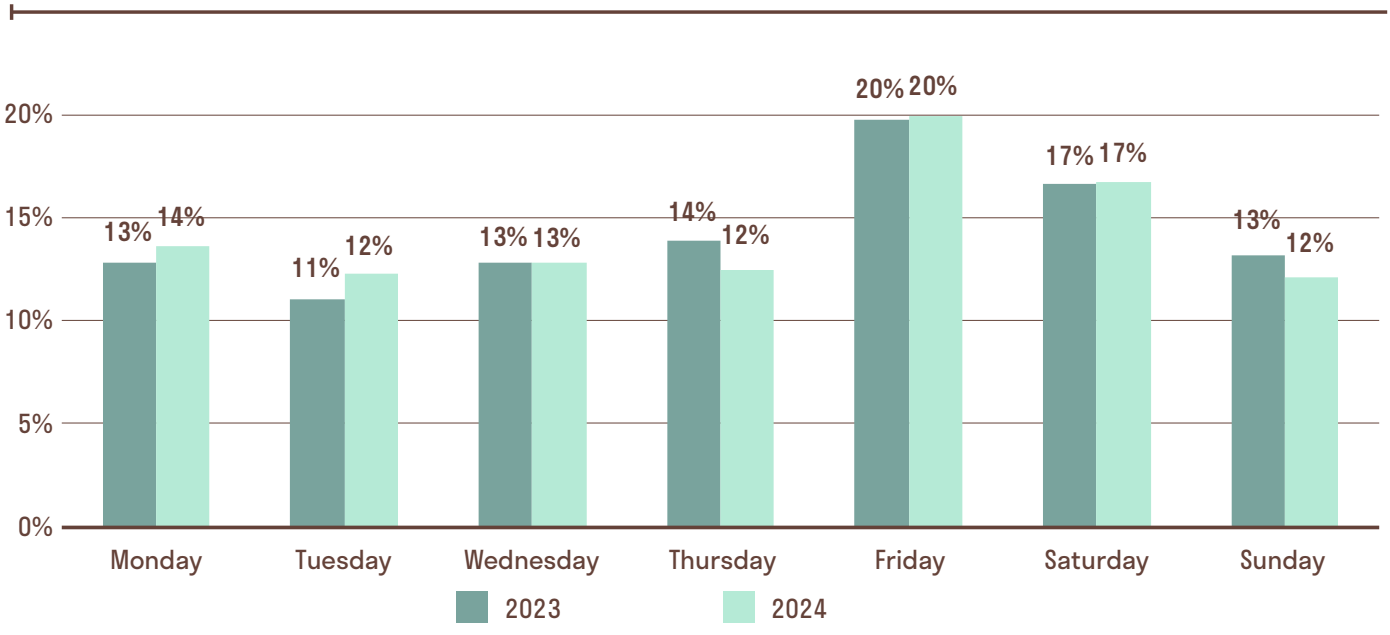
Studies indicate that the early onset of offending substantially increases the risk of persistent criminal behaviour. If a young person has not committed an offence by the age of 15, the likelihood of later involvement in crime is low.[3] Given that young people spend a significant share of their formative years in school, the school-day environment plays a central role in shaping both risk and protective factors. Protective factors function as buffers that mitigate risks and support healthy development, including a supportive school climate, positive peer relationships, a safe physical environment, opportunities for self-expression through extracurricular education, and the development of self-confidence and coping skills. Previous research has shown that offences involving pupils tend to increase during the school year – particularly in autumn and spring – and decline during the summer months.[4]

Data and methodology. From September to the end of May in the 2023 school year, the Estonian Police and Border Guard Board registered 2,701 offences committed by 7–17-year-olds; during the same period in 2024, 2,520 offences were recorded. The offences were mapped across a 24-hour time scale.

The aim of this article is to analyse the temporal distribution of youth offending on school days in order to identify key risk windows – that is, times when the likelihood of offending is highest. It also provides an overview of the availability of extracurricular education in Estonia, as research identifies it as one of the most effective measures for reducing youth offending.

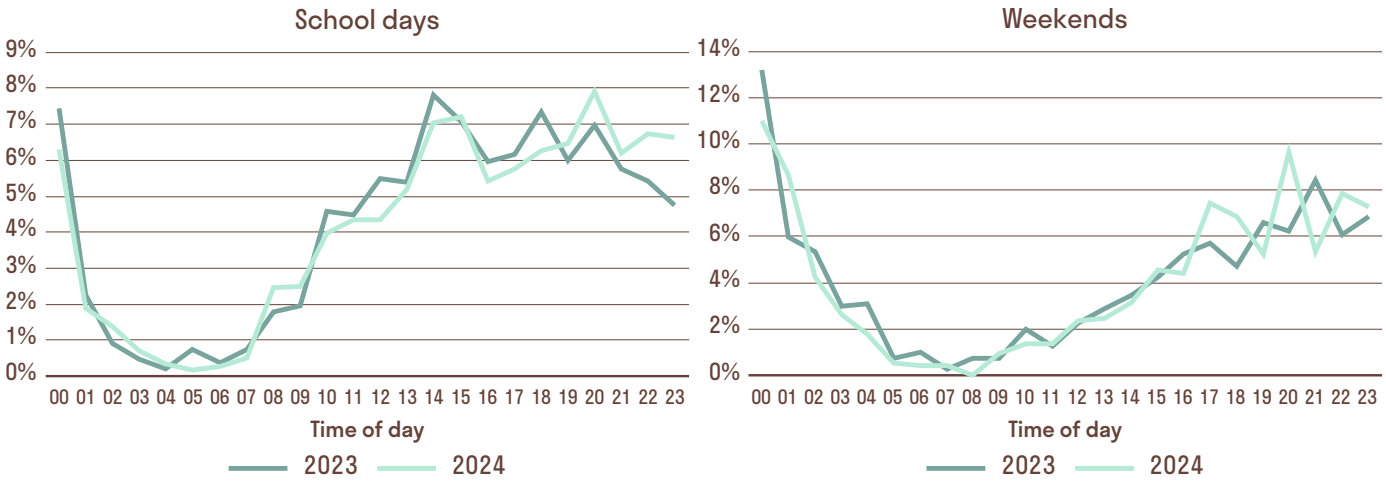
Data and methodology. From September to the end of May in the 2023 school year, the Estonian

Figure 7.4.1 Youth offences by day of the week, school months 2023 and 2024



SOURCE: Estonian Police and Border Guard Board

Figure 7.4.2 Youth offences on school days and weekends, school months 2023 and 2024



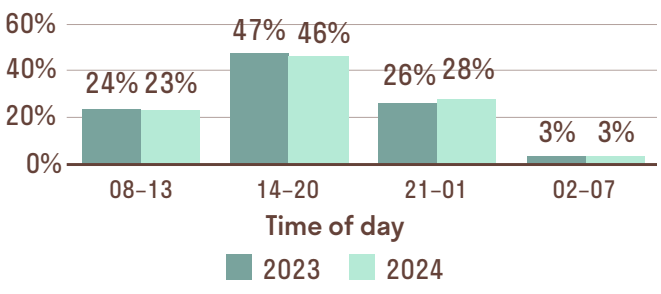
SOURCE: Estonian Police and Border Guard Board

Police and Border Guard Board registered 2,701 offences committed by 7–17-year-olds; during the same period in 2024, 2,520 offences were recorded. The offences were mapped across a 24-hour time scale.

THE RISK WINDOW FOR OFFENDING IN ESTONIA IS LONGER THAN IN OTHER COUNTRIES

Youth offences during the school months of 2023 and 2024 followed a clear pattern: most incidents occurred on school days, particularly on Fridays (20%), when the risk appears to be highest (Figure 7.4.1). Fewer offences were recorded on Tuesdays and Wednesdays. The midweek decline may indicate that the regular structure and routine of the school week help reduce risk on those days.

Figure 7.4.3 Youth offences on school days, school months 2023 and 2024



SOURCE: Estonian Police and Border Guard Board

A comparison of school days and weekends reflects clearly different daily routines (Figure 7.4.2). The data indicate that youth offending is closely linked to daily schedules and levels of supervision. The end of the school day and late-night hours at weekends constitute risk windows that warrant particular attention in prevention efforts and in safeguarding young people. This pattern is consistent with routine activity theory in criminology, which holds that the likelihood of an offence is greatest when a motivated offender encounters a suitable target in the absence of capable guardianship.[5] Such conditions often arise at the end of the school day, when parents are still at work, and during late evening hours outside the home.

Research dating back to the 1940s has shown that youth offending is not concentrated at weekends but occurs more frequently on weekdays, particularly after the end of the school day.[6] Numerous studies have confirmed that both offending and victimisation among young people peak immediately after the final school lesson.[7] The most frequently cited risk window falls between 14:00 and 18:00 or 15:00 and 18:00 – precisely the time when school has ended but parents are still

at work.[8] Estonian data, however, point to an even longer risk window. Figure 7.4.3 shows that the main risk period for youth offending in Estonia on school days extends from 14:00 to 20:00. This may partly be explained by family structure and supervision-related factors. In 2024, single-parent households accounted on average for 12.7% of households with children in the European Union, whereas in Estonia the figure was 36.7% – the highest in the EU.[9] Estonia was followed by Lithuania (29.5%), Latvia (24.9%) and Denmark (23.2%). In 2023, one in three single parents in Estonia lived at risk of poverty, and one in four single-parent households experienced material deprivation, meaning an inability to afford several goods and services regarded as standard in society.[10]

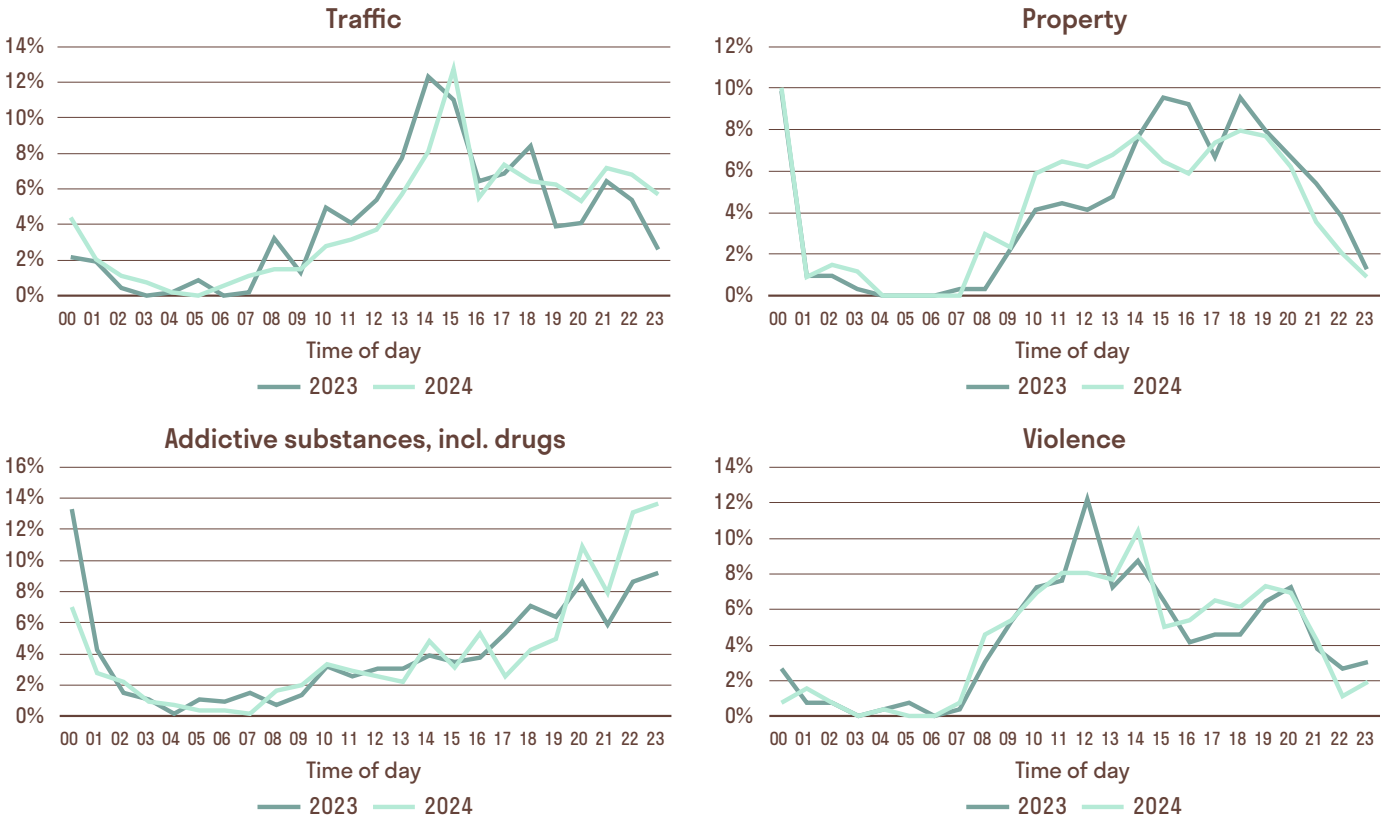
Many parents, including single parents, work long hours or shifts, leaving young people unsupervised more often in the late afternoon and evening. Similar patterns have been observed internationally: young people growing up in low-income single-parent households or in families affected by violence or substance misuse are significantly more likely to come to the attention of the justice system.[11]

Approximately half of all offences committed on school days occur within the six-hour period between 14:00 and 20:00 (Figure 7.4.3). Offences are particularly concentrated between 14:00 and 18:00, when around one third of the day's total offences are recorded.

PEAK TIMES IN YOUTH OFFENDING VARY BY OFFENCE TYPE: DAYTIME VIOLENCE, NIGHT-TIME SUBSTANCE OFFENCES, AFTER-SCHOOL THEFT AND TRAFFIC OFFENCES

We next examine which types of offences occur at what time of day. Our analysis (Figure 7.4.4) shows that, on school days, each category of offence has a characteristic peak period – a time

Figure 7.4.4 Youth offences by time of day on school days, by type of offence



SOURCE: Estonian Police and Border Guard Board

interval when the risk of that specific offence is highest. Traffic offences peak between 13:00 and 15:00, accounting for nearly 14% of all such incidents; half of all daily traffic offences occur between 13:00 and 18:00. Property offences are concentrated between 14:00 and 20:00, with a peak immediately after the end of the school day. Substance-related offences differ markedly: they occur predominantly late in the evening, between 21:00 and 00:00, when nearly half of all such incidents are recorded. Violent offences are most frequent between 11:00 and 14:00, coinciding with lunch breaks and, in some cases, the end of the school day, when supervision may be weaker and tensions between young people intensify.

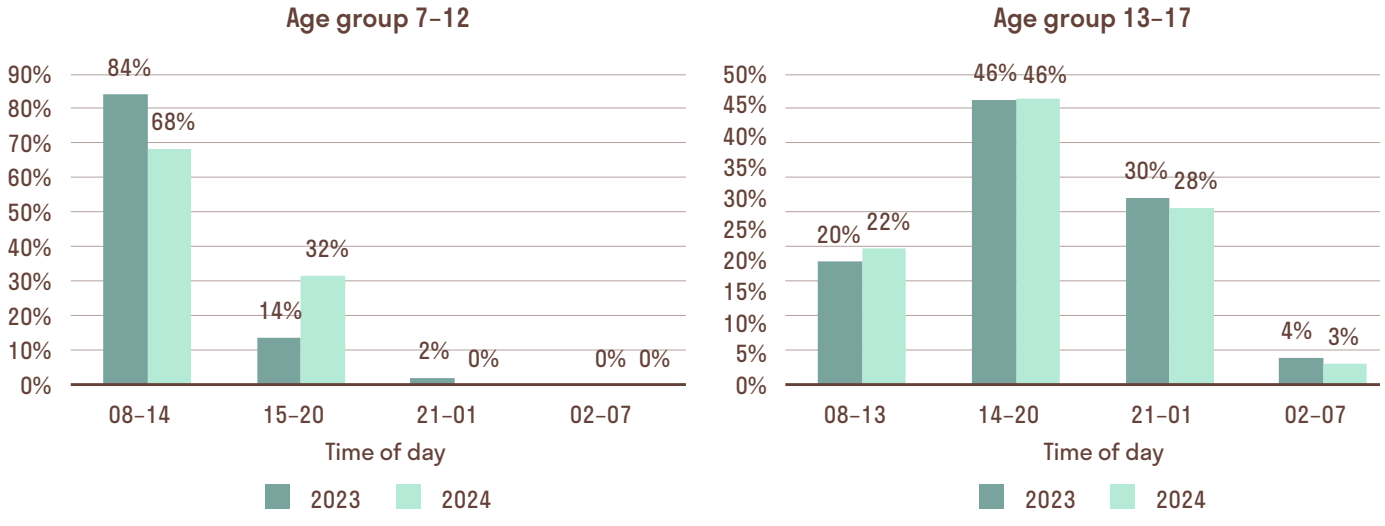
Different types of youth offending also tend to cluster on specific days of the week. The highest number of offences occurs on Fridays, when young people's independence and presence in public space increase. Substance-related offences clearly peak at the start of the weekend: nearly half of all such incidents are recorded on Fridays and Saturdays, suggesting an interaction between leisure time and reduced supervision. Violent incidents, by contrast, are concentrated in the middle of the school week – Wednesday to Friday – pointing to the possible accumulation of tensions in the school environment.

The temporal pattern of offending shifts with age: younger children offend mainly during the school day, whereas adolescents' offences are spread across the afternoon and evening.

Figure 7.4.5 highlights a marked difference between the two age groups in the distribution of offences on school days. Among 7–12-year-olds, offences are clearly concentrated during school hours (8:00–14:00): in 2023, as many as 84% of incidents occurred during this period, and in 2024 slightly fewer, at 68%. This suggests that problems arise primarily within the school environment, where peer conflicts, behavioural difficulties and insufficient supervision may play a role. After the end of the school day, the number of offences declines sharply, with only isolated cases occurring in the evening and at night.

Among 13–17-year-olds, offences on school days are distributed much more evenly than among younger children. Although 14:00–20:00 remains the main risk window (46% of incidents in both years), a substantial share of offences also occur late in the evening, between 21:00 and 01:00. In 2023, 30% of all incidents occurred during this period, and in 2024, 28%. This reflects greater independence, more active social lives and often limited supervision after the end of the school day.

Figure 7.4.5 Youth offences by time of day on school days, by age group



SOURCE: Estonian Police and Border Guard Board

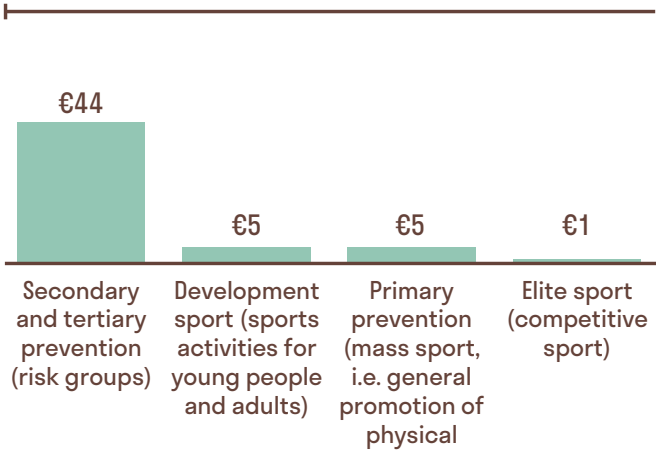
Age-related differences in risk behaviour indicate that preventing youth offending cannot be confined to the school day alone. Data from the United Kingdom show that nine out of ten young people in custody have some form of special educational need, most commonly emotional and behavioural difficulties and dyslexia.[12] Many of these young people do not experience a single success during the school day, which in turn deepens exclusion and behavioural problems. Non-formal education, such as extracurricular education, may therefore serve as a crucial support mechanism. It offers young people opportunities to experience belonging, self-development and positive social relationships outside the structures of formal education, helping prevent escalating risk behaviour and marginalisation.[13] Estonian studies indicate that not all youth workers are prepared or equipped to include young people with behavioural difficulties or special educational needs.[14] As a result, these young people may face double exclusion – first within the formal education system, where they do not receive adequate support, and then in extracurricular education, where they are not always adequately included.

INEQUALITIES IN EXTRACURRICULAR EDUCATION IN ESTONIA MAY INCREASE YOUTH RISK BEHAVIOUR AND OFFENDING

Criminological research indicates that non-formal education, including extracurricular education and activities, is one of the most effective preventive measures against youth risk behaviour.[15] This is particularly important for older adolescents, whose daily lives are marked by increasing independence, reduced adult supervision and more pronounced existential concerns. Miller's five-year study of 21 youth gangs found that group-based offending is often driven by existential factors, notably boredom arising from a sense that life is empty, aimless and without meaning.[16] According to Miller, society must reconsider how it relates to young people and recognise the harmful and potentially destructive effects of existential boredom.[17] This applies to both risk behaviour and mental health.

High-quality extracurricular education that genuinely engages young people can reduce youth offending through two main mechanisms. First, it provides a safe setting and supervision during the critical afternoon hours when risk behaviour tends to increase. Second, it supports the development of values and social skills, strengthening internal motivation and a sense of belonging – effects that accumulate over time.[18] For example, each

Figure 7.4.6 Social return on investment in youth sport



SOURCE: Gosselin et al. 2020[19]

NOTE. In public health, primary prevention aims to prevent the onset of disease. Secondary prevention involves early detection and treatment to avoid deterioration, while tertiary prevention seeks to reduce the consequences of an existing condition.

Data and methodology. Extracurricular education refers to structured, long-term learning provided by licensed extracurricular schools registered in the Estonian Education Information System. Extracurricular activities are less formal and take place in various settings, such as schools and youth centres. As comprehensive national data are available only for extracurricular education, extracurricular activities are not included in this analysis. Statistics Estonia analysed participation in extracurricular schools among 7–19-year-olds in 2020–2023, examining participants' background characteristics, including parental income and education, place of residence and school dropout. On average, 45% of children in this age group (approximately 84,269) participated annually in extracurricular schools, while 55% (approximately 102,962) did not.

euro invested in sports activities for at-risk young people has been estimated to generate an average long-term saving of 44 euros for society (Figure 7.4.6). This impact is particularly significant when activities target risk groups – young people from disadvantaged socio-economic backgrounds, those with special educational needs, or those experiencing mental or physical health difficulties.

Participation in extracurricular education is more common among younger children, although the need for prevention is greatest among adolescents (Table 7.4.1). The age groups with the lowest participation rates are also those whose offending is more widely distributed across time and often more serious. Participation declines sharply from the age of 13: only 47% of 13–15-year-olds and 25% of 16–19-year-olds take part in extracurricular education. At the same time, data from the Estonian Police and Border Guard Board show that offences committed by 13–17-year-olds cluster in the critical afternoon and evening hours (14:00–20:00), when this age group is often unsupervised. This points to a clear policy implication: the provision and accessibility of extracurricular education should focus more strongly on adolescents, who need support precisely at the times when they are most vulnerable to risk behaviour.

SOCIO-ECONOMIC AND REGIONAL INEQUALITIES IN EXTRACURRICULAR EDUCATION

A 2019 study from the United Kingdom shows that the school a pupil attends, the region in which they grow up and their family's socio-economic background largely determine which extracurricular opportunities are available outside the classroom.[20] What is the situation in Estonia?

Among children whose parents have a high monthly net income (over 1,800 euros for mothers and over 2,100 euros for fathers), nearly

Table 7.4.1 Participation in extracurricular schools by age group, 2020–2023

Participation in extracurricular schools	Age			
	7–9	10–12	13–15	16–19
Participated	55%	56%	47%	25%
Did not participate	45%	44%	53%	75%

SOURCE: Statistics Estonia

Table 7.4.2 Parents' monthly net income and child participation in extracurricular schools, 2020–2023

	Mother				Father			
Participation in extracurricular schools, 2020–2023	59%	47%	40%	37%	60%	48%	43%	40%
Net income per month	over €1,820	€1,283–€1,820	€837–€1,283	under €837	over €2,141	€1,289–€2,141	€630–€1,289	under €630

SOURCE: Statistics Estonia

60% participate in extracurricular education. In contrast, in low-income families (below 837 euros for mothers and below 630 euros for fathers), participation falls to 37–40% (Table 7.4.2). When children from lower-income families are excluded from extracurricular education, they are more likely to spend time unsupervised and to engage in risk behaviour.

Extracurricular schools are located mainly in county centres, particularly Tallinn, Tartu and Pärnu, which may limit access for children and young people in peripheral areas (Table 7.4.3). While more than half of children in cities and small towns participate in extracurricular education (51% and 52%, respectively), only 31% of children living in rural areas do so. This indicates substantial access barriers in rural areas, whether due to distance, limited transport or a narrower range of activities. Rural areas also tend to have lower average incomes than cities, which directly constrains participation in extracurricular schools.

School dropout is more common among those who do not participate in extracurricular education. Table 7.4.4 shows that children from low-income families participate less often in extracurricular education and are more likely to leave school early – both recognised risk factors for offending. For example, among children whose mother's monthly income is below 837 euros and who have not participated in extracurricular education, school dropout is three times more frequent than among children whose mother has the same income level but whose child has participated in extracurricular education for at least four years (3% vs. 1%). The same pattern is observed for fathers. It should be emphasised that this does not imply a causal relationship.

Table 7.4.3 Participation rates in extracurricular education by county, 2020–2023

County													
Harju	Tartu	Pärnu	Võru	Saare	Hiiu	Järva	Viljandi	Lääne	Ida-Viru	Rapla	Põlva	Jõgeva	Valga
53%	47%	43%	43%	40%	37%	37%	36%	36%	32%	32%	30%	27%	21%

SOURCE: Statistics Estonia

Table 7.4.4 Years of participation in extracurricular schools, parental income and school dropout, 2023

	Mother							
School dropout (2023)	0.6%	0.1%	0.7%	0.1%	1.0%	0.1%	3.0%	1.0%
Years in extracurricular schools (2020–2023)	0	4	0	4	0	4	0	4
Parent's net income	over €1,820		€1,283–1,820		€630–1,289		under €630	
	Father							
School dropout (2023)	1.0%	0.2%	0.6%	0.1%	1.1%	0.1%	2.0%	0.4%
Years in extracurricular schools (2020–2023)	0	4	0	4	0	4	0	4
Parent's net income	over €2,141		€1,289–2,141		€630–1,289		under €630	

SOURCE: Statistics Estonia

SUMMARY

A young person's life rests on four main pillars: family, leisure time, peers and school. While the state cannot intervene directly in family life, it can influence the other three through school and extracurricular education. In Estonia, greater attention should be directed towards adolescents. Adolescence is a developmental stage in which young people seek belonging and role models, and peer influence is particularly strong. The more young people find their place in extracurricular education and organised activities rather than in loosely structured peer groups or unregulated online environments, the better the outcomes for both them and society. At the same time, marked socio-economic inequalities persist in Estonia: participation in extracurricular education is significantly lower among young people from low-income families and those living in rural areas.

REFLECTION

Madis Kallas

During the school day, children have structured activities and adult supervision. Immediately after the school day ends, however, unstructured time increases the risk of drifting into harmful behaviour. Young people want to spend time with friends and seek shared ways to dispel boredom. The need for belonging and the desire to prove oneself become particularly salient. When these needs are met through sport or other extracurricular activities under adult guidance and in an appropriate setting, the outcomes are constructive. When left unsupervised, the result is often behaviour typical of loosely organised peer groups – from tobacco and alcohol use or inappropriate language to theft and vandalism in public spaces and online. This is evident in the statistics and, regrettably, in everyday life in larger cities.

Every child can find an activity that genuinely interests them. If we want to guide young people towards extracurricular education, we must support the development of intrinsic motivation. Although participation may begin at the urging of parents or friends, sustained engagement and genuine achievement arise only when motivation comes from within the young person. Extracurricular activities provide belonging and opportunities for self-realisation, improve concentration and strengthen the capacity to maintain routines. How can extracurricular education be made more accessible and more young people guided from unstructured peer groups into organised teams? I propose three measures.

Transport and mobility support must form an integral part of financing extracurricular education. A realistic objective would be to ensure access to at least one activity costing 20–50 euros per month for every child within their county. It is not feasible to provide a broad range of activities in every small settlement or rural school, but county centres can offer such diversity. Public transport and targeted mobility subsidies are essential, and ensuring access from all parts of a county requires deliberate policy effort.

A further concern relates to participation in performances and competitions. Regular competitions, performances and camps are integral to extracurricular education, even where there is no ambition to reach elite level. Young people need opportunities to present and compare their skills, build networks and broaden their horizons. The greater the distance from major centres, the higher the costs for families. Socio-economic disparities further intensify this inequality.

Children should be confidently guided towards suitable activities. In addition to parents, teachers and instructors should be able to direct children towards appropriate activities and recommend changes where necessary if a current activity does not suit the child or sustain interest. In a per-capita funding system, changing activities requires resolve, but such flexibility is essential because the child's well-being and development are at stake. If a young person would

thrive in a team setting, individual athletics training may not be the most suitable starting point. Conversely, if team ball sports do not align with a child's strengths, running, swimming or cycling may be more appropriate.

When an activity is ill-suited, boredom and withdrawal often follow quickly, returning the young person to a situation in which they are disengaged during their free time. In many municipalities, suitable options already exist within the range of available extracurricular activities. Adults surrounding the child have a responsibility to guide them accordingly.

Higher pay to properly value people working in extracurricular education. Estonia has created increasingly favourable conditions for pursuing diverse interests. Music schools, stadiums, sports halls and other facilities provide a strong foundation for a wide range of activities. The main challenge now lies in the shortage of qualified and motivated instructors. Infrastructure has improved, but remuneration remains inadequate.

Time spent after school and at weekends is as significant for a child as time spent in school. During these hours, a skilled instructor can cultivate belonging, provide opportunities for self-development and reinforce constructive values. Extracurricular education is not merely a way of filling leisure time; it is a direct investment in young people's development and sense of belonging, and ultimately in a safer present and future for the state.

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7.5

Higher educational attainment reduces the risk of offending

Andri Ahven and Ingrid Saarepuu

KEY MESSAGES

- **Higher levels of education reduce the risk of offending.** Among persons referred to court, the largest proportion have primary or basic education, while those with higher education are least represented.
- **The risk of offending is highest among men with low levels of education.** In recent years, men have consistently committed approximately 90% of registered crimes.
- **Criminal proceedings against more highly educated individuals are more often terminated on grounds of expediency.** Owing to the high proportion of terminated proceedings, offenders with higher education place the least burden on the justice system.

INTRODUCTION

In examining the relationship between education and crime, several questions arise: does the nature of offending change as educational attainment increases; do individuals with different levels of education commit different types of offences; do more highly educated offenders receive more lenient treatment; and does a higher level of education among offenders entail greater costs for the justice system? The national statistics used in this article offer some indications in response to these questions. The analysis focuses on the pre-trial phase of criminal proceedings because the available data do not allow for an assessment of the extent to which an accused person's level of education may influence sentencing outcomes.

LONGER EDUCATIONAL PATHWAYS SUPPORT LAW-ABIDING BEHAVIOUR

Most international studies have shown that higher levels of education are associated with a reduced risk of offending. Research indicates

that completing upper secondary education is itself a significant factor in reducing crime.[1] It has also been found that greater access to university education is associated with reductions in both property crime and violent crime,[2] with longer educational trajectories particularly reducing the risk of offending among men.[3] Analyses of the Estonian context suggest that, as in other countries, property crime is more strongly explained by economic and socio-demographic factors than violent crime is.[4]

THE RISK OF OFFENDING IS HIGHEST AMONG MEN WITH LOW LEVELS OF EDUCATION

In recent years, men have consistently committed approximately 90% of registered crimes. Among the most common offence types in 2018–2023 (Figure 7.5.1), the share of men was highest in cases involving threats (92%), followed by driving while intoxicated (91%). The offence type with the highest proportion of women was fraud (20%).

As the seriousness of offences increases, the proportion of male offenders generally rises; the average number of offences committed is also higher among men than among women. For both sexes, the largest group of suspects consisted of those suspected of bodily harm (Table 7.5.1), approximately half of whom had committed domestic violence. It should be noted that perpetrators are identified more frequently in violent crimes than in property crimes, and in traffic offences the perpetrator is almost always known.[5]

Across all types of offence combined, 44% of suspects in 2018–2023 had primary or basic education, 48% had upper secondary or vocational secondary education and 8% had higher education (Figure 7.5.2). During the same period, among residents aged 15 and over, 21% had primary or basic education, 52% had upper secondary or vocational secondary education, and 28% had higher education.[6]

Among the selected types of offence, suspects with primary or basic education were most

Data and methodology. The analysis is based on data from the e-File system.[7] It primarily relies on information concerning suspects and accused persons in respect of whom the prosecutor has made a final procedural decision, either referring the case to court or terminating proceedings on grounds of expediency.[a] This group is referred to as 'offenders' or 'suspects' and includes those accused. The analysis focuses on such cases because commission of the offence has generally been established[b] and they provide the most comprehensive data on educational attainment.

The educational level of offenders is examined for selected categories of offence:

1. all registered crimes combined and crimes registered under Penal Code, Sections 120, 121, 157[3], 184, 199, 209, 213, 422, 423 and 424;
2. and misdemeanours which, when repeated or more serious, are classified as crimes: Penal Code Section 218, Traffic Act Section 224, and Act on Narcotic Drugs and Psychotropic Substances and Precursors Section 15[1].

The dataset mainly covers the period 2018–2023, and in some cases 2024. Data are presented for three groups, referred to as 'education groups': persons with primary or basic education; persons with upper secondary or vocational secondary education; and persons with higher education, including professional higher education.[c]

[a] Criminal proceedings were terminated under Sections 201, 202, 203 or 2031 of the Code of Criminal Procedure.

[b] In 2020–2023, 98% of natural persons whose cases were resolved in court were convicted in full or in part.

[c] Data on educational attainment vary in level of detail across sources, which makes it appropriate to combine smaller groups.

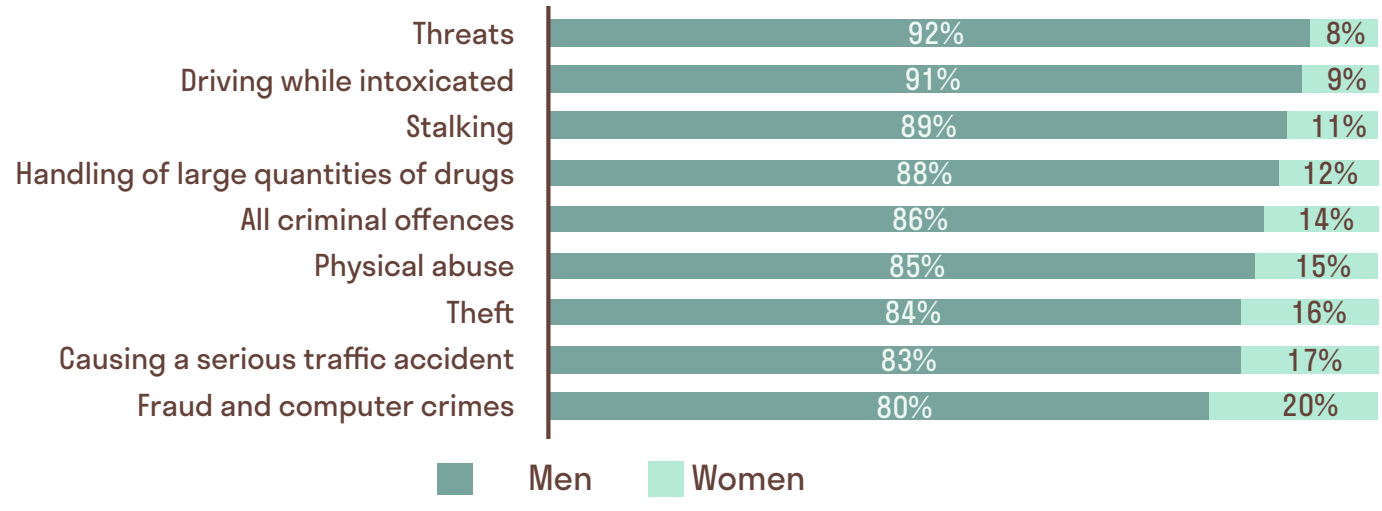
prevalent in theft (57%). The highest proportion of suspects with upper secondary or vocational education was found in stalking (62%), while the highest proportion of suspects with higher education was in causing a serious traffic accident (21%).

For the misdemeanours examined, the figures for 2023 were as follows.

- Among perpetrators of property misdemeanours (Penal Code, Section 218), 50% had primary or basic education, 46% upper secondary or vocational education and 3% higher education.
- Among perpetrators of the misdemeanour of exceeding the legal alcohol limit while driving (Traffic Act, Section 224), 33% had primary or basic education, 54% upper secondary or vocational education, and 13% higher education.
- Among perpetrators of drug-related misdemeanours (Act on Narcotic Drugs and Psychotropic Substances, Section 15[1]), 71% had primary or basic education, 27% upper secondary or vocational education, and 2% higher education.

There is no consistent long-term time series on offenders' educational attainment. Data on defendants referred to court in 2001[8] suggest that the overall picture was broadly similar to that observed today.

Figure 7.5.1 Proportion of male and female offenders in selected offence categories, 2018–2023



SOURCE: figure by the authors based on e-File data[9]

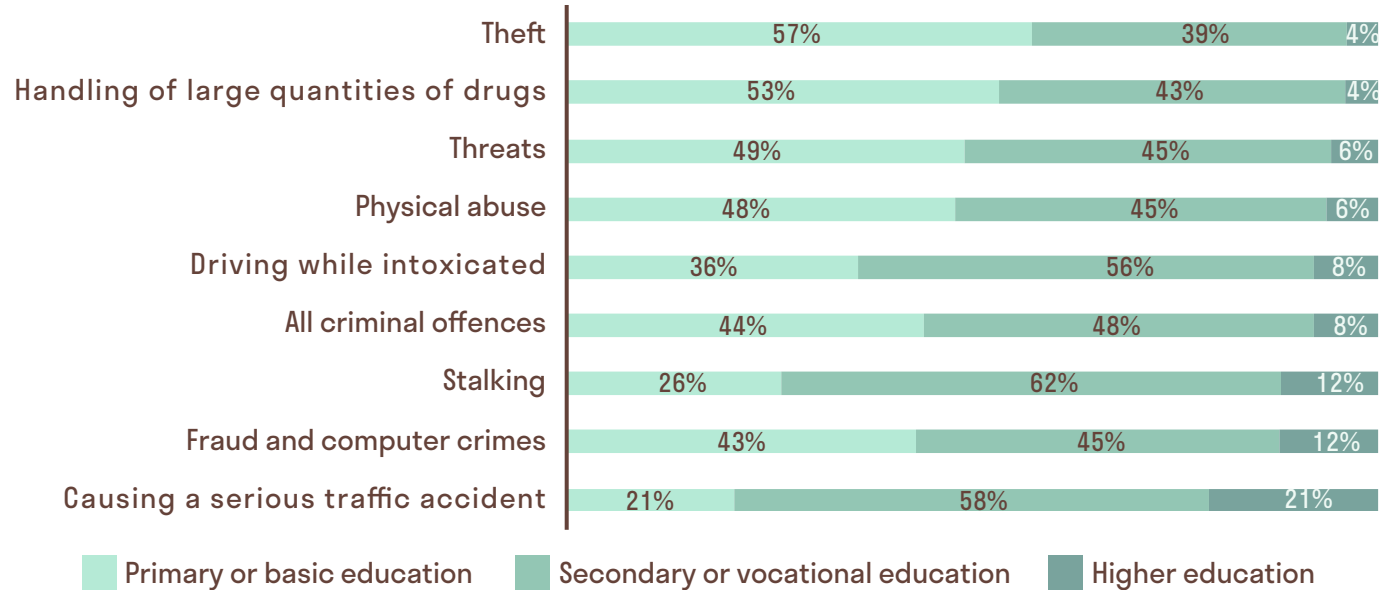
NOTE. The same person may appear in the statistics for different types of crime.

Table 7.5.1 Number of offenders and gender distribution in selected offence categories, average 2018–2023

Offence	Penal Code	Number		Share (%)	
		Men	Women	Men	Women
Threats	Sect. 120	399	35	6	3
Physical abuse	Sect. 121	2,270	388	34	36
Stalking	Sect. 157[3]	60	7	1	1
Handling of large quantities of drugs	Sect. 184	548	74	8	7
Theft	Sect. 199	974	191	14	18
Fraud and computer fraud	Sects. 209, 213	287	73	4	7
Causing a serious traffic accident	Sects. 422, 423	56	11	1	1
Driving while intoxicated	Sect. 424	1,897	187	28	17

SOURCE: table by the authors based on e-File data[10]

Figure 7.5.2 Distribution of suspects by level of education in selected offence categories, 2018–2023



SOURCE: figure by the authors based on e-File data[11]

- In property crimes, approximately 60% of accused persons had primary or basic education, 40% had upper secondary education, and around 1% had higher education.
- In offences against the person, 43% of accused persons had primary or basic education, 54% upper secondary education, and 3% higher education.
- In traffic offences, around 30% of accused persons had primary or basic education, while approximately 70% had upper secondary or higher education.

In recent years, the proportion of suspects with primary or basic education has declined, while the share of other education groups has increased. Between 2015 and 2024, the proportion of suspects aged 15 and over with higher education rose to 16%,[12] and their share among suspects doubled during the same period (Figure 7.5.3).

The increase in the proportion of suspects with higher education is primarily related to driving while intoxicated, where the number of higher-educated suspects has risen year by year. Although their share has also increased in some other offence categories, including domestic violence, fraud, embezzlement, offences against public trust and economic crime, this is largely due to a decline in the number of suspects with lower levels of education; there is no clear upward trend in the absolute number of suspects with higher education.

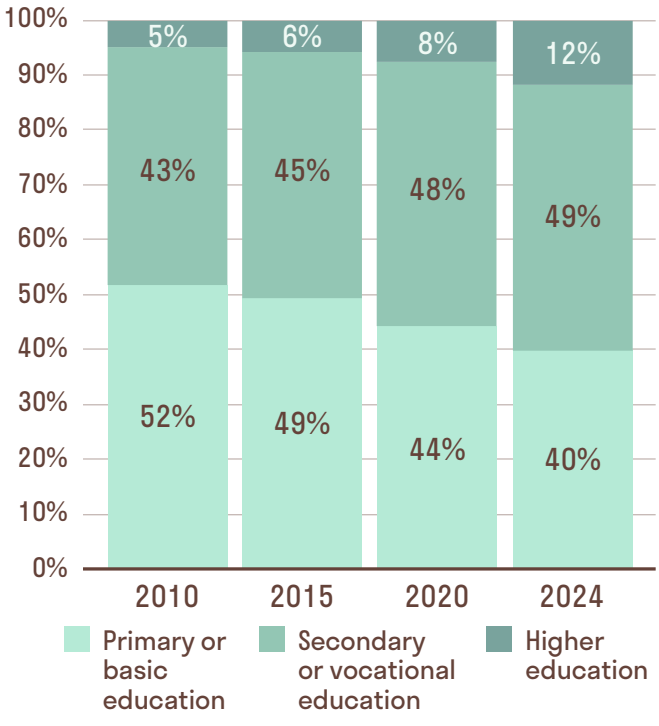
In 2018–2023, there were on average 136 suspects per year for every 10,000 residents with primary or basic education, the highest rate among the education groups. This was more than twice the corresponding figure for persons with upper secondary or vocational education (59) and nearly eight times the figure for persons with higher education (18) (Figure 7.5.4). The population base included residents aged 15 and over with known educational attainment.[13]

When the number of suspects per 10,000 persons is considered, differences between education groups were most pronounced in theft and drug offences (Table 7.5.2).

In offences against the person, the data may not fully reflect actual differences between education groups, as the perpetrator is often the victim's partner or another family member. In such cases,

Among women with higher education, the share of suspects in drink-driving offences has increased more rapidly than among men, although men continue to dominate this type of crime. In 2015, women with higher education accounted for 0.8% of all suspects in drink-driving offences; by 2024, the figure had risen to 3.3%, representing an approximately fourfold increase. Among men with higher education, the corresponding figures were 4.5% and 8.6%, representing an approximately twofold increase. This may reflect a trend observed in surveys:[14] in 2014, 10.6% of women with higher education consumed alcohol at least two to three times a week, compared with 16.5% in 2022. Among men with higher education, the share of frequent alcohol consumers did not increase over the same period.

Figure 7.5.3 Distribution of suspects by level of education across all offence categories, 2010–2024



SOURCE: figure by the authors based on e-File data[15]

reporting may be avoided in the hope of resolving the matter privately or out of fear of retaliation. Electronic channels are playing an increasingly significant role in crime, which makes it difficult to group offenders clearly by offence type or other characteristics. The same individuals may commit both 'traditional' theft and online fraud, and may use parcel lockers and GPS devices in drug offences. Substance misuse substantially increases the risk of offending[16] and occurs across all education groups: in 2023, 8% of respondents with primary or secondary education and 4% of those with higher education reported heavy alcohol consumption.[17] This is particularly relevant in violent crime, most of which is committed while intoxicated, shoplifting, where a large share of offenders have substance dependence, and driving while intoxicated, which is largely linked to excessive alcohol consumption.[18] Domestic violence occurs across all population groups, although the risk of physical violence decreases as education level increases.

For the offence types examined, bodily harm accounted for the largest number of suspects in all education groups in 2018–2023, followed by drink-driving and theft (Figure 7.5.5). The higher the suspects' level of education, the lower the share suspected of theft, drug offences or threats. Suspects in fraud or computer fraud, causing a serious traffic accident and stalking were most prevalent in the higher education group.

HIGHER EDUCATIONAL ATTAINMENT MAKES REFERRAL TO COURT LESS LIKELY

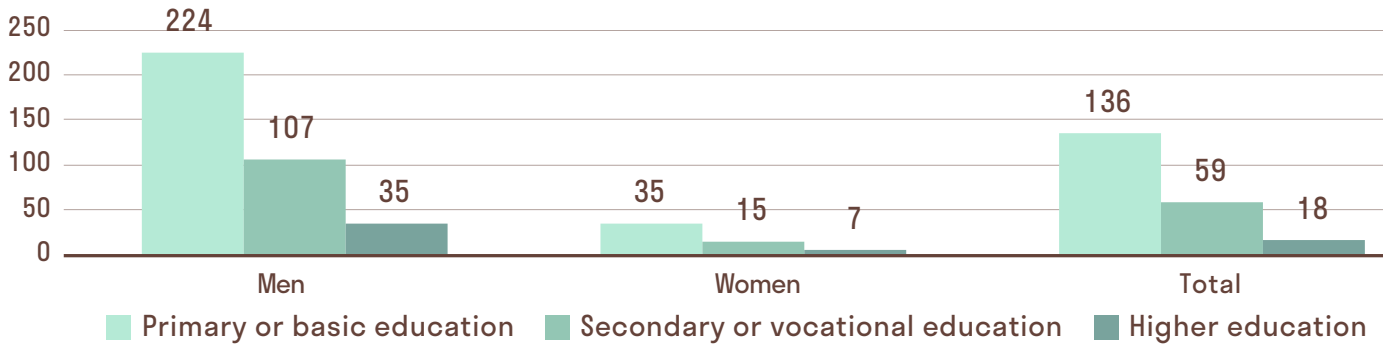
At the conclusion of the pre-trial investigation, the prosecutor decides whether to refer the criminal case to court or terminate the proceedings on

Table 7.5.2 Number of suspects per 10,000 persons by gender and level of education in selected offence categories, 2018–2023

Offence	Penal Code	Men			Women		
		Primary or basic education	Secondary or vocational education	Higher education	Primary or basic education	Secondary or vocational education	Higher education
Threats	Sect. 120	88	37	10	10	2	1
Physical abuse	Sect. 121	496	211	61	92	30	11
Stalking	Sect. 157[3]	7	8	3	1	1	0
Handling of large quantities of drugs	Sect. 184	123	43	8	17	5	1
Theft	Sect. 199	264	75	12	45	15	6
Fraud and computer fraud	Sects. 209, 213	58	25	14	13	6	3
Causing a serious traffic accident	Sects. 422, 423	6	7	5	1	1	1
Driving while intoxicated	Sect. 424	321	213	60	21	20	10

SOURCE: table by the authors based on e-File data[19]

Figure 7.5.4 Number of suspects per 10,000 persons, 2018–2023



SOURCE: figure by the authors based on e-File data[20]

Among persons with higher education, the risk of domestic violence offences is lowest.

In domestic violence offences (Penal Code, Section 121(2)(2)), the average annual number of suspects per 10,000 residents in 2018–2023 was 22 among persons with primary or basic education, 12 among those with upper secondary or vocational education, and three among those with higher education.

According to survey data, differences between education groups among victims have been considerably smaller.

- In a 2009 survey, 14% of respondents with primary or basic education, 10% with upper secondary or vocational education, and 8% with higher education reported having experienced intimate partner violence in the previous 12 months; for physical violence, the corresponding figures were 8%, 5% and 3%.[21]
- In a 2022 survey, 33.7% of women with primary or basic education, 27.1% with upper secondary or vocational education, and 22.1% with higher education reported having experienced domestic violence in adulthood; the corresponding figures for men were 18.0%, 15.3% and 15.9%.[22]

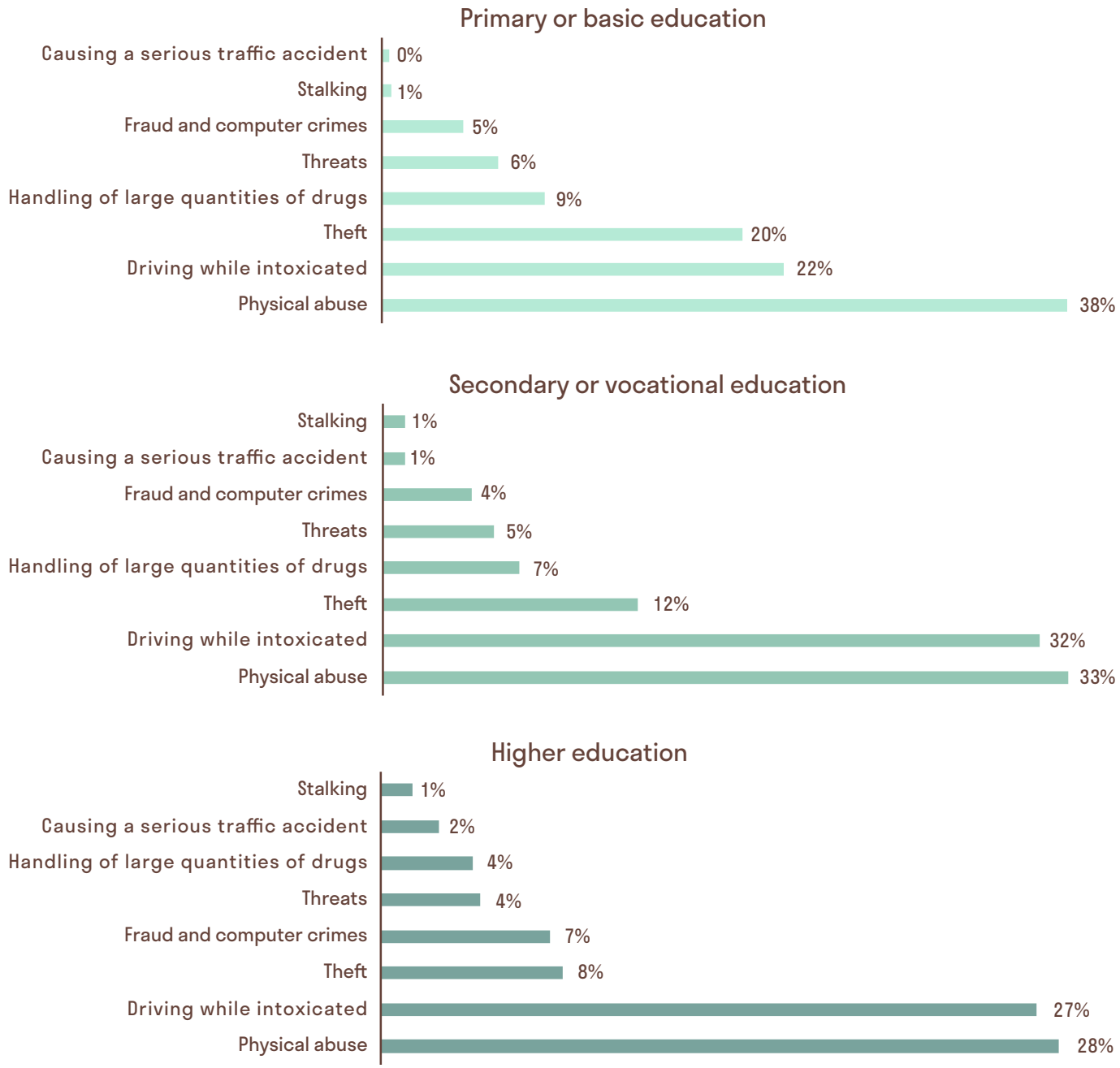
As a hidden and sensitive offence category, domestic violence data may be influenced by factors that complicate comparisons between education groups, such as awareness of what constitutes domestic violence, perceptions of severity, willingness to initiate formal proceedings and financial dependence on the perpetrator. In survey data, the severity and total number of incidents are also unknown, including whether reported cases were preceded by unreported incidents and whether this varies across education groups.

Suspects of stalking were several times fewer in number, with rates below one per 10,000 residents. Among persons with higher education, the proportion was approximately three times lower than in the other education groups. While differences between groups are observable, they are markedly smaller than in domestic violence offences.

In domestic violence cases, procedural practice has generally followed the pattern seen in other offence categories: where the perpetrator has higher education, proceedings are more often terminated on grounds of expediency, including in repeat cases, whereas perpetrators with primary or basic education are more frequently referred to court.[a]

[a] The specific circumstances influencing procedural decisions, such as prior convictions or other types of crime in the same proceedings, are not known.

Figure 7.5.5 Distribution of suspects by offence category within each education group, 2018–2023



SOURCE: figure by the authors based on e-File data[23]

grounds of expediency, provided that the suspect agrees to assume time-bound obligations (Code of Criminal Procedure, Sections 201–203). Even where proceedings are terminated, the prosecutor is satisfied that the offence was committed. Proceedings are most commonly terminated because there is no public interest in continuing them and the degree of guilt is not significant (Code of Criminal Procedure, Section 202): in 2024, this accounted for 78% of all cases terminated on grounds of expediency. Cases involving juvenile offenders accounted for 13% of terminations (Code of Criminal Procedure, Section 201), while 5% were terminated because punishment was deemed disproportionate (Code of Criminal Procedure, Section 203) and 4% because the damage caused by the offence had been remedied (Code of Criminal Procedure, Section 203[1]).

The prospects for terminating proceedings are more favourable for suspects who are economically and psychologically stable; these factors are, to a considerable extent, associated with the level of education. For example, the prosecutor may consider that imposing obligations is sufficient to influence a more highly educated suspect. Similarly, a person with higher education may have greater financial or time resources to compensate damage, fulfil obligations or perform community service. Decisions may also be significantly influenced by repeat offending, which, depending on the offence type, may preclude termination, compliance with previously imposed obligations, prior convictions, the suspect's attitude towards the offence and its consequences, and their willingness to fulfil obligations within the prescribed time limit.

The proportion of persons referred to court has been highest among those with primary or basic education and lowest among those with higher education (Table 7.5.3). Differences between offenders with primary or basic education and those with higher education are relatively pronounced in violent crime, theft and traffic offences, but smaller in fraud, computer fraud

Table 7.5.3 Educational attainment of persons referred to court by offence type, 2018–2023

Offence	Penal Code	Primary or basic education	Secondary or vocational education	Higher education
Physical abuse	Sect. 121	48%	37%	22%
Causing a serious traffic accident	Sects. 422, 423	82%	62%	34%
Threats	Sect. 120	67%	61%	40%
Theft	Sect. 199	75%	70%	41%
Driving while intoxicated	Sect. 424	80%	68%	50%
Stalking	Sect. 157[3]	65%	62%	51%
Fraud and computer fraud	Sects. 209, 213	83%	81%	79%
Handling of large quantities of drugs	Sect. 184	98%	97%	86%
ALL CRIMINAL OFFENCES[a]		63%	57%	44%
Selected categories				
Domestic violence	Sect. 121(2)2)	49	37	22
Repeated domestic violence[b]	Sect. 121(2)2) and 3)	68	50	28
First-time driving while intoxicated	Sect. 424(1)	74	60	44
Repeated driving while intoxicated	Sect. 424(2)	97	96	96

SOURCE: table by the authors based on e-File data[24]

NOTE. [a] Includes all offence types, including those not presented in the table. [b] The offence was simultaneously classified under Penal Code Section 121(2) points (2) and (3): the domestic violence offence had been preceded by bodily harm. It may be assumed that, in most cases, the earlier offence was also domestic violence.

and drug offences. An exception is repeat driving while intoxicated (Penal Code, Section 424(2)), where prosecutors generally do not terminate proceedings on grounds of expediency.

In property and traffic offences, the possibility of compensating the victim for damage is an important factor influencing procedural decisions. Violent offences encompass a wide range of conduct, and there may be differences between education groups in the average severity of offences. The degree of severity is one of the factors taken into account when deciding whether to terminate proceedings or refer a case to court.

THE COST OF COURT PROCEEDINGS DEPENDS PRIMARILY ON PROCEDURE TYPE, NOT EDUCATION LEVEL

In 2022–2024, 72% of criminal cases referred to court were adjudicated in settlement proceedings, 15% under general procedure, 12% under alternative proceedings and less than 1% under summary proceedings. This distribution was similar across all education groups. Information on defendants' education was unavailable in 29% of cases. Given the predominance of common offences such as bodily harm and driving while intoxicated in court cases, it is unlikely that the average procedural cost per defendant differs significantly between education groups overall. In certain offence categories, such as corruption, cases may be more complex than average and a relatively large proportion of defendants may have higher education; however, the number of such cases is small.

SUMMARY

As educational attainment increases, the overall risk of offending decreases. Offenders have consistently been disproportionately represented among people with low levels of education, while relatively few have had higher education; the differences are most pronounced in theft. Violence occurs across all population groups, but the share of direct physical assaults declines as education level rises. In certain less frequent offences requiring specific expertise, such as corruption and economic crime, the risk of offending may increase with higher education. The risk of offending is highest among men with low levels of education, particularly in violent offences, including domestic violence, and theft. The risk of becoming a victim of domestic violence is also highest among persons with lower educational attainment, and perpetrators with higher education are less likely to be referred to court than those with lower education.

In 2024, 134 defendants were referred to court for corruption offences. Among those whose education level was known, 30% had primary or basic education, 53% had upper secondary or vocational education, and 17% had higher education. Thus, the share of defendants with higher education in such offences was twice as high as across all offences combined, where it was approximately 9%.[25]

Irrespective of the type of offence, the likelihood of termination of proceedings on grounds of expediency increases with the suspect's level of education. Compared with suspects with lower educational attainment, those with higher education are generally better placed to fulfil the time-bound obligations required for termination; they are also more likely to have no prior convictions.

Because criminal proceedings involving offenders with higher education are more often terminated before reaching court, these offenders place the least burden on the justice system. Regardless of the offender's level of education, termination of proceedings may be appropriate, particularly in the case of first-time offenders, without increasing the risk of reoffending. In recent years, for example, repeat offending among first-time offenders apprehended for driving while intoxicated has declined significantly where proceedings were terminated because there was no public interest in continuing them and obligations were imposed.

REFLECTION

Jürgen Rakaselg

The relationship between educational attainment and offending is more complex than a simple correlation. In the psychology of criminal behaviour, a finding that is also reflected in Estonian data appears to hold: longer participation in formal education reduces the risk of offending.[26] Admittedly, the relationship between education and corruption offences differs to some extent from the relationship between education and property offences or violent offences. This may also be explained by the fact that higher levels of education tend to lead individuals into different occupational fields. A person with only basic education, for example, is far less likely in practice to encounter opportunities for corruption.

When considering the link between educational attainment and the risk of offending, it must be recognised that the presence or absence of education, or the length of time spent in education, may mask other characteristics that have a stronger influence on offending risk. The temptation to conclude simply that more education reduces crime captures only part of the picture. When education is analysed in isolation from other factors that affect the risk of offending, research suggests that its weight in an offending risk profile is, depending on the study, around 5–10%. In other words, raising the level of education alone would, at best, reduce the predicted likelihood of risk behaviour by up to 10%.

At the same time, educational attainment and the time spent in education signal the presence of other, more influential factors affecting offending risk. These include literacy, verbal ability, opportunities to experience recognition even after modest intellectual effort, moral attitudes, the social norms of peers and friendship groups, the capacity for sustained intellectual effort, and the absence of substance dependency. The absence of such factors both reduces the likelihood of educational success and increases the risk of offending.

Effective prevention should therefore focus particularly on these factors that shape the course of learning. More important than the formal attainment of a given level of education are the preconditions for achieving that level and the quality of the learning environment. Too often, the mere fact of attaining a certain educational qualification is treated as more important than the development of competences, attitudes and values, and than addressing factors that appear to lie outside education, such as lifestyle. Educational policy should therefore shift its emphasis from formal outcomes towards the process and substance of education, both in supervision and in the support provided to educational institutions.

From the perspective of specific prevention – that is, with regard to the individual, including those who have already offended – broad opportunities should be provided to develop the foundations for learning, both in school and in extracurricular education. In the context of custodial sentences, greater use should also be made of legally available but currently rarely used opportunities for learning outside prison, rather than relying primarily on prison schools.

Addressing the skills, opportunities, attitudes and other factors that underpin educational attainment and reduce offending risk may complicate the execution of sentences. As a result, more readily available in-prison solutions are often preferred, even where more effective options exist outside prison. It is therefore worth considering a clearer distinction between penal policy and the function of sentence enforcement. Otherwise, there is a risk that practical and administrative considerations in the execution of sentences will begin to shape penal policy itself. Ideally, the relationship should be reversed: informed and evidence-based policy should guide practice.



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Estonian education 2050


TEHISARU
Jänesehaak
UUENDUSED
REFORMID
Põdra samm

Estonian education 2050

Eneli Kindsiko, Tea Danilov and Uku Varblane

KEY MESSAGES

- **A sense of belonging is a key driver of societal development.** In education, it underpins the vitality and security of the entire system. When learners, teachers and communities feel that they are part of the education system rather than merely its users, trust is accompanied by a shared sense of responsibility.
- **Education will increasingly be shaped by where decision-making authority lies:** Are decisions centralised and system-centred or decentralised and people-centred?
- **The vitality of Estonian education will depend on how we move through the education landscape – in a steady stride, a rampaging rush, cautious stealth or quick zigzags.** Much depends on our ability to recognise the opportunities and risks associated with each mode of movement.

INTRODUCTION

The future is difficult to predict, but one thing is certain: children born in the year ChatGPT was launched will enter the first grade in 2028 or 2029 and begin university studies around 2040. Their patterns of information consumption will differ significantly from those of previous generations.

However, before turning to the future and sketching out the year 2050, it is worth pausing to look back at the world and Estonia over the past quarter century.

THE WORLD AND ESTONIA, 2000–2025

2000 In Estonia, 13,067 children are born; the e-Tax Board is launched. Almost all schools are connected to the internet with the support of the Tiger Leap programme (launched in 1996).

2001 Wikipedia and the Estonian Biobank are established; Estonia wins the Eurovision Song Contest.

2002 Estonia issues its first digital ID card.

2003 Skype is launched.

2004 Facebook is launched; Estonia joins the European Union and NATO.

2005 YouTube is launched.

2007 iPhone is launched.

2008 The global financial crisis hits.

2010 Instagram is launched.

2011 Zoom is launched; Estonia adopts the euro.

2013 ESTCube-1 reaches orbit; Bolt (formerly Taxify) is founded.

2016 TikTok is launched.

2017 Microsoft Teams is launched.

2018 The EU General Data Protection Regulation (GDPR) begins to apply.

2020 The Covid-19 pandemic.

2022 Russia launches its full-scale war against Ukraine; ChatGPT is released.

2024 In Estonia, 9,690 children are born. The transition to Estonian as the sole language of instruction begins in early childhood education and in grades 1 and 4.

2025 Estonia launches the AI Leap (TI-hüpe).

In this future-oriented chapter, we draw on both global and local trends to outline the possible development scenarios for Estonian education. The chapter consists of three parts: first, it introduces the trends shaping the future of education, followed by an explanation of the principles of scenario planning. The final section presents four future scenarios that help to identify possible development paths and the decisions we need to make today. Each scenario reflects a different trajectory for the development of Estonian education, inviting the reader to consider what kind of world we wish to live in and which developments we seek to avoid. How can the Estonian education system adapt to both global changes and local challenges?

FUTURE SCENARIOS FOR EDUCATION

2020 OECD, 'Back to the future of education'[1]

2022 PRAXIS, 'Future scenarios for Estonia's youth field'[2]

2023 Foresight Centre, 'The future for the next generation of teachers: Trends and scenarios up to 2040'[3]

2024 European Commission, 'Scenarios for the future of school education in the EU'[4]

THE PRINCIPLES OF SCENARIO PLANNING

Education, like society as a whole, operates in an increasingly unpredictable environment. Crises such as the Covid-19 pandemic and the Russia–Ukraine war have shown that our strategies must be more flexible. Rather than following a single predictable path, the key question is how well we can adapt to different situations. Educational institutions and ministries draw up strategic development plans, but alongside a strategic vision, potential major deviations or unexpected turns are rarely considered.

According to futures studies researcher Sohail Inayatullah,[5] we need to make sense of the continuities in our history and identify where breaks have occurred. Have changes unfolded gradually, or through abrupt leaps?

The purpose of scenarios is not to predict the future but to develop futures literacy – the ability to recognise trends, make sense of uncertainty and ask 'what if ...?'. This type of thought exercise is used by international organisations such as the OECD, IMF, UNICEF, NATO and the European Commission – not to identify a single correct future but to prepare for many.

The foundation of futures thinking lies in the ability to detect weak and strong signals – early signs of future trends.[6] These are often unfamiliar or novel patterns that may, but do not necessarily, develop into broader trends. Below are a few examples from the field of education.

The first women entered universities in Europe and Estonia at the turn of the 20th century, but they were seen as exceptions. What went unnoticed was that this would become an irreversible social change, affecting not only university enrolment patterns, but also the labour market, the direction of research and the content of knowledge itself. Today, however, 60% of university students are women.[7]

While opportunities for online meetings and online learning had existed for a long time, the Covid-19 pandemic accelerated the digital revolution. At present, we can only ask: what if Covid-19 had not happened?

The Estonian education 2050 scenarios were developed in three stages:

I **Horizon scanning:** mapping global and local trends and signals on the basis of relevant literature.

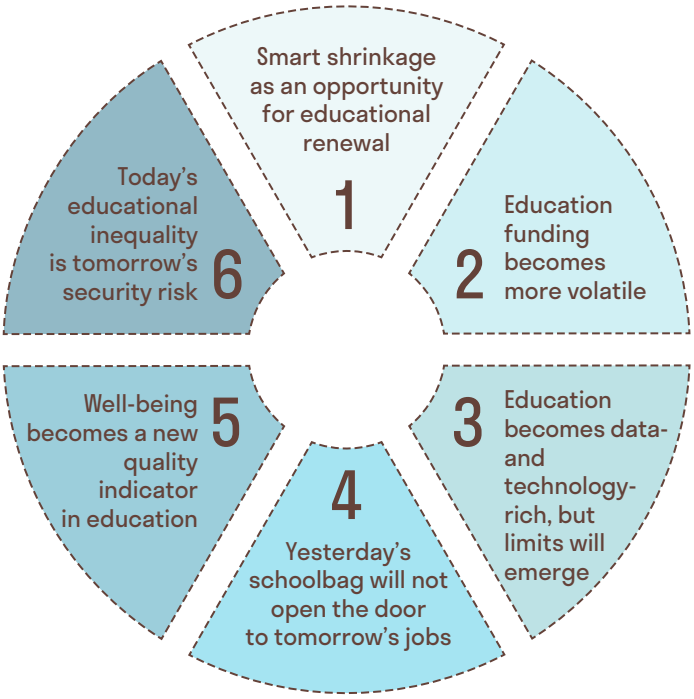
II **Futures workshops:** to understand regional specificities, five futures workshops were held between May and June 2025 in Kuressaare, Obinitsa, Saku, Narva-Jõesuu and Tallinn. Participants included school leaders, teachers, pupils, policymakers and active community members.

III **2 × 2 future scenarios:** drawing on trends identified in the literature and input from the local futures workshops, four future scenarios for education were developed.

I HORIZON SCANNING: THE TRENDS SHAPING THE FUTURE OF EDUCATION

Horizon scanning is typically the first step in scenario development. Using frameworks such as PESTLE, it maps the social, technological, economic, environmental and other factors that may shape the future.[8] Figure 8.1 presents six key trends that will influence the development of education in the near future, both globally and locally.

Figure 8.1 Trends in education



TREND 1. SMART SHRINKAGE AS AN OPPORTUNITY FOR EDUCATIONAL RENEWAL

Schools connect people across different stages of the life course. Since 1990, the number of births in Estonia has fallen by more than half; whereas more than 22,000 children were born annually at that time, the number of births remained below 10,000 in both 2024 and 2025. According to projections, Estonia's population will decline over the next 25 years in almost all counties – with growth expected only in Harju County and Tartu County.[9] However, over the coming decades, both internal and external migration may redraw the entire playing field – a settlement or region that is currently shrinking may begin to grow instead. Technological solutions and educational innovations also contain underappreciated potential that enables the education system to shrink in a smart way, so that population decline does not necessarily lead to school closures but may instead encourage a smart reorganisation of activities. For example, the OECD envisions future schools as community centres where both children and adults learn. In an ageing society, general education schools could also evolve into places for further training and retraining, with new roles that increase resilience to change.[10]

> 'Education should dare to be bolder.'
>
> Participant in a futures workshop, 2025

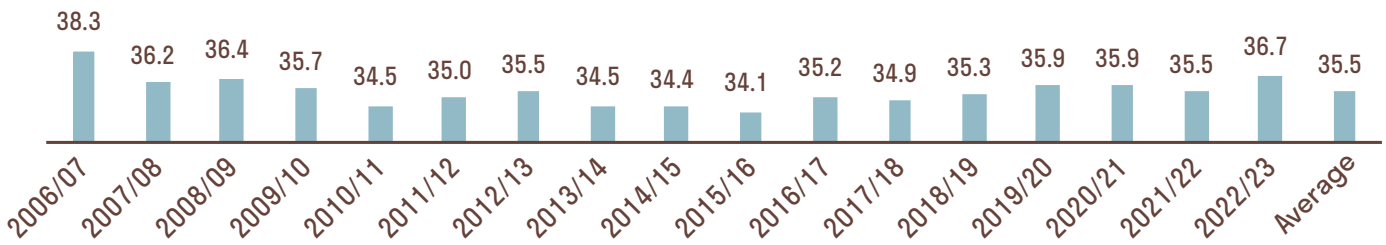
> 'Career switchers are the key to the future.'
>
> Participant in a futures workshop, 2025

Education is increasingly a second or third career, entered later in life. Looking at global trends, it is becoming ever clearer that teaching or academic work is not always the first career choice for young people (Figure 8.2), but often a second or third step taken at a more mature age after a career change. This also calls for an updated understanding of future workforce supply – alongside young people, those who decide to contribute to education later in life must be deliberately engaged and supported. It is precisely they who bring to schools the life experience, awareness and stability that learners and schools increasingly need. Workforce supply in the education sector therefore involves not only recruiting young people but also providing targeted continuing education and support for adults later in life.

TREND 2. EDUCATION FUNDING BECOMES MORE VOLATILE

Declining birth rates and rising defence spending: risks to the long-term sustainability of education funding. Weaker-than-expected economic performance and rising defence expenditure may, in the coming years, call into question plans to increase state funding for general education. In the short term, the situation may be eased

Figure 8.2 Average age of novice teachers in Estonia, 2006/07–2022/23

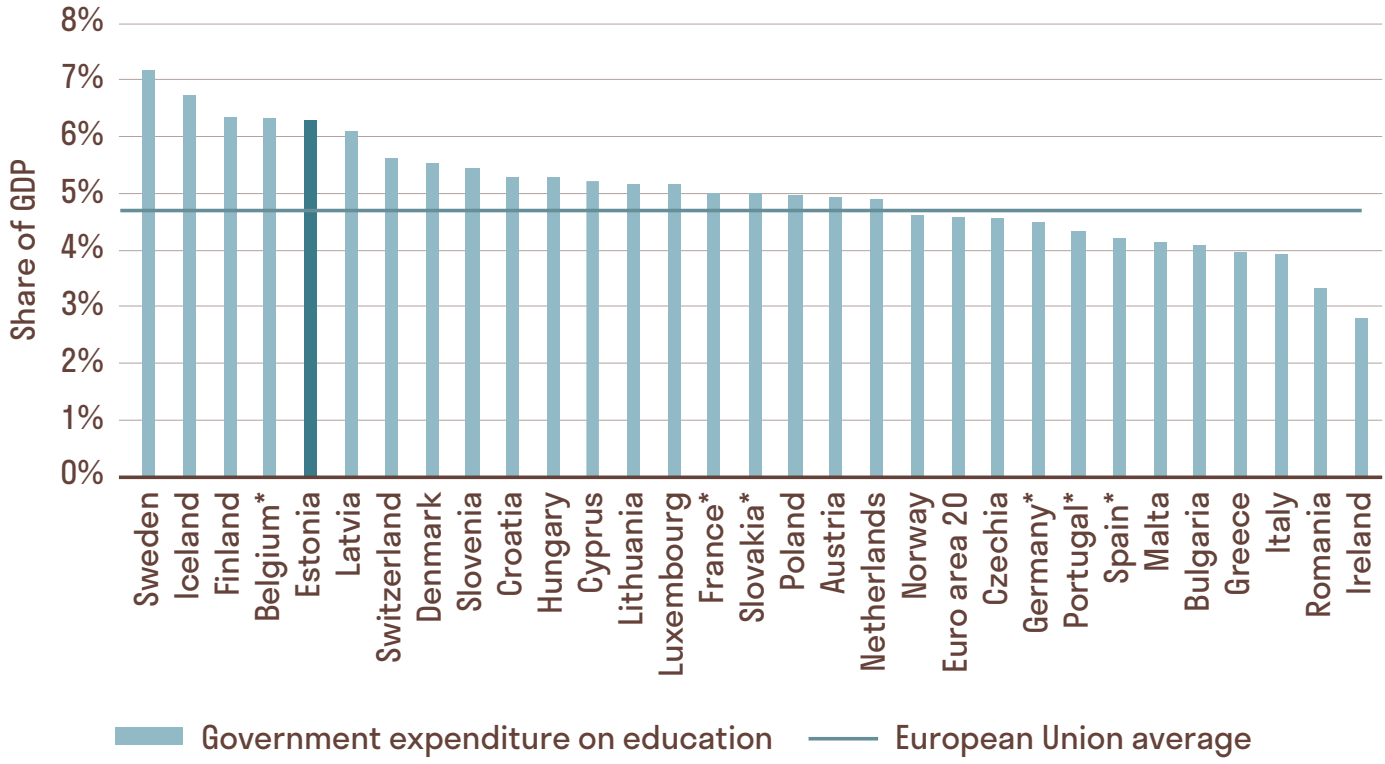


SOURCE: EHIS[11]

and public education expenditure reduced by the fact that over the past three years the birth rate has been lower than predicted. In the long term, however, a birth rate that is 4,500–7,500 lower than projected in 2022–2024 will accelerate population ageing and reduce Estonia's revenue base by at least 750 million to 1.3 billion euros over the next 40–60 years. Population decline and falling tax revenues may result in Estonia being unable to maintain its current level of government education expenditure, which is high in international comparison (Figure 8.3).

The competitiveness of pay for education professionals varies across fields and regions. The attractiveness of teaching and academic careers depends on the competitiveness of pay in the education sector. Both wage premiums and wage penalties can be observed in teaching and academic professions.[12] Specialists in science, technology, engineering and mathematics (STEM) and other technology-related fields – such as teachers of mathematics, physics or computer science – often forego the higher salaries they could earn in the private sector and thus experience a wage penalty when working in education.[13] For example, in Harju County a mathematics teacher with relevant qualifications working outside schools can earn as much as 150% more than the average wage of teachers in Estonian schools; in Tartu County the figure is 136%, and elsewhere in Estonia 130%.[14] At the same time, some fields offer teachers or academic staff a relative wage premium because labour market alternatives are fewer or less well paid. Regional differences also matter: in Tallinn and Tartu, where the labour market is more diverse, the competitiveness of teachers' pay is weaker, whereas in other regions teachers' wages exceed the county average by more than a quarter.

Figure 8.3 Government expenditure on education, 2023



SOURCE: Eurostat[15]

NOTE. The data for countries and regions marked with an asterisk (*) is provisional.

> 'The application of AI's potential to advance human development depends primarily on investment in people, not solely in algorithms.'
>
> UN Human Development Report, 2025[16]

TREND 3. EDUCATION IS ENRICHED BY DATA AND TECHNOLOGY, BUT LIMITS WILL EMERGE

The UN's Human Development Report 2025 notes that instead of viewing artificial intelligence (AI) as an all-knowing authority, we need to learn to use it as a tool for inquiry, learning and creation – as an extension of curiosity, not a substitute for humans.[17] At the same time, digital learning and administrative systems are making education an increasingly data-rich environment. We now have more data than ever before on learners, teachers and learning processes, which could support the prevention of educational problems, personalised learning and evidence-based education policy, while also reducing the administrative burden on teachers. However, the use of data is hindered (often justifiably) by strict data protection constraints, limited analytical capacity and low interoperability between systems.

Cyber threats and data security in education. More intensive data use also makes education more vulnerable – cyberattacks are commonplace, and the personal data of pupils, teachers and parents are an attractive target. As stated in the Estonian Internal Security Service's annual review:[18] 'It is crucial to recognise that data, particularly personal data, is a valuable commodity.' According to the Estonian Information System Authority,[19] dozens of educational institutions in Estonia fall victim to cyberattacks every year. For schools, a cyberattack is not merely a technical incident – it can strike at the most critical moment: during examination periods, at the start of the school year or during assessment.

The education sector therefore faces a dual challenge: how to use existing data in a smart and responsible way while ensuring security, privacy and sustained trust in the digital education environment.

TREND 4. YESTERDAY'S SCHOOLBAG WILL NOT OPEN THE DOOR TO TOMORROW'S JOBS

AI and new technologies are rapidly transforming the world of work: some jobs disappear, new ones emerge, and the skills we need are changing quickly.[20] This shift also affects education: what kind of future are we preparing people for? Between 10% and 20% of today's occupations did not yet exist in the year 2000.[21] For most people, the arrival of AI leads to job transformation and the creation of new occupations rather than job loss.[22] According to the World Economic Forum, a modern professional may hold up to 20 different jobs over their lifetime – and future generations even more.[23] Schools therefore need to start preparing young people for lives and careers that we are not yet able to describe.

Lifelong learning as the new norm: the rise of older learners and workers. By 2050, the number of people aged over 60 worldwide will exceed the combined number of children and young people aged 0–24.[24] In Estonia, projections indicate that by the same year there will be 1.5 times more people aged over 60 than those aged 0–24.[25] It is also important to note that today's 70-year-old is not comparable to a 70-year-old a few decades ago. In 2022, the cognitive abilities of a 70-year-old were comparable to those of a 53-year-old in 2000, and their physical fitness to that of a 56-year-old in 2000.[26] As a result, remaining in the labour market for longer is becoming the norm, and the profile of learners, including continuing learners, is therefore also likely to become more age-diverse.

The linear learning pathway of early adulthood is fading, giving way to a plurality of learning patterns. Some people study continuously while others take breaks lasting several years. Over the past decade, the share of graduates under

> 'We have accumulated many new things to teach over time, but nothing has been taken away.'
>
> Participant in a futures workshop, 2025

Table 8.1 Share of graduates under the age of 30 among vocational and higher education graduates

Academic year	Vocational education	Higher education		
		First level	Second level	Third level
2014/15	71%	80%	69%	15%
2023/24	58%	77%	45%	15%

SOURCE: EHIS[27]

the age of 30 has declined in both vocational education and higher education. In vocational education and at master's level, graduates aged 30 and over already account for approximately half of all graduates, meaning that an increasing number of adults are returning to education or upgrading their skills later in life (Table 8.1). Learning is becoming distributed across the life course.

According to the World Economic Forum, the nature of work and careers is changing so rapidly that in the future, skills and the ability to learn on the job will matter more than diplomas alone.[28]

The OECD suggests that one possible future scenario for education is a world in which learning takes place everywhere and at all times – a world where the distinctions between formal and non-formal education disappear.[29] The growing need for lifelong learning is clearly evident in Estonian higher education, where providers increasingly offer microcredentials, which are extended continuing education programmes with coherent content, based on degree-level courses. Estonians are also making active use of online self-development opportunities – in 2024, 40% of the population had participated in an online course. This placed Estonia seventh among European Union countries (the EU average was 33%).[30]

TREND 5. WELL-BEING EMERGES AS A NEW QUALITY METRIC IN EDUCATION

The quality of working life determines whether teachers remain in the profession. Teacher shortages are not caused solely by retirement. Voluntary exit from the profession is the main reason why teachers leave their jobs in Estonia, Austria, Denmark, England, Poland, Slovakia and Sweden.[31] Work-related well-being is therefore key to teacher retention.

For the first time in history, five generations of workers are present side by side in the labour market, particularly in education.[32] In such an educational environment, promoting work-related well-being requires a thorough understanding of the needs and expectations of different generations.

Young people's mental health is increasingly vulnerable, but specialists are in short supply. The Estonian Human Development Report 2023 noted that school-aged young people in Estonia experience sadness and depressive symptoms significantly more often than their peers in neighbouring countries.[33] Approximately one in

> 'If society can't keep up with a changing learner profile, that's where most of our problems begin.'
>
> Participant in a futures workshop, 2025

four full-time pupils in general education has special educational needs.[34] At the same time, the availability of support specialists across Estonia's education network is uneven and in many places critical. For example, in the 2024/25 academic year there were 18 children per speech therapist and 23 per special education teacher, while in general education one school psychologist was responsible for 61 pupils and one speech therapist for 70, on average. The situation is most severe in vocational education. As the Estonian National Audit Office notes, insufficient attention has been paid to the support needs of vocational education pupils compared with those of upper secondary school pupils.[35]

TREND 6. TODAY'S EDUCATIONAL INEQUALITY IS TOMORROW'S SECURITY RISK

Educational inequality and exclusion can contribute to deviant behaviour among children and youth. According to PISA 2022 data, pupils from higher socio-economic backgrounds tend to have higher PISA scores, a stronger sense of belonging and better relationships with teachers.[36] Estonian registry data show that educational inequality is even more pronounced: average parental income differs by more than fourfold across schools, with the largest inequalities in Tallinn, and income correlates with children's examination results in mathematics.[37]

The absence of a sense of belonging can have serious consequences for society. For example, in its 2024/2025 annual review, the Estonian Internal Security Service notes the growing prominence of youth extremism.[38] Young people seek places where they can feel a sense of belonging, gain recognition and express themselves – and these searches are often rooted in social problems and exclusion.[39] Therefore, education must be more than a provider of knowledge – it must also foster a sense of belonging.

Exclusion during school years can deepen distrust towards state institutions, create fertile ground for radicalisation, and increase susceptibility to disinformation, influence activities and narratives that fragment society.

> 'Lonely individuals who have faced difficult childhoods and seek a sense of belonging may find their way to extremist ideology when offered a compelling message.'
>
> Estonian Internal Security Service[40]

School-choice-driven mobility deepens inequality. Studies from the past decade show that parents increasingly choose kindergartens and schools based on children's well-being rather than academic results alone. Factors considered important include access to support services, smaller class sizes and appropriate teaching methods, with the psychosocial environment becoming an increasingly prominent criterion in school choice.[41] This, in turn, fuels school-choice-driven mobility within Estonia. The average school journey for Estonian children is twice as long as it would be if every child attended the nearest school to their home:[42] 48% of children do not attend the nearest kindergarten, 45% do not attend the nearest primary school and 59% do not attend the nearest upper secondary school.[43] School-choice-driven mobility deepens inequality: more affluent families are able to choose better schools, while lower-income families depend on what is available close to home.[44]

II FROM SETO *LEELO* TO INTELLIGENT JUNIPERS: FUTURES WORKSHOPS HELP UNDERSTAND LOCAL CONTEXTS

Five futures workshops were held between May and June 2025 in different parts of Estonia to understand local variations in future education trends – in Kuressaare, Obinitsa, Saku, Narva-Jõesuu and Tallinn. What were the regionally grounded best-case scenarios for education?

The **Saaremaa** workshop in Kuressaare produced the future scenario 'Intelligent Junipers', which emphasises the importance of fostering a sense of belonging and place attachment. When young people have a strong connection to their home region, outmigration is not a problem – they come back, not only at retirement age but when they

Snapshots from the workshops



seek a safe environment and schooling for their children.

In **Obinitsa**, at Ilmaveere, children from the Seto School's Obinitsa community class also joined the futures workshop. The discussion centred on how to connect education more closely with community potential. In the best-case scenario, Estonian education could resemble Seto *leelo*, a traditional communal singing style where 'everyone has their own voice, but together it sounds harmonious'.

The **Saku** workshop brought together upper secondary school pupils in grade 12. The pupils' main concern was that the school system has fallen behind the times: it focuses excessively on outcomes and does not sufficiently take individual development into account. In the young people's best-case scenario, 'Through the Pink Window', education is people-centred, learning is flexible and out-of-school pursuits are also recognised, meaning that non-formal education is valued equally alongside formal education.

In the **Narva-Jõesuu** workshop, a desire emerged to link regional specificities more closely with education. In the best-case scenario, 'Diversity Enriches', Ida-Viru County's linguistic and cultural diversity and strong industrial heritage contribute to educational development. Amid change, maintaining joy in learning across the life course was seen as a key priority.

In the **Tallinn** workshop, the central question was whether in the future technology will be guided by humans or humans by technology. Participants discussed whether technology brings people together or instead isolates and stratifies them. The best-case scenario, 'Song Festival', depicts education as a space with a strong sense of belonging where humans remain in control of technology and well-being and the quality of relationships take precedence.

Figure 8.4 PISA mathematics performance and pupils' sense of belonging at school (selected countries)

Below-average mathematics performance **Above-average sense of belonging** Albania, Croatia, Iceland, Montenegro, Saudi Arabia, Serbia, Uzbekistan	**Above-average mathematics performance** **Above-average sense of belonging** Austria, Belgium, the Netherlands, South Korea, Sweden, Slovenia, Finland, Switzerland, Denmark
Below-average mathematics performance **Below-average sense of belonging** Brazil, Bulgaria, Georgia, Greece, Malaysia, Malta, Moldova, Türkiye, USA, Vietnam	**Above-average mathematics performance** **Below-average sense of belonging** Australia, Estonia, Hong Kong, Ireland, Canada, Lithuania, Latvia, Poland, Singapore, United Kingdom, Czech Republic, New Zealand

SOURCE: OECD[45]

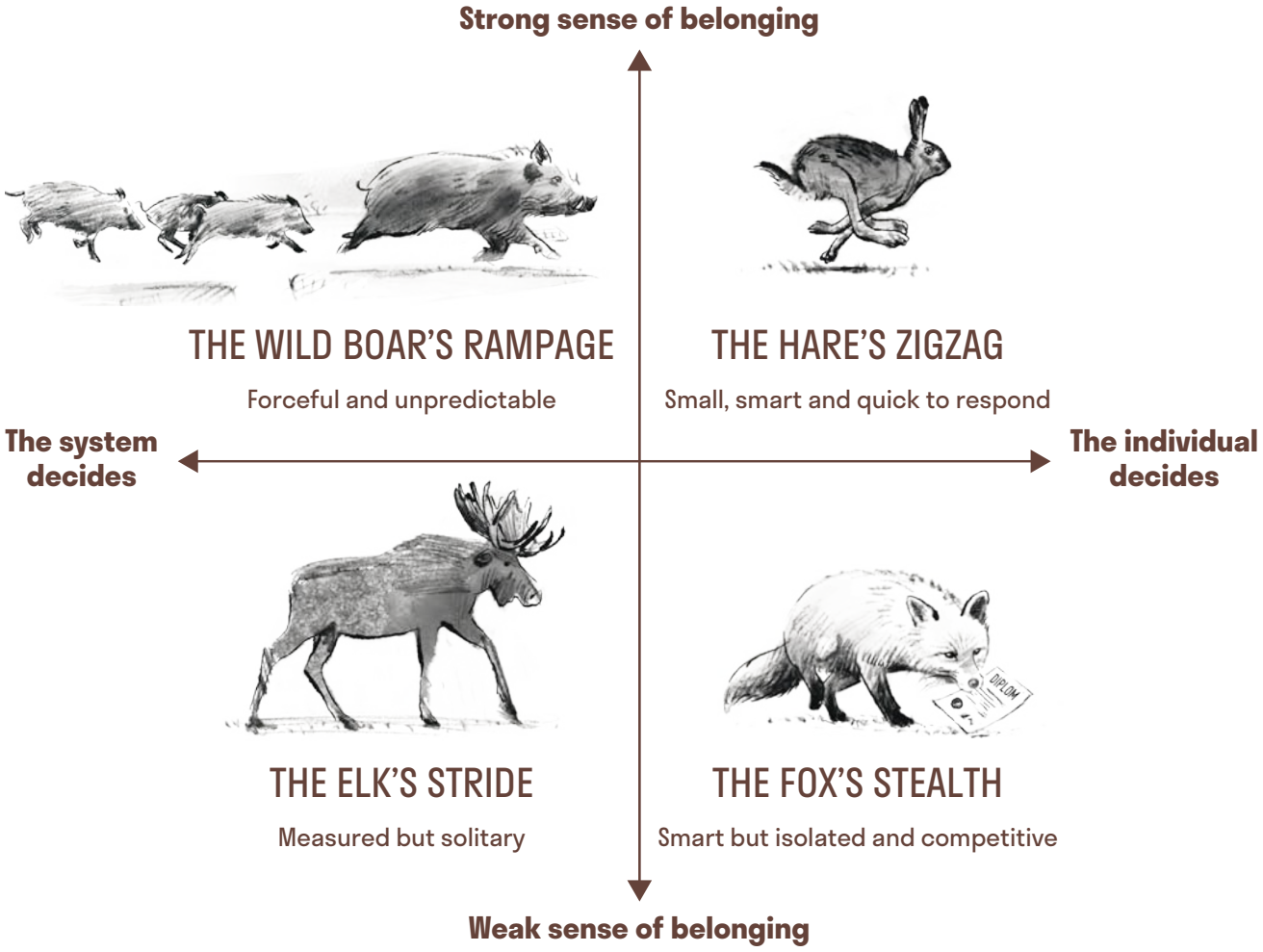
III ESTONIAN EDUCATION 2050: THE HARE'S ZIGZAG, THE FOX'S STEALTH, THE ELK'S STRIDE OR THE WILD BOAR'S RAMPAGE?

How did the two critical uncertainties emerge? Drawing on existing research, we defined the first future axis – sense of belonging – in advance, while participants in each workshop determined the second axis based on their own focus. Looking across all five workshops, the question of decision-making authority emerged as a shared second axis.

AXIS 1. SENSE OF BELONGING is the central axis of the future scenarios for education, as it determines the extent to which people – whether learners, teachers, leaders or community members – feel that they are part of the education system rather than merely its users or temporary participants. In PISA assessments, Estonia ranks among countries with strong mathematics performance but a weaker-than-average sense of belonging (Figure 8.4).[46] Local futures workshops likewise noted that when schools and communities foster a strong sense of belonging and place attachment, there is no need to fear young people leaving to study or work elsewhere, as they are likely to return.

AXIS 2. SYSTEM VERSUS INDIVIDUALS This axis defines where primary decision-making authority lies in education: whether decisions are made centrally and imposed by the system (the system decides), or whether learners, teachers and communities themselves are able to guide, shape and decide education policy and practice (the individual decides). If the education system moves towards rigidly centralised governance, this may reduce motivation, innovation and a sense of responsibility at the grassroots level. Conversely, if responsibility shifts too far towards individuals, quality and equality may suffer.

How were the scenarios named? We searched for metaphors to describe different modes of movement and found them in the animal kingdom. Animals do not move through their environments at random – the ways they move have evolved out of the need to survive and adapt. In the same



way, society and education systems do not move along linear or random paths, but respond to environmental change, including technological advancements and evolving social values. The future scenarios for Estonian education in 2050 use the modes of movement of different animals as metaphors to create a clearer understanding of possible development pathways – not to predict the future but to increase awareness and flexibility.

The use of animal metaphors in Estonian education was also discussed in the context of the Tiger Leap programme in 1996, during the ETV broadcast Otseliin, where President Lennart Meri remarked that the tiger leap was not particularly apt, as 'there are no tigers in Estonia and Estonians have never leapt – they simply stride ….'[47] In the same discussion, Professor Marju Lauristin suggested replacing the tiger leap with the hare's zigzag: 'We make a hare's zigzag in our development […] This gives us the opportunity to draw on [nineteenth-century Estonian national thinker] Jakob Hurt's observation: we are not great in strength, but we can be great in spirit. This means that the small and fast can be more successful than the large, slow and wealthy.' Thus, at moments of societal and educational transformation in Estonia, animal metaphors have often provided a way to make sense of possible future paths. Drawing on Professor Lauristin's words, the future scenarios for Estonian education in 2050 presented in this report were inspired by the idea of the 'hare's zigzag' proposed in 1996.

THE WILD BOAR'S RAMPAGE

When the environment changes faster than the rules, decisions are made hastily, without due consideration but forcefully. The future of teachers and schools increasingly depends on short-term political point-scoring priorities rather than stable, well-considered development. A focus on metrics pushes well-being into the background.



A wild boar does not run without reason. It sniffs for food in the moss, listens to the silence of the forest and moves calmly with its herd. But when it senses danger or disturbance, it can instantly charge – all its strength and mass are set in motion with the aim of breaking through, regardless of what lies in the way.

The education system can behave in much the same way when too much changes at once or when there is a sense that something must be done immediately. If the environment changes faster than the rules, or if the rules cannot be updated in time, the system may begin to resemble a wild boar in a rampage: decisions are made quickly and forcefully, but not necessarily wisely. The more tense the situation, the stronger the impulse to push through. If someone gives the order, everyone runs. At times, a rampage may also follow a prolonged period of indecision, when action is finally taken simply because something has to be done.

The future of teachers and schools increasingly depends on which issues dominate the political agenda at a given time. A project-based approach brings large, campaign-like injections of funding to priority areas, but often followed by stagnation.

The wild boar does not choose whether to run or stand still – it reacts to its environment. But if the system leaves no room for reflection, adaptation or local thinking, rapid reaction can lead to profoundly negative consequences. This is why we must ask ourselves: Is education moving forward, or are we merely forcing our way through?

THE HARE'S ZIGZAG

When the environment is unfamiliar, a small country must be smart and make zigzags at the right time and in the right direction, because a zigzag can be either life-saving or catastrophic. In the hare's zigzag scenario, Estonia turns its small size into an advantage by transforming schools into community centres that serve learners at different stages of life and making education flexible across the life course.

The hare does not run in a straight line. It stops, listens and chooses the moment to move. It advances quietly, ears alert, eyes open, ready to respond before others even notice that something has changed. It does not leap at random but makes smart zigzags.



In the hare's zigzag scenario, Estonia's small size becomes an asset. This is a world in which shrinking does not mean retreat. Falling birth rates, regional population decline and an ageing society do not lead to school closures but instead prompt a rethinking of the role of schools. Schools become community centres that support learning at different stages of life, bringing together children, working-age adults and pensioners. Education is no longer merely the starting point of a young person's path but also the second and third step of adult life.

A strong sense of community that keeps schools alive can, however, also become a stumbling block – avoiding difficult or unpopular decisions, such as school closures, may lead to overspending. This, in turn, threatens teachers' pay levels and reduces opportunities to invest in buildings, technology or other areas. Moreover, too many zigzags taken without a clear direction can ultimately leave education reactive rather than creative. And a zigzag in the wrong direction may lead straight into the wolf's path.

Above all, making zigzags must not leave any child or learner invisible. Education does not merely transmit knowledge; it holds society together. Schools must be community shelters, not grading machines. At the heart of all this must be the individual – one that, like the hare, can respond, manoeuvre, pause and leap, doing so not at random, but with a sense of when and where it is wise to move. The hare's zigzag does not allow us to know in advance exactly what education will look like in 2050, but it provides preparedness, flexibility and clarity to recognise the moment when a change of direction is needed.

THE FOX'S STEALTH

In the fox's stealth scenario, education is smart and adaptive, but increasingly isolated and competitive. Only the most skilful navigators survive. A sense of belonging and safety nets are not taken for granted – everyone must find their own path and support.

The fox is neither loud nor impatient. It moves quietly, keeps to the shadows, stops, observes and listens. Its step is soft but purposeful – always ready to change direction, reassess and, if necessary, retreat. The fox has no pack; it operates alone, cleverly and discreetly, keeping its distance. It chooses opportunity over confrontation. Fox's stealth is not about speed or bravery but about survival in a highly competitive environment.



This could also be Estonian education in 2050. Smart and adaptive, yet increasingly isolated and competitive. Population decline does not lead to school closures but to dispersion. Education shifts towards cities and centres where resources, learners and teachers concentrate. In smaller places, the system formally remains in place but in reality becomes thin and uneven in quality. Educational institutions compete for both teachers and learners, and educational inequality deepens.

Well-being and mental health also become individual responsibilities. Pupils must find support on their own, and teachers must manage their workload independently. Education relies on the strongest, as the system lacks the capacity to provide support.

A sense of belonging does not emerge by default. If education fails to create community, the vacuum is filled by those who offer simplicity – a clear identity, a black-and-white worldview and seemingly unequivocal answers. Excluded young people do not forget their experiences; adults who were denied a second chance later feel little obligation to contribute. An education system that does not connect can produce distrust, susceptibility to disinformation and radicalisation. If education does not offer a sense of belonging, it will be sought elsewhere – sometimes outside the system, sometimes in opposition to it.

Fox's stealth does not mean collapse. It describes an environment in which those who survive are the most skilful navigators, the best adapters and the quickest responders. Education does not disappear; it changes. It no longer offers an implicit safety net but requires everyone to stand up for themselves. Cleverly, quietly, as unobtrusively as possible.

THE ELK'S STRIDE

In the elk's stride scenario, education moves slowly and with composure along a familiar path, drawing on past success and stability. It offers a sense of security, but slow adaptation may leave the system vulnerable to unexpected change, as it discovers too late that the old path now leads directly into danger.

The elk travels long distances, with purpose and dignity. It does not run or rush, as it has few natural predators – its greatest threat is humans: the hunter lurking at a distance or a car suddenly appearing on the road. The elk does not seek contact; it does not need a herd or companions, but moves at its own rhythm, often alone. Strong and quiet, it radiates calm confidence, even a sense of immunity. Yet it is precisely in this strength that its vulnerability lies – when the environment changes unexpectedly, the elk may not realise that the familiar path now leads directly into danger.



The education system in the elk's stride scenario in 2050 is balanced, structured and predictable. It follows a fixed path, even if this no longer aligns with the rhythms of the real world. Like the elk that trusts in its size and experience, education relies on the strength of the system and its past success rather than environmental sensitivity. When the population declines, this does not trigger bold educational innovation but an orderly and quiet contraction – schools are closed where there are too few children. Adult education is seen primarily as a labour market policy instrument rather than as a driver of human development or social cohesion.

Financial pressure places the system in austerity mode, but the direction of movement does not change. Support and services are more likely to be cut than the nature of education is to be fundamentally rethought. Teachers' job satisfaction relies more on personal vocation than on consciously designed support. However, the system continues to move forward, assuming that teachers will remain in the field.

Technology is adopted moderately and cautiously. Information systems function and data are collected but used mainly for reporting rather than for substantive change. The potential of AI remains underutilised – not out of malice but out of caution that favours established ways of working.

Lifelong learning may be a priority on paper, but in practice a linear, youth-centred educational pathway continues to dominate. Diversification of learning formats remains incomplete – the elk keeps moving along the path it knows, even though the forest around it has changed. In places, it may no longer even exist.

The elk's stride scenario does not lead to catastrophe, but neither does it generate renewal. It is a future in which education largely persists on the basis of its past success. The system appears too large to be seriously threatened – until the moment the elk, unnoticed, steps onto the road into oncoming traffic.

HOW DO WE MOVE FORWARD?

The future does not demand from us only knowledge and skills, but above all readiness to adapt – the ability to recognise when to accelerate, when to slow down, when to make an unexpected

Table 8.2 Future scenarios for education

	Wild boar's rampage	Hare's zigzag	Fox's stealth	Elk's stride
Sense of belonging	Strong	Strong	Weak	Weak
Decision-making	System-centred decision-making	People-centred decision-making	People-centred decision-making	System-centred decision-making
Environment	High reform intensity sets the pace	Constant change requires rapid responsiveness	Strong competition; advantage for those with stronger skills	Stable; limited need for change
Nature of learning	Intensive, goal-oriented	Flexible and practical, rapid learning	Strategic, selective application of knowledge	Thorough, systematic, slow
Communication and cooperation	One-sided, top-down governance	Horizontal, dynamic cooperation	Competition rather than cooperation	Formal, institutional communication
Measure of performance	Tests and examinations	Adaptability	Comparison with others (rankings)	Continuity

SOURCE: table by the authors

turn or when to maintain a steady pace. Just as in nature there is no single best way of moving, there is no single ideal future scenario for education. All four animal-based scenarios have their own strengths and risks, which depend on context. In some situations, the forceful and rapid movement of the wild boar may be needed; in others, the hare's smart zigzags; and in yet others, the fox's restrained strategy or the elk's stable perseverance.

Table 8.2 summarises the main differences between the four future scenarios. What matters is not so much which scenario we currently inhabit or which one is the best but whether we are able to recognise when our existing mode of movement no longer works. At that point, the ability to distinguish patterns, assess conditions and consciously adjust our responses becomes crucial – whether at the level of the individual, the organisation or the system as a whole.

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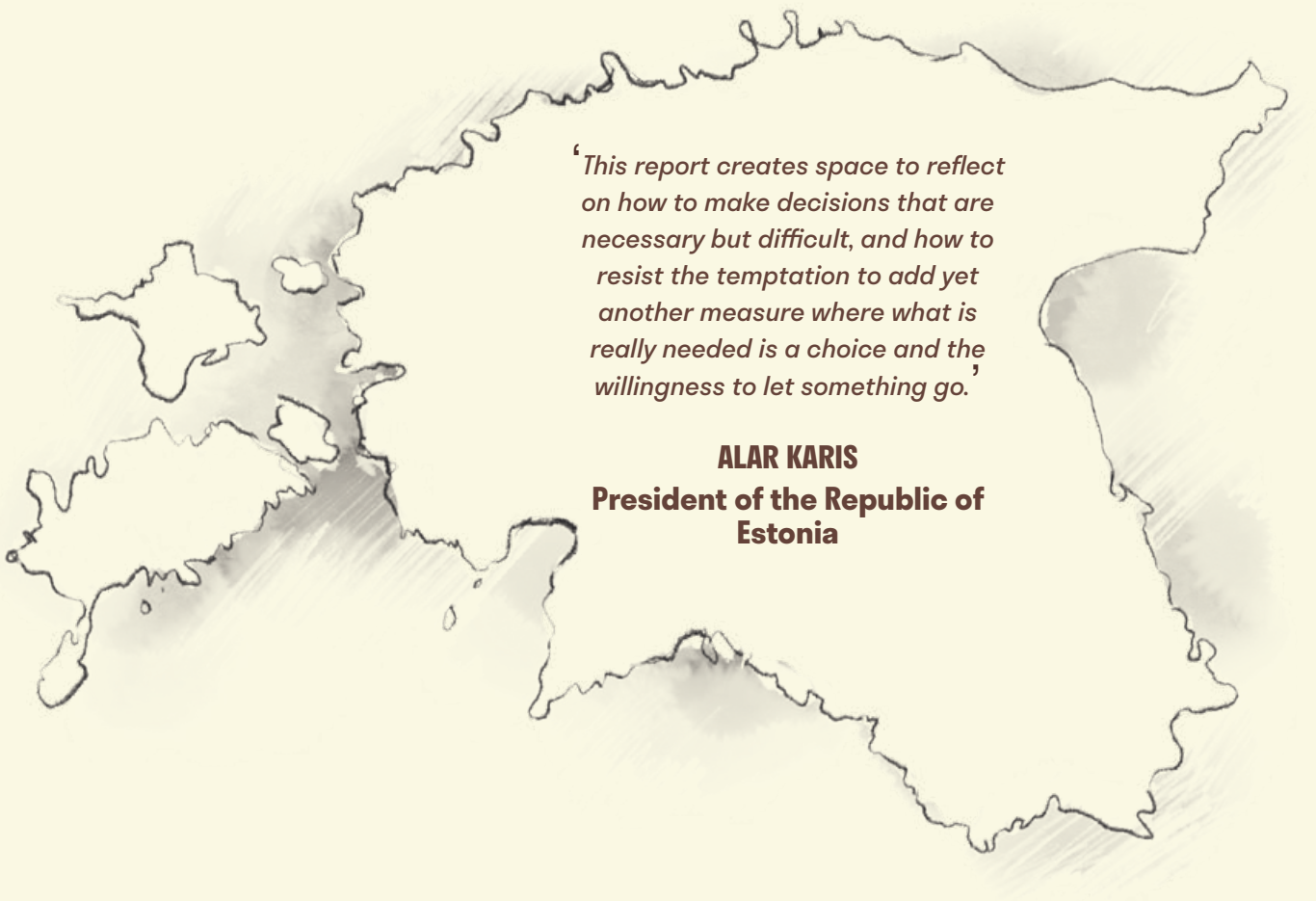
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'This report creates space to reflect on how to make decisions that are necessary but difficult, and how to resist the temptation to add yet another measure where what is really needed is a choice and the willingness to let something go.'

ALAR KARIS
President of the Republic of Estonia

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