# PUBLIC SECTOR PERFORMANCE PROGRAMME 2022-2025

## An International Benchmarking Study
## Sub-Study 2025

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# 4. EVIDENCE-BASED STRATEGIES FOR IMPROVING EDUCATION

*From Benchmarking to Reform: Evidence-based Strategies for Improving Education*

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**Abstract**

This chapter provides a comparative analysis of the Dutch education system in the context of other high-income countries across Europe, North America, Oceania, and Asia. By benchmarking a broad set of indicators – ranging from educational investment and resource allocation to learning outcomes and labour market integration – the chapter identifies key structural strengths and pressing challenges. Particular attention is paid to issues such as teacher shortages, educational inequality, under-enrolment in early childhood education, and declining performance in international assessments such as the Programme for International Student Assessment (PISA). Drawing on evidence from high-performing systems in Finland, Estonia, Canada, and Singapore, the analysis emphasises the importance of integrated policy strategies that enhance teacher quality, promote equity, and support early intervention.
The chapter concludes with evidence-based recommendations, advocating for coordinated governance, robust evaluation frameworks, and inclusive, data-informed reforms that respond to evolving societal needs while ensuring access to high-quality education for all learners.

# 4.1. INTRODUCTION

Education systems around the world are increasingly being evaluated not only by their capacity to expand access but also by their efficiency, equity, and responsiveness to changing societal needs (Agasisti et al., 2023). In this context, benchmarking national education systems against international peers has become a relevant tool for policymakers. Comparative analysis allows the identification of structural strengths and systemic weaknesses, and it fosters a deeper understanding of how investment, policy, and institutional arrangements shape educational outcomes. This chapter adopts such an international perspective, focusing on the Dutch education system in relation to other high-income countries across Europe, North America, Oceania, and Asia. By assessing trends in investment, outcomes, and system performance, the chapter aims to provide a comprehensive diagnostic framework that informs both ongoing reforms and strategic planning in Dutch education policy.

The benchmarking exercise is structured around a multidimensional set of indicators capturing inputs (such as educational expenditures and resources) and outputs (including enrolment rates, graduation levels, and standardised test scores), as well as broader outcomes related to educational attainment and labour market integration. In doing so, the analysis highlights how the Netherlands compares to other countries. Particular attention is paid to longitudinal trends, enabling the identification of shifts in performance and investment over time. While this approach facilitates the identification of best practices, it also underscores the contextual specificity of each education system; thus, the analysis avoids simplistic policy transfers and instead emphasises adaptable insights rooted in evidence.

Building on this comparative foundation, the chapter proceeds to examine several pressing challenges that are particularly salient in many education systems. These include persistent teacher shortages, increasing educational inequality, declining performance in international assessments such as the Programme for International Student Assessment (PISA), and the need for more inclusive and equitable early childhood and primary education. For each of these areas, the chapter presents a synthesis of relevant literature and evidence-based strategies, drawing on both academic research and case studies from high-performing systems. The goal is to provide evidence-based policy recommendations that can guide future interventions.

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# 4.2. CROSS-COUNTRY BENCHMARKING

**In this section, the Dutch education system is analysed in comparison with a selection of countries, using a set of indicators that reflect key dimensions of educational systems. The indicators used for this benchmarking exercise are defined and discussed in the following subsection. The aim of the comparative analysis is to highlight the main features and trends that characterise the Dutch system within the broader international context.**

### 4.2.1. The choice of indicators

Several indicators have been selected to describe and compare educational systems. These include measures of investment in education, along with key outputs and outcomes of the educational systems (see Table 0).

*Table 0: List of indicators adopted in the benchmarking analysis*

Cross-Country Benchmarking

| Description | Source | Years available | values |
|---|---|---|---|
| Indicator of investments in education | | | |
| Government expenditure on primary education as % of GDP (%) | Eurostat | From 2017 to 2022 | percentage |
| Government expenditure on secondary education as % of GDP (%) | Eurostat | From 2017 to 2022 | percentage |
| Government expenditure on tertiary education as % of GDP (%) | Eurostat | From 2017 to 2022 | percentage |
| Annual expenditure per student in primary education (ISCED 1) | Eurostat | From 2014 to 2021 | Purchasing power standard (PPS) |
| Annual expenditure per student in lower secondary education (ISCED 2) | Eurostat | From 2014 to 2021 | Purchasing power standard (PPS) |
| Annual expenditure per student in upper secondary non-tertiary education (ISCED 3-4) | Eurostat | From 2014 to 2021 | Purchasing power standard (PPS) |
| Annual expenditure per student in tertiary education (ISCED 5-8) | Eurostat | From 2014 to 2021 | Purchasing power standard (PPS) |
| Distribution of funding sources on primary education (ISCED 1) | Eurostat | 2021 | Million Purchasing power standard (PPS) |
| Distribution of funding sources on lower secondary education (ISCED 2) | Eurostat | 2021 | Million Purchasing power standard (PPS) |
| Distribution of funding sources on upper secondary education and non-tertiary education (ISCED 3 and 4) | Eurostat | 2021 | Million Purchasing power standard (PPS) |
| Distribution of funding sources on tertiary education (ISCED 5-8) | Eurostat | 2021 | Million Purchasing power standard (PPS) |
| Outputs and outcome of the educational systems | | | |
| Enrolment rate for 15-19 year-old | OECD | From 2013 to 2022 | percentage |
| Upper secondary graduation rate | OECD | From 2017 to 2020 | percentage |
| Tertiary graduation rate | OECD | From 2018 to 2021 | percentage |
| Mean PISA test score in mathematics, reading or science | OECD (PISA) | 2009; 2012; 2015; 2018; 2022 | mean =500, std.dev=100 |
| Mean ICCS civic knowledge test score | IEA (ICCS) | 2022 | mean =500, std.dev=100 |
| Mean ICCS scores for attitudes towards equal gender rights | IEA (ICCS) | 2022 | mean =10, std.dev=2 |
| Mean ICCS scores for attitudes towards equal rights for ethnic groups | IEA (ICCS) | 2022 | mean =10, std.dev=2 |
| Percentage of 25-64 year-old with primary education (ISCED 0-2) | OECD | 2023 | percentage |
| Percentage of 25-64 year-old with secondary education (ISCED 3-4) | OECD | 2023 | percentage |
| Percentage of 25-64 year-old with tertiary education (ISCED 5-8) | OECD | 2023 | percentage |
| NEET Rates Among Young People (Ages 15-24), 2019-2023 | Eurostat | From 2019 to 2023 | percentage |

To reflect the different levels of investment in education across countries, the analysis includes indicators on education expenditure. The total expenditure on education (as a percentage of GDP) is a measure of the quantity of available resources, although dependent upon the absolute value of the GDP (for the same percentage GDP, richer countries are investing more resources than poorer). It is also a measure of policy priority – the higher the proportion of GDP

invested in education, the higher the consideration of this policy domain by governments. The data is presented separately by level (primary, secondary, and tertiary education), from 2017 to 2023. In addition. the annual expenditure by students in purchasing power standard, separated by educational level, is a measure of the intensity of spending in the sector. The information is expressed on a student basis to consider the differences in the size of the country. In addition to the data reported in absolute values, this chapter also reports the percentage change (increase or decrease) in the period between 2014 and 2023. In this sense, the indicator measures the policy attention devoted by politicians to the educational sector (investments or divestments, with the related intensity). Finally, the distribution of funding sources (as a total expenditure in education) indicates whether the available resources come from investments by the government and other public sources or by private agents (such as families and students, foundations, and companies). This indicator reflects the importance of the private sector in supporting the educational system.

As measures of the outputs and outcomes of educational systems, this chapter includes various indicators related to enrolment and graduation rates. The "enrolment rate among 15–19-year-old students" indicates the proportion of students in this age cohort which is enrolled in a typically secondary educational programme. This variable measures the degree of participation of young students in secondary education, as a volume of formal education produced in the system. In addition to the absolute value in the last year, the trend between 2013 and 2022 is illustrated. The "upper secondary education graduation rate" represents the estimated percentage of people who will graduate from secondary education over their lifetime. This indicator reflects the effectiveness of the secondary education cycle – in other words, its ability to provide students with a secondary education degree. The indicator is observed over the period from 2018 to 2020. Similarly, the "tertiary graduation rate" refers to the proportion of individuals who are expected to complete a tertiary-level degree, also observed over the period 2018 to 2020. The indicator provides insight into the overall output of the higher education system. The percentage change from 2018 is included to capture recent trends and assess the progress made by education systems in expanding higher education attainment. Lastly, the average scores in the OECD's PISA tests in reading, mathematics, and science are compared across countries. These scores represent a measure of 15-year-old students' knowledge in three key domains that are essential for both social and economic life. The results are reported for the last waves, i.e. 2009, 2012, 2015, 2018, and 2022. In addition to cognitive outcome, this chapter examines indicators of civic attitudes and values, derived from the International Civic and Citizenship Education Study. These indicators measure: (i) civic knowledge, (ii) attitudes towards equal gender rights, (iii) attitudes towards equal rights for ethnic groups. Although not academic outcomes, these indicators are not soft skills in the strict sense, but proxies for the degree to which education systems foster civic values, democratic attitudes, and social responsibility consistent with modern democratic societies. Building on these student-level outcomes, it is also important to consider population-level measures of educational attainment. In this regard, a further indicator examines the "proportion of adult population (25–64 years old) who have attained an educational level" (i.e. obtained an educational degree), separated by primary, secondary, or tertiary education, based on the most recent data available (2023). This indicator measures whether an educational system can equip its adult population with a certain level of education. Finally, another important indicator concerns the "share of young people aged 15–29 in the EU who are not in employment, education, or training (NEET)". Reducing this rate is one of the objectives of the European Pillar of Social Rights, which sets a target of bringing it down to 9% by 2030. This indicator provides insight into how effectively education systems prepare young people for the labour market and promote their inclusion in economic and social life.

The benchmarking exercise refers to the following list of countries, when data are available: European countries (Estonia, Poland, Slovenia, Czech Republic, Latvia, Slovak Republic, Lithuania, Hungary, Croatia, Bulgaria, Romania, Denmark, Finland, Sweden, Norway, Portugal, Italy, Spain, Malta, Greece, Cyprus, the Netherlands, Belgium, United Kingdom, Germany, Ireland, Austria, Switzerland, France and Luxembourg), North America (Canada and the United States of America), Oceania (New Zealand and Australia), and Asia (South Korea and Japan).

### 4.2.2. Investments in education and resources

Before analysing educational outcomes, it is important to consider the level of investment that supports them. This section describes the resources devoted to education.

Figures 1a, 1b, and 1c compare the government expenditure on education as a proportion of GDP (by different levels) from 2017 to 2023. When looking at primary education, on average, countries invested around 1.8% of GDP, with the Netherlands falling below the average level, spending about 1.5% of GDP. However, Figure 1a shows some more marked differences. Sweden invested more than 4% of its GDP in primary and pre-primary education over the years.

On the other hand, Bulgaria, Lithuania, and Romania are economies investing less in primary education (between 0.7% and 0.9% of GDP). For all countries, on average, investment in primary education increased from 1.7% in 2017 to 1.9% in 2020. However, following this rise, spending gradually declined, returning to pre-COVID-19 levels of 1.7% in 2023.

Turning to secondary education (see Figure 1b), the Netherlands consistently allocated around 19–2.1% of its GDP to this level from 2017 to 2023, which is above the international average (around 1.6%) throughout the period. Other countries with the highest rate of GDP devolved to secondary education in the later years are Belgium (2.4%), Finland (2.6%), and the Czech Republic (2.2%) – the same countries that invested more in 2022. The Czech Republic is one of the countries that increased its spending the most, rising from 1.7% in 2017 to 2.2% in 2023. Similarly to primary education, some countries increased their share between 2019 and 2020, only to reduce it again in the following years, reaching lower levels by 2023. Concerning investments in tertiary education (see Figure 1c), the Netherlands allocated between 1.2% and 1.3% of its GDP to this level from 2017 to 2023, which is above the average (around 0.9%) but below the highest spending countries. In particular, Hungary, Finland, and Denmark are the countries with the highest proportion of GDP for tertiary education. Hungary significantly increased its share, rising from 0.9% in 2017 to 2.1% in 2023. The lowest rates are observed in Italy, Ireland, Luxembourg, and Spain.

Overall, the data suggests that the resources allocated to education at all levels remained relatively stable. However, during the COVID-19 pandemic, spending increased in almost all countries, but in most cases, it returned to pre-pandemic levels after the crisis. This evidence should be read together with the strong political debate about the importance of education which, however, seems not to influence decisions about the allocation of funding (at least, on average). Moreover, while the share of GDP invested in education provides useful insights into political priorities, it does not fully capture changes in actual investment. In particular, when GDP increases, a stable percentage can still correspond to a significant rise in the resources allocated per student. For this reason, it is important to complement this indicator with per-student spending measures.

*Figure 1a: Government expenditure on primary education as a percentage of GDP – 2017 and 2022*

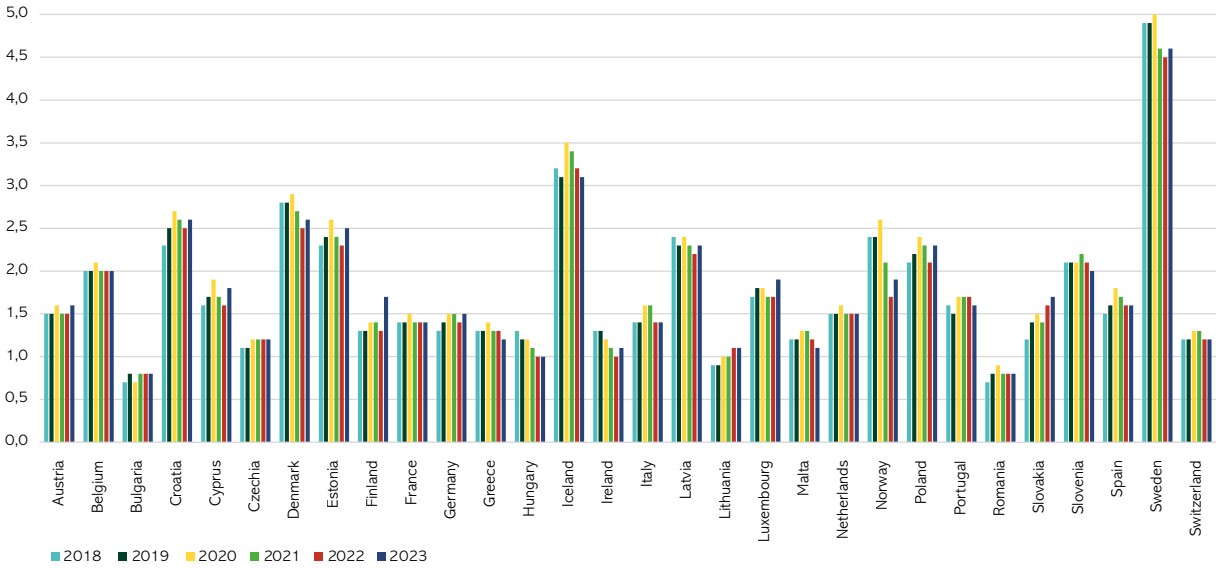


*Figure 1b: Government expenditure on secondary education as a percentage of GDP – 2017 and 2022*

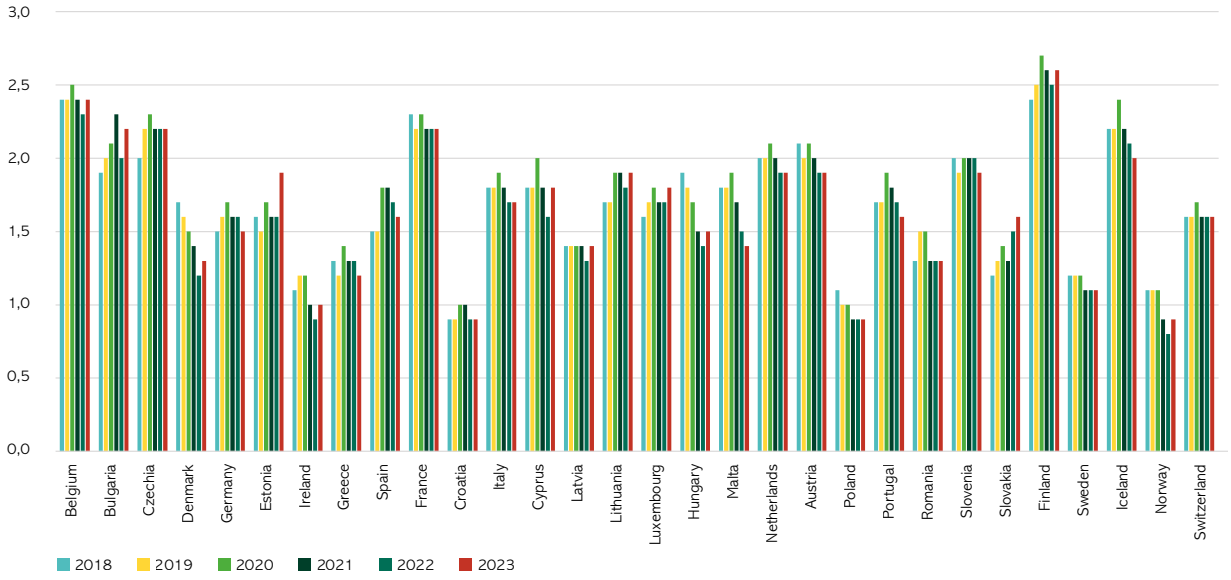
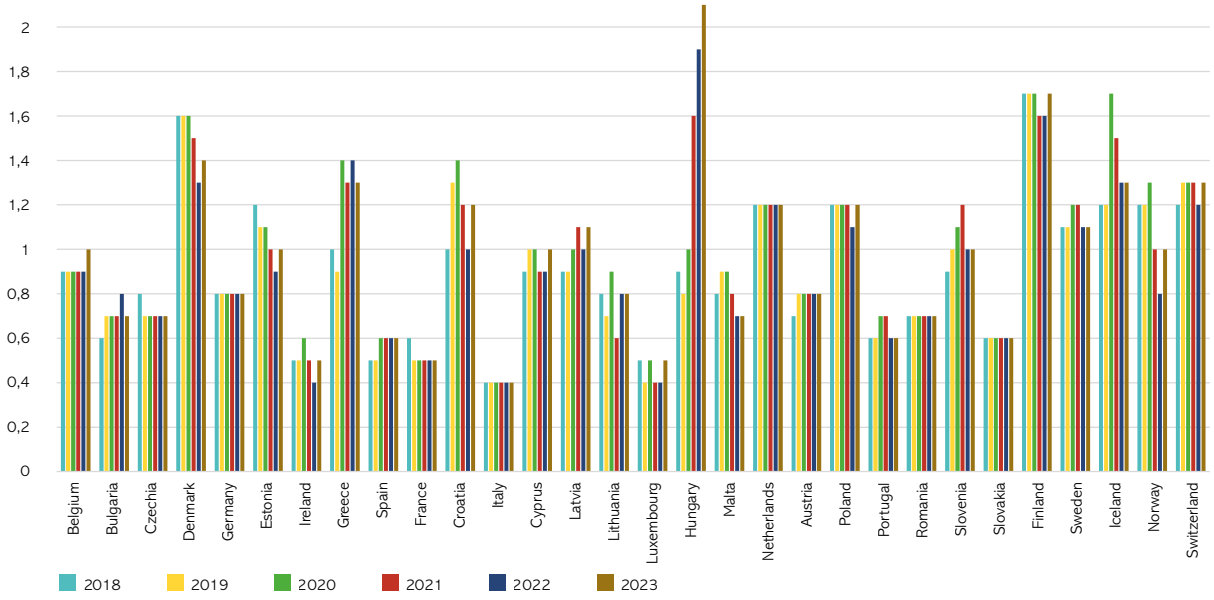



*Figure 1c. Government expenditure on tertiary education as a percentage of GDP – 2017 and 2022*




Government expenditure on education per student provides a complementary perspective, as it measures the intensity of funding relative to the size of the educational system. Tables 1a, 1b, 1c, and 1d show this indicator by levels: primary, lower secondary, upper secondary non-tertiary, and tertiary.

It is interesting to note that the Netherlands increases the investment per student in every level, but some differences can be highlighted. The increase in expenditure per student is 40%, 30.4%, 27.7%, and 6.4% in primary, lower secondary, upper secondary, and tertiary, respectively. Luxembourg, Switzerland, and Norway are the countries with the highest annual government expenditure on primary education with an average of 14,149, 11,903 and 10,335 PPS, respectively; while Hungary, Bulgaria, and Romania are the lowest[1]. However, they also increased between 2014 and 2022 by 165.7% and 147.7%, with 75% showing a significant upward trend. Other important increases in annual expenditure in primary level are observed in Malta and Lithuania, with 55.7% and 71.6% respectively. The final consideration relates to the investment by years: on average investment increases, moving from 5,843 to 7,498 PPS. Similar considerations can be made for annual expenditure per student in secondary education (Tables 1b and 1c).

[1] The PPS is the purchasing power standard, an artificial currency unit standardised by country: with the same amount, it is possible to buy the same amount of goods in all the listed countries.

Again, it is interesting to observe that the highest increase in this indicator over years is registered for those countries which, at the beginning of the period, invested less money in the field. For lower secondary education Romania, Malta, and Bulgaria register an average increase of 107%, 87%, and 84%, respectively, while for upper secondary education in Romania, Bulgaria, and Malta the expenditure per student rose by 113%, 80%, and 43% respectively from 2014 to 2022[2]. Government expenditure per student in tertiary education (Table 1c) show again a particularly high value for Luxembourg, always at the top of these rankings, with an average investment of 36,385 PPS. It is followed by Norway, Sweden, and Switzerland with 24,719 PPS, 21,014 PPS, and 21,088 PPS respectively. At the bottom of this ranking, there are Bulgaria with 5,608 PPS per student and Croatia with 4,768 (in 2022). A decrease in expenditure per tertiary education student over the last years is registered for some countries: Cyprus, Finland, Norway, Portugal, and France experienced the most evident decreases (between −2% and −23.9%).

*Table 1a: Annual expenditure per student in primary education from 2014 to 2022*

| Country | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | mean by country | increase percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulgaria | 2987 | 2948 | 3126 | 3241 | 3482 | | 4183 | 4935 | 7938 | 4105 | 165,79% |
| Romania | 1371 | 1419 | 1360 | 1520 | 1672 | 2070 | 2059 | 2095 | 3395 | 1884 | 147,72% |
| Hungary | 2737 | 3699 | 3725 | 3532 | 3718 | 4937 | 4503 | 4579 | 4792 | 4025 | 75,11% |
| Lithuania | 3837 | 4041 | 4298 | 4281 | 4323 | 4752 | 5116 | 5269 | 6585 | 4722 | 71,64% |
| Malta | 4565 | 4709 | 4802 | 4916 | 5584 | 6349 | 6446 | 7261 | 7112 | 5749 | 55,79% |
| Estonia | 4270 | 4389 | 4561 | 4965 | 5502 | 6253 | 6505 | 6477 | | 5365 | 51,66% |
| Czechia | 3593 | 3784 | 3555 | 3987 | 4380 | | | 5342 | | 4107 | 48,69% |
| Finland | 6461 | 6978 | 6843 | 6675 | 6911 | 7307 | 7268 | 7606 | 9533 | 7287 | 47,54% |
| Slovakia | 4240 | 4836 | 4679 | 4556 | 4697 | | 5385 | 6135 | | 4932 | 44,69% |
| Netherlands | 6153 | 6367 | 6228 | 6432 | 6792 | 7013 | 7348 | 8054 | 8677 | 7007 | 41,03% |
| Germany | 6149 | 6312 | 6369 | 6491 | 6807 | 7211 | 7479 | 7966 | | 6848 | 29,55% |
| Spain | 4447 | 4691 | 4727 | 4853 | 4930 | 5124 | 5206 | 5677 | | 4957 | 27,64% |
| Poland | 4908 | 5046 | 4666 | 5012 | 5346 | 5628 | 6892 | 6180 | 5306 | 5443 | 25,91% |
| Cyprus | 7190 | 7637 | 7812 | 7585 | 8031 | 8205 | | 8877 | | 7905 | 23,46% |
| Cyprus | 7190 | 7637 | 7812 | 7585 | 8031 | 8205 | | 8877 | | 7905 | 23,46% |
| France | 5234 | 5381 | 5316 | 5563 | 5785 | 6206 | 6173 | 6428 | | 5761 | 22,82% |
| Norway | 9699 | 9777 | 9180 | 9684 | 10646 | 10649 | 10196 | 11374 | 11809 | 10335 | 21,76% |
| Sweden | 7985 | 8245 | 8248 | 8707 | 8914 | 9181 | 9261 | 9472 | 9693 | 8856 | 21,39% |
| Ireland | 5776 | 5558 | 5418 | 5659 | 5842 | 5976 | 6230 | 6854 | | 5914 | 18,66% |
| Austria | 8128 | 8696 | 8806 | 8777 | 8913 | 8738 | 8908 | 9464 | | 8804 | 16,43% |
| Belgium | | | 7546 | 7486 | 7744 | 7896 | 8132 | 8536 | | 7890 | 13,12% |
| Italy | 5674 | 6050 | 5596 | 6109 | 6155 | 6810 | 7454 | 8166 | 6314 | 6481 | 11,28% |
| Denmark | 8846 | | 7764 | 8098 | 8231 | 8231 | 9080 | 9395 | | 8521 | 6,21% |
| Luxembourg | 14525 | 15206 | 12322 | 12944 | 13793 | 14618 | 14482 | 15303 | | 14149 | 5,35% |
| Slovenia | 6215 | 5845 | 5698 | 5741 | 6122 | 6269 | 6700 | 7391 | 6356 | 6260 | 2,27% |
| Switzerland | | | 11623 | 11657 | 11693 | | 12265 | 12895 | 11285 | 11903 | -2,91% |
| Latvia | 4795 | 4973 | 4607 | 4267 | 4330 | 4530 | 4480 | 4392 | | 4547 | -8,40% |
| Croatia | | | 7500 | 7771 | 8429 | 9049 | | 4943 | | 7538 | -34,10% |
| mean by year | 5843,360714 | 5978,896296 | 6148,416129 | 6287,783871 | 6580,13871 | 7054,446154 | 7099,312 | 7497,907143 | | | |

[2] The calculus for the percentage increase in this indicator considers data from 2021 and from 2014, but for countries missing information in these years the closest data is used.

*Table 1b: Annual expenditure per student in lower secondary education from 2014 to 2022*

| Country | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | mean by country | increase percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Romania | 2.481,10 | 2.703,80 | 2.648,80 | 3.053,10 | 3.566,80 | 4.540,00 | 4.417,80 | 4.507,20 | 5.146,10 | 3.489,83 | 107,41% |
| Malta | 5.413,00 | 6.732,40 | 8.676,40 | 8.442,00 | 9.556,20 | 10.157,00 | 10.840,60 | 11.491,40 | 10.141,80 | 8.913,63 | 87,36% |
| Bulgaria | 3.350,10 | 3.450,80 | 3.609,60 | 3.989,60 | 4.519,20 | | 5.268,70 | 6.219,80 | 6.195,10 | 4.343,97 | 84,92% |
| Estonia | 4.551,90 | 4.762,80 | 4.848,60 | 5.121,50 | 5.722,20 | 6.529,40 | 6.716,20 | 7.026,20 | 7.639,10 | 5.659,85 | 67,82% |
| Lithuania | 3.687,30 | 3.776,40 | 3.985,10 | 4.046,90 | 4.330,50 | 4.719,00 | 5.076,70 | 5.256,60 | 5.916,20 | 4.359,81 | 60,45% |
| Czechia | 5.957,00 | 6.302,30 | 5.978,20 | 6.739,70 | 7.478,60 | | | 9.105,00 | | 6.926,80 | 52,85% |
| Hungary | 2.831,60 | 3.411,90 | 4.004,00 | 3.421,00 | 3.587,60 | 4.309,20 | 4.023,10 | 4.218,90 | 4.307,20 | 3.725,91 | 52,11% |
| Netherlands | 8.706,10 | 9.078,70 | 8.991,70 | 9.005,10 | 9.416,30 | 9.567,00 | 9.720,10 | 10.691,50 | 11.353,20 | 9.397,06 | 30,41% |
| Spain | 5.643,50 | 5.949,40 | 5.921,60 | 5.991,30 | 5.951,00 | 6.288,90 | 6.366,80 | 6.946,40 | 7.261,90 | 6.132,36 | 28,68% |
| Germany | 7.573,50 | 7.796,00 | 7.896,00 | 8.101,10 | 8.464,30 | 8.884,50 | 9.172,60 | 9.520,00 | | 8.426,00 | 25,70% |
| Luxembourg | 15.527,60 | 15.521,10 | 15.292,70 | 15.510,80 | 17.240,30 | 16.783,80 | 17.309,30 | 18.664,00 | 19.396,00 | 16.481,20 | 24,91% |
| Poland | 4.888,70 | 4.888,60 | 4.908,40 | 4.734,20 | 5.235,20 | 5.620,60 | 5.080,20 | 5.645,70 | 6.071,10 | 5.125,20 | 24,19% |
| Norway | 10.343,10 | 10.740,00 | 9.931,60 | 9.797,40 | 10.805,90 | 10.848,10 | 10.425,60 | 11.605,80 | 12.580,00 | 10.562,19 | 21,63% |
| Slovakia | 4.373,30 | 4.394,90 | 4.408,80 | 4.161,70 | 4.311,30 | | 4.967,70 | 5.314,20 | | 4.561,70 | 21,51% |
| Finland | 10.165,80 | 11.009,10 | 10.893,90 | 10.669,90 | 11.026,90 | 11.654,60 | 11.488,80 | 11.977,80 | 12.243,90 | 11.110,85 | 20,44% |
| Portugal | 6.756,60 | 6.591,60 | 6.992,40 | 7.296,90 | 7.293,80 | | 7.336,90 | 7.956,90 | | 7.175,01 | 17,76% |
| Slovenia | 6.944,20 | 6.790,60 | 6.925,80 | 7.181,10 | 7.789,20 | 7.883,90 | 7.187,90 | 7.887,30 | 8.127,00 | 7.323,75 | 17,03% |
| Cyprus | 8.693,70 | 9.200,10 | 9.476,20 | 9.433,50 | 9.534,10 | 9.850,60 | | 10.077,40 | | 9.466,51 | 15,92% |
| Belgium | | | 9.525,50 | 9.915,60 | 10.018,70 | 10.189,00 | 10.661,80 | 11.009,30 | | 10.219,98 | 15,58% |
| Sweden | 8.623,20 | 8.912,90 | 8.906,50 | 9.203,90 | 9.373,90 | 9.330,60 | 9.403,90 | 9.587,60 | 9.962,70 | 9.167,81 | 15,53% |
| Switzerland | | | 14.626,60 | 14.369,50 | 14.426,20 | | 14.526,20 | 15.397,10 | 16.389,10 | 14.669,12 | 12,05% |
| France | 7.183,20 | 7.351,00 | 7.295,70 | 7.397,60 | 7.468,70 | 7.755,20 | 7.698,20 | 7.966,20 | | 7.514,48 | 10,90% |
| Denmark | 10.056,20 | | 7.641,50 | 8.082,80 | 8.111,60 | 9.558,50 | 10.804,40 | 11.064,50 | | 9.331,36 | 10,03% |
| Italy | 6.254,90 | 6.711,80 | 6.276,60 | 6.752,90 | 6.913,50 | 7.177,70 | 6.182,10 | 6.580,50 | | 6.606,25 | 5,21% |
| Austria | 11.007,30 | 11.534,00 | 11.657,80 | 11.521,80 | 11.273,10 | 11.262,20 | 10.998,10 | 11.541,70 | | 11.349,50 | 4,85% |
| Ireland | 7.477,00 | 6.931,30 | 6.532,60 | 5.956,50 | 6.776,10 | 6.846,70 | 7.281,30 | 7.718,40 | | 6.939,99 | 3,23% |
| Latvia | 4.780,90 | 5.010,50 | 4.645,40 | 4.351,60 | 4.373,90 | 4.610,50 | 4.490,30 | 4.476,40 | | 4.592,44 | -6,37% |
| mean by year | 6.855,04 | 6.982,92 | 7.399,11 | 7.458,89 | 7.839,64 | 8.218,63 | 8.297,81 | 8.868,66 | | | |

*Table 1c: Annual expenditure per student in upper secondary and non-tertiary education from 2014 to 2022*

| Country | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | mean by country | increase percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Romania | 2.318,4 | 2.570,5 | 2.483,1 | 3.003,5 | 3.339,0 | 4.092,1 | 4.417,8 | 4.507,2 | 4.957 | 3.520,9 | 113,8% |
| Bulgaria | 2.864,3 | 2.849,0 | 2.899,0 | 3.023,3 | 3.181,8 | | 5.269 | 6.220 | 5.167 | 3.934,1 | 80,4% |
| Malta | 7.134,1 | 8.881,4 | 8.479,4 | 8.382,0 | 9.923,3 | 10.360,6 | 10.840,6 | 11.491,4 | 10.212 | 9.522,8 | 43,1% |
| Lithuania | 4.349,0 | 3.894,0 | 3.899,2 | 3.959,7 | 4.463,8 | 5.336,1 | 5.076,7 | 5.256,6 | 6.223 | 4.717,6 | 43,1% |
| Slovenia | 5.422,0 | 5.597,9 | 5.414,5 | 5.782,4 | 6.234,8 | 6.617,5 | 7.187,9 | 7.887,3 | 7.689 | 6.425,9 | 41,8% |
| Czechia | 5.209,0 | 5.612,0 | 5.391,0 | 5.821,7 | 6.973,1 | | | 9.105 | 7.298 | 6.487,1 | 40,1% |
| Portugal | 5.951,8 | 6.026,6 | 6.037,0 | 6.685,7 | 6.287,8 | | 7.337 | 7.957 | | 6.611,8 | 33,7% |
| Netherlands | 8.319,3 | 8.645,5 | 8.829,4 | 8.447,3 | 9.444,2 | 9.031,2 | 9.720,1 | 10.691,5 | 10.625 | 9.305,9 | 27,7% |
| Luxembourg | 14.714,0 | 14.185,7 | 14.612,6 | 14.746,0 | 16.225,2 | 16.038,2 | 17.309,3 | 18.664, | 18.442 | 16.104,1 | 25,3% |
| Austria | 10.543,6 | 11.027,5 | 11.313,4 | 11.101,2 | 11.206,6 | 10.706,0 | 10.998,1 | 11.541,7 | 12.638 | 11.230,7 | 19,9% |
| Poland | 4.078,4 | 4.224,7 | 4.424,6 | 4.433,5 | 4.631,9 | 4.814,7 | 5.080,2 | 5.645,7 | 4.770 | 4.678,2 | 17,0% |
| Norway | 13.083,6 | 13.192,7 | 12.793,6 | 13.296,9 | 14.220,2 | 14.135,6 | 10.425,6 | 11.605,8 | 15.299 | 13.117, | 16,9% |
| Spain | 6.042,5 | 6.436,5 | 6.698,8 | 6.925,4 | 6.912,4 | 7.215,5 | 6.366,8 | 6.946,4 | | 6.693, | 15,0% |
| Sweden | 9.566,8 | 9.892,9 | 9.776,1 | 10.328,4 | 10.716,3 | 10.754,7 | 9.403,9 | 9.587,6 | 10.966 | 10.110,3 | 14,6% |
| Cyprus | 8.821,5 | 9.373,2 | 9.765,0 | 10.287,9 | 11.073,9 | 10.812,7 | | 10.077,4 | | 10.030,2 | 14,2% |
| Germany | 8.340,6 | 8.521,0 | 8.552,3 | 8.816,4 | 9.219,2 | 9.523,2 | 9.172,6 | 9.520, | | 8.958,2 | 14,1% |
| Slovakia | 4.689,3 | 5.175,4 | 4.736,1 | 5.072,0 | 5.132,1 | | 4.968 | 5.314 | | 5.012,4 | 13,3% |
| Finland | 6.941,2 | 6.882,7 | | 6.032,5 | 6.275,8 | 6.797,5 | 11.488,8 | 11.977,8 | 7.579 | 7.996,9 | 9,2% |
| Belgium | | | 10.133,6 | 10.305,6 | 10.402,1 | 10.620,1 | 10.661,8 | 11.009,3 | | 10.522,1 | 8,6% |
| Italy | 6.256,6 | | 6.634,0 | 7.187,5 | 8.608,1 | 7.195,3 | 6.182,1 | 6.580,5 | | 6.949,2 | 5,2% |
| Estonia | 4.751,2 | 5.249,0 | 4.946,9 | 5.075,1 | 5.872,5 | 5.134,4 | 6.716,2 | 7.026,2 | 4.587 | 5.484,3 | -3,5% |
| Denmark | 12.135,4 | | 8.615,6 | 8.549,8 | 8.681,4 | 8.879,1 | 10.804,4 | 11.064,5 | | 9.818,6 | -8,8% |
| Latvia | 5.083,7 | 5.721,2 | 5.513,0 | 5.458,7 | 5.640,2 | 6.050,1 | 4.490,3 | 4.476,4 | | 5.304,2 | -11,9% |
| France | 9.356,2 | 9.548,0 | 9.400,0 | 9.375,4 | 9.569,7 | 10.020,6 | 7.698,2 | 7.966,2 | | 9.116,8 | -14,9% |
| Ireland | 9.262,9 | 6.964,4 | 7.078,1 | 7.339,4 | 8.178,7 | 8.323,6 | 7.698,2 | 7.718,4 | | 7.820,5 | -16,7% |
| Switzerland | | 14.217,0 | 9.477,1 | 9.363,7 | 9.228,6 | | 14.526 | 15.397 | 10.559 | 11.824, | -25,7% |
| Hungary | 6.093,2 | 5.682,5 | 5.731,0 | 6.083,8 | 6.273,7 | 5.055,0 | 7.698,2 | 4.218,9 | | 5.854,5 | -30,8% |
| mean by year | 7.325,87 | 7.730,47 | 7.361,36 | 7.484,69 | 7.949,64 | 8.332,55 | 8.629,98 | 9.036,41 | | | |

*Table 1d: Annual expenditure per student in tertiary education from 2014 to 2022*

| Country | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | mean by country | increase percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulgaria | 2.780,8 | 2.767,3 | 2.774,0 | 4.204,1 | 4.328,7 | | 4.975 | 5.598 | 5.607,3 | 3.918,3 | 101,6% |
| Slovenia | 7.008,4 | 7.262,9 | 7.500,8 | 8.141,8 | 9.539,6 | 10.263,8 | 10.752, | 10.979,3 | 12.263,6 | 8.931,1 | 75,0% |
| Hungary | 5.165,8 | 4.924,0 | 5.795,3 | 6.609,3 | 7.189,7 | 7.001,5 | 7.018,6 | 12.614,7 | 8.924,6 | 7.249,3 | 72,8% |
| Romania | 3.953,0 | 4.121,6 | 4.723,6 | 5.201,6 | 5.753,6 | 6.788,2 | 6.415,5 | 6.465,4 | 6.730,6 | 5.427,8 | 70,3% |
| Czechia | 5.039,4 | 5.496,5 | 5.395,4 | 5.956,1 | 8.634,5 | | | 8.816 | 8.149,4 | 6.556,3 | 61,7% |
| Poland | 5.777,8 | 6.346,6 | 5.846,8 | 6.358,1 | 6.853,4 | 7.856,4 | 8.254,7 | 8.817,5 | 8.583,3 | 7.013,9 | 48,6% |
| Croatia | | | 4.062,3 | 4.616,7 | 4.592,2 | 5.180,9 | | 5.386,7 | 5.766,5 | 4.767,8 | 42,0% |
| Ireland | 9.296,2 | 13.563,4 | 13.133,0 | 12.378,5 | 12.324,8 | 12.169,0 | 11.958,3 | 12.513,5 | | 12.167,1 | 34,6% |
| Denmark | 15.950,5 | | 17.573,8 | 16.854,3 | 17.393,2 | 18.954,3 | 19.371,8 | 20.971,1 | | 18.152,7 | 31,5% |
| Estonia | 7.391,6 | 7.711,9 | 8.537,6 | 7.765,7 | 8.751,5 | 8.578,2 | 8.759,5 | 9.528,3 | | 8.378, | 28,9% |
| Lithuania | 5.933,5 | 5.701,7 | 4.183,4 | 4.272,2 | 5.015,0 | 5.679,6 | 6.675,8 | 6.895,8 | 7.621,3 | 5.544,6 | 28,4% |
| Slovakia | 7.505,0 | 10.561,6 | 6.901,9 | 6.672,7 | 6.831,6 | | 8.123 | 9.623 | | 8.031,3 | 28,2% |
| Austria | 12.881,9 | 13.486,0 | 13.589,9 | 13.281,6 | 13.835,2 | 13.208,5 | 14.497,4 | 15.130,1 | 16.280,9 | 13.738,8 | 26,4% |
| Belgium | | | 12.859,4 | 13.310,4 | 13.869,1 | 14.766,9 | 14.548, | 14.552,6 | | 13.984,4 | 13,2% |
| Germany | 13.125,2 | 13.088,3 | 13.090,3 | 13.161,8 | 13.661,8 | 13.607,7 | 14.045,4 | 14.187,8 | | 13.496, | 8,1% |
| Italy | 6.985,5 | 6.993,2 | 6.916,4 | 7.127,0 | 7.293,7 | 7.267,4 | 7.137,8 | 7.510,8 | | 7.154, | 7,5% |
| Spain | 7.032,1 | 7.110,1 | 6.797,5 | 6.990,0 | 6.968,3 | 7.249,7 | 7.036,3 | 7.548,1 | | 7.091,5 | 7,3% |
| Luxembourg | 33.996,9 | 36.249,7 | 34.292,5 | 34.251,0 | 31.788,1 | 34.189,2 | 34.130,2 | 36.849,1 | 36.385,5 | 34.468,3 | 7,0% |
| Latvia | 5.304,0 | 6.010,9 | 3.924,2 | 3.823,2 | 4.383,9 | 5.176,0 | 5.232,6 | 5.659,5 | | 4.939,3 | 6,7% |
| Netherlands | 13.847,4 | 13.743,1 | 14.658,5 | 13.398,6 | 14.705,6 | 14.019,0 | 13.589,7 | 14.737,8 | | 14.087,5 | 6,4% |
| Switzerland | | | 20.123,0 | 20.270,9 | 20.243,2 | | 20.324 | 20.003 | 21.088,6 | 20.193, | 4,8% |
| Sweden | 20.730,4 | 21.552,2 | 20.291,4 | 20.196,7 | 20.678,7 | 20.740,7 | 20.465,1 | 20.781,2 | 21.014,1 | 20.679,6 | 1,4% |
| Malta | 15.681,1 | 15.985,6 | 15.023,2 | 13.470,0 | 14.542,3 | 16.489,7 | 16.021,1 | 15.792,7 | | 15.375,7 | 0,7% |
| Norway | 25.228,8 | 20.677,6 | 20.537,4 | 20.823,0 | 22.522,0 | 22.341,9 | 21.095,1 | 22.229,1 | 24.719,3 | 21.931,9 | -2,0% |
| France | 10.178,6 | 10.406,0 | 9.963,8 | 9.960,8 | 10.065,1 | 10.344,6 | 9.837,6 | 9.783,7 | | 10.067,5 | -3,9% |
| Portugal | 5.850,5 | 6.165,5 | 5.632,8 | 5.608,0 | 5.540,3 | | 5.465 | 5.419 | | 5.668,7 | -7,4% |
| Finland | 14.816,7 | 14.528,9 | 13.959,5 | 13.049,3 | 12.582,5 | 12.541,2 | 12.632,8 | 12.635,9 | | 13.343,4 | -14,7% |
| Cyprus | 6.522,7 | 6.702,6 | 5.893,2 | 6.367,9 | 5.299,8 | 4.783,2 | | 4.963,4 | | 5.790,4 | -23,9% |
| mean by year | 10.952,40 | 11.171,20 | 11.473,17 | 11.061,17 | 11.503,40 | 12.138,02 | 12.641,17 | 12.901,22 | | | |

So far, only government expenditure is considered to quantify the investment in education. However, it is relevant to look deeper into how different sources of funding are distributed among countries (Figures 2a, 2b, 2c, and 2d). These elaborations, provided by the Eurostat databases, show the composition of educational investments between public (general), private, and international investments. Capturing differences in terms of types of educational funding is useful for benchmarking purposes: it detects differences in political inclinations and the capacity to attract external (private or international) investors for the sector.

Starting from the lowest educational level, Figure 2a visually highlights an important contribution of state funding for primary education: government funding covers around 90% of the total sources; in countries such as Romania, Finland, and Norway this rate is almost 100%. Countries with the highest proportion of private investments are Malta, Poland, Portugal, and Spain. Several countries receive some level of international funding, but it accounts for less than 5% of the total. Secondary education funding (referring to Figures 2b and 2c) shows a smaller proportion of public sources (even if it is still above 80% on average), leaving room for private ones. The highest proportion of private funding refers to Poland and Ireland in lower education, and to Switzerland and the Netherlands for upper education with rates above 40% of the total funding[3]. The international investments are close to 10% of the total expenditure in Lithuania and Latvia for upper secondary education. As in the previous representation, a different story is depicted for the case of tertiary education. Figure 2d clearly shows a more heterogeneous composition of funding sources for the selected countries. Public investment represents an important source for Luxembourg, Romania, and Malta, accounting for more than 85% of the total. Considering private investments, Cyprus and Bulgaria, followed by Italy, the Netherlands, and Portugal reach almost 45% and 30% respectively, while international investments are attracted by Latvia, Lithuania and Croatia for around 15%.

[3] It should be noted that some government expenditure relates to payments and transfers for education to the non-educational private sector, this includes subsidies to households and students, as well as payments to other non-educational private entities. As such, this part is counted twice, once in government expenditure and a second time in the expenditure of households and other non-educational private entities. (See Eurostat, Educational expenditure statistics, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational_expenditure_statistics).

*Figure 2a: Distribution of sources for educational expenditure by primary education (ISCED 1)*

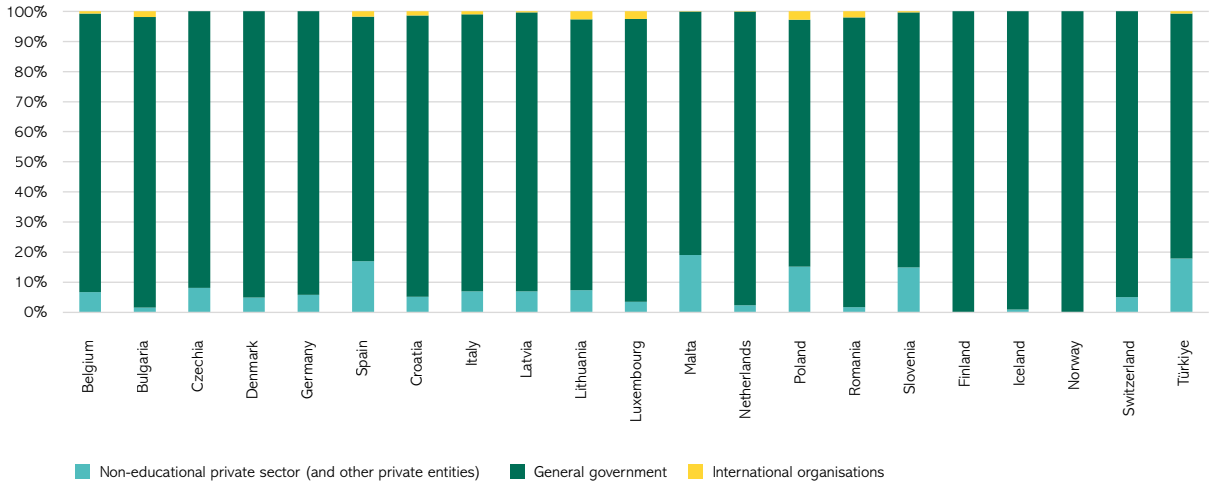



*Figure 2b: Distribution of sources for educational expenditure by lower secondary education (ISCED 2)*

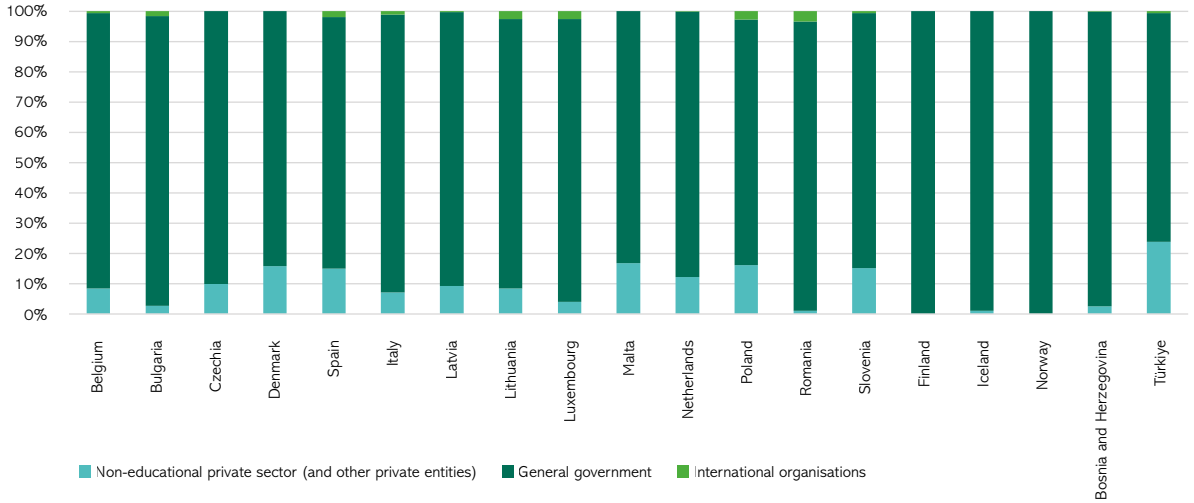



*Figure 2c: Distribution of sources for educational expenditure by upper secondary and non-tertiary education (ISCED 3-4)*

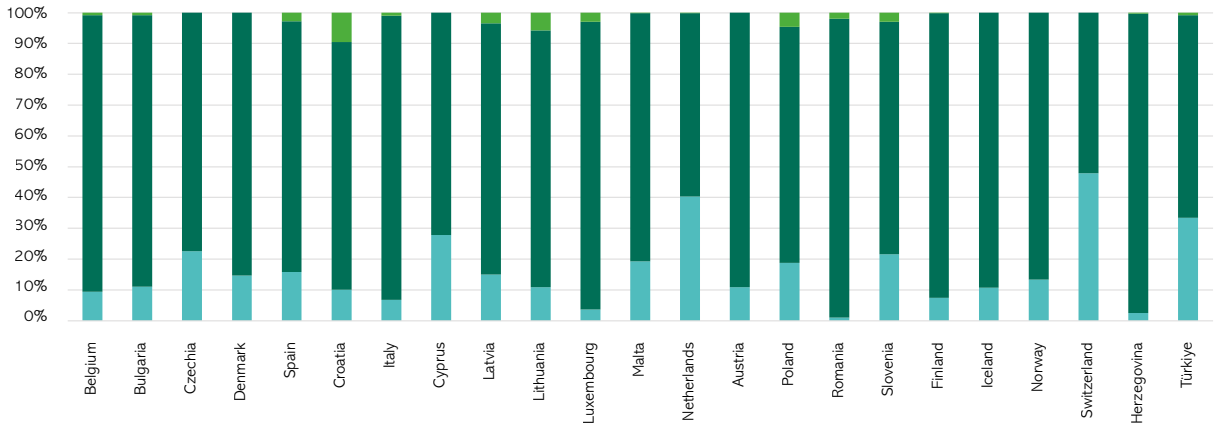
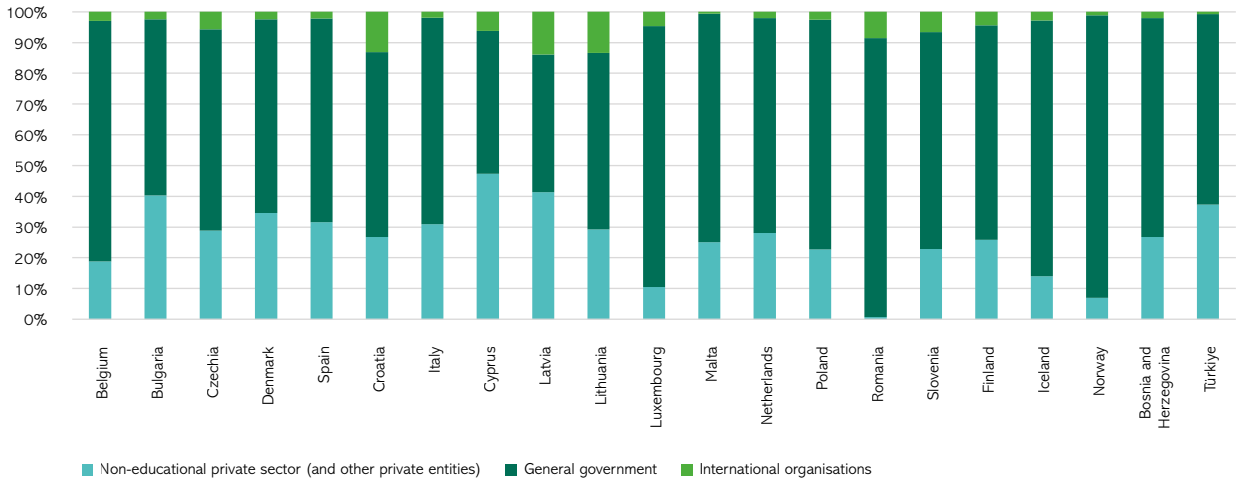


*Figure 2d: Distribution of sources for educational expenditure by tertiary education (ISCED 5-8)*




### 4.2.3. Outputs and outcome of the systems

According to the conceptual framework adopted in this chapter, the inputs are the main drivers of the educational system, but the outputs represent the short-term educational effect. As anticipated, the following indicators are discussed: (i) enrolment rate for 15–19-year-olds, (iii) upper secondary graduation rate, and (iii) tertiary graduation rate.

The first indicator about educational outputs relates to the enrolment rate for 15–19 years old students in secondary education to describe the universal nature of the educational system. For the considered age groups, education is no longer mandatory in most countries. Countries with the highest rate of enrolment in 2022 are Poland (96.35%), Lithuania (94.96%), and Slovenia (94.86%), while the lowest are observed in Austria (80.24%), Luxembourg (77.69%), and Canada (73.79%).

Table 2 presents the mean percentage increase in enrolment rate by regions between 2013 and 2019, and between 2019 and 2022. Considering global macro areas, Central and Eastern Europe show a negative difference in the first-time window, even if with lower intensity (from −0.61% to −2.76%). Northern and Western European countries, the ones with the highest enrolment rates, show a constant positive trend of +0.61% and +0.55% between 2010 and 2015, and +0.46% and +0.52% between 2015 and 2020, respectively. Southern Europe is significantly increasing enrolment rates among the 15–19 years old group, with a percentage increase of 1.18% and 2.99% in the two years' windows.

Table 2 presents the average percentage change in enrolment rate by regions in 2013–2019 and 2019–2022. Considering global macro areas, Central and Eastern Europe, as well as Eastern Asia, show a negative trend in the first period (−0.61% and −3.46% respectively) but a subsequent recovery (+2.76% and +1.67%). Oceania follows the opposite pattern, with an initial increase (+1.15%) followed by a decline (−2.70%). Northern and Western Europe, along with Northern America, maintain a generally stable positive trend. In particular, Northern and Western Europe register a growth in both periods (+0.52% and +0.08%, then +1.03% and +0.34%), while Northern America shows a slight rise (+1.21%), followed by small change in the second window (+0.08%). Finally, Southern Europe recorded the highest growth between 2013 and 2019 (+3.46%), even at a lower rate in the second period (+0.53%).

*Table 2: Enrolment rate among 15–19 years old students*

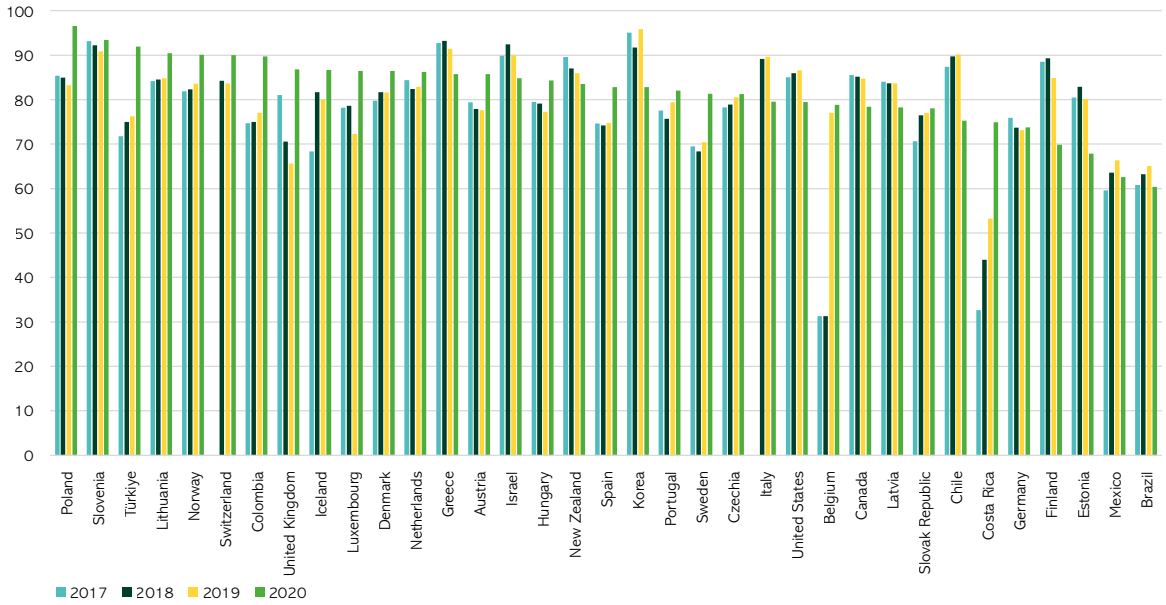
| Region | Average percentage change in enrolment rate among 15-19 year-old students (from 2013 to 2019) - % | Average percentage change in enrolment rate among 15-19 year-old students (from 2019 to 2022) - % | Country | Enrolment rate among 15-19 year-old students (2022) - % |
|---|---|---|---|---|
| Central and Eastern Europe | -0,61% | 2,76% | Czechia | 92,17 |
| | | | Estonia | 88,04 |
| | | | Hungary | 82,86 |
| | | | Lithuania | 94,96 |
| | | | Latvia | 91,98 |
| | | | Poland | 96,35 |
| | | | Slovenia | 94,86 |
| | | | Slovakia | 86,06 |
| Eastern Asia | -3,46% | 1,67% | Korea, Dem. People's Rep. | 84,90 |
| Northern America | 1,21% | 0,08% | Canada | 73,79 |
| | | | United States | 81,61 |
| Northern Europe | 0,52% | 1,03% | Denmark | 87,62 |
| | | | Finland | 87,91 |
| | | | Norway | 88,77 |
| | | | Sweden | 87,50 |
| Oceania | 1,15% | -2,70% | Australia | 84,87 |
| | | | New Zealand | 80,59 |
| Southern Europe | 3,46% | 0,53% | Spain | 87,75 |
| | | | Greece | 85,80 |
| | | | Italy | 87,31 |
| | | | Portugal | 90,66 |
| Western Europe | 0,08% | 0,34% | Austria | 80,24 |
| | | | Belgium | 93,06 |
| | | | Switzerland | 85,87 |
| | | | Germany | 87,03 |
| | | | France | 87,92 |
| | | | United Kingdom | 82,13 |
| | | | Ireland | 91,57 |
| | | | Luxembourg | 77,69 |
| | | | Netherlands | 92,07 |

The second output indicator is the upper secondary graduation rate: it is the estimated percentage of people who will graduate from secondary education over their lifetime. The OECD (2020) suggests that this indicator is not a measure of the proportion of graduates in a country at a specific time, but a measure of the probability of someone in the country graduating in the long term, based on current graduation patterns. Therefore, graduation rates are sensitive to any changes in education systems, such as the introduction of new programmes or variation in a programme's duration.

Figure 3 compares this rate over 2018, 2019, and 2020. Poland and Slovenia are the European countries with the highest rate in 2020 with 96.5% and 93.4% respectively, while Finland and Estonia are the lowest (around 70%)[4]. The Netherlands obtains a good ranking too, with 92.07% of enrolment rate. The Netherlands' data show positive results also in terms of upper secondary graduation rates, consistently above 80% – specifically 82.3%, 82.8%, and 86.2% in 2018, 2019, and 2020 respectively. While this upward trend reflects both high enrolment and an education system capable of retaining students until graduation, it is important to highlight that the increase observed in 2020 is likely COVID-related. During the pandemic, many education systems, including that of the Netherlands, implemented more lenient assessment and graduation policies to mitigate disruptions. As such, the higher graduation rate in 2020 should be interpreted with caution, as it may not fully reflect structural improvements in student retention or achievement, but rather temporary policy adjustments in response to the pandemic context.

[4] Both cases must be treated with caution, as the high variability over these years does not allow for precise considerations due to statistical errors in prediction.

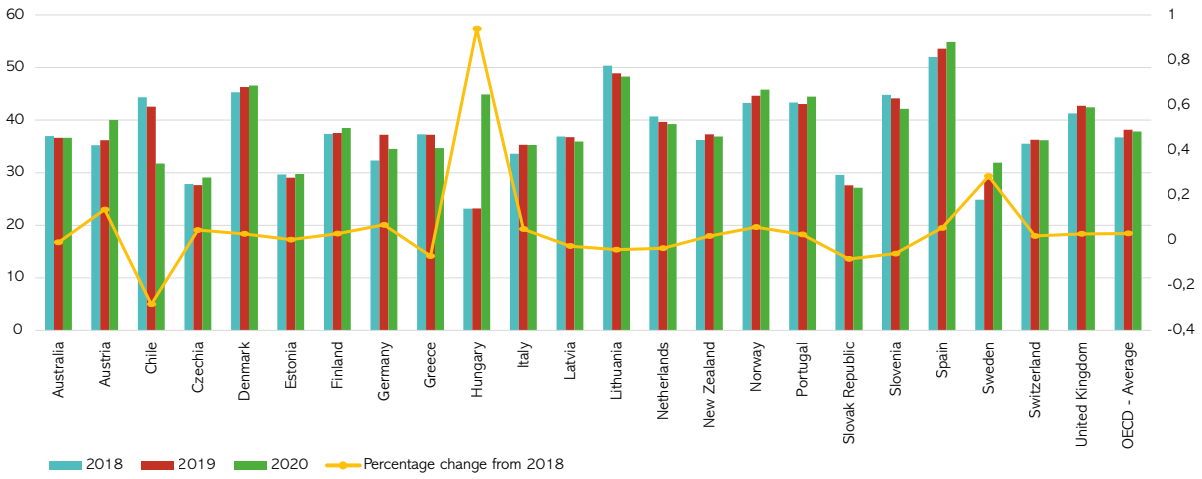
*Figure 3: Upper secondary education graduation rate from 2018 to 2020*




Moving to the tertiary education outputs, Figure 4 shows the tertiary graduation rate from 2018 to 2020. The indicator represents the expected probability of an individual graduating for the first time from tertiary education before reaching a specific age threshold. Specifically, age 30 is used as the upper limit for completing bachelor's degrees and first-time tertiary education overall. In contrast, age 35 is considered the upper age limit for graduation at the master's and doctoral levels. It is important to note that international students are excluded from this calculation.

The Netherlands shows a slight downward trend over the period, with the graduation rate falling from 40.7% in 2018 to 39.2% in 2020. However, the indicator does not account for international students and the reduction of foreign students may lead to lower reported rates, as these individuals are not considered first-time graduates within the country's education system. The variations in tertiary graduation rates should be interpreted with caution, particularly in nations where international mobility plays a significant role in higher education. Figure 4 also shows that some countries have particularly high graduation rates, such as Spain, Lithuania, and Portugal, which all have rates above 40%, with Spain reaching 54.9% in 2020, one of the highest among OECD countries. Looking at the trends, some countries experienced relevant increases in their graduation rates, for example, increases in the rate from 35.2% in 2018 to 40% in 2020. Hungary also recorded a significant growth from 23.2% in 2018 to 44.9% in 2020. Conversely, several countries have declined in their tertiary graduation rates, for example Chile, Greece, and Slovenia.

*Figure 4: Tertiary graduation rate from 2018 to 2020*



#### 4.2.3.1. PISA indicators of educational achievement

The OECD conducts internationally standardised and nationally representative tests to measure the performance of 15-year-olds in reading, mathematics, and science (PISA). It has carried out surveys every three years since 2000, and 2022. Performance scores are standardised, with a mean of 500 test-score points and a standard deviation of 100 points across the OECD countries. As explained by the OECD (2014a), not all PISA results can be compared over time due to differences in scaling, sampling, and testing conditions. To assess the last years' trends of students' performance, the waves of 2009, 2012, 2015, 2018, and 2022 of the three subjects are considered in this chapter.

Table 3 documents the average scores by countries between 2009 and 2022 for the three subjects. The Netherlands performed above the OECD average across almost all PISA waves and in all three subjects: mathematics, reading, and science. However, despite these relatively strong performances, the trend over time is negative, with declining scores from 2009 to 2022. This pattern is observed in several other countries as well. It is worth noting that PISA results are generally considered robust and internationally comparable, as they are based on large and representative samples, and use consistent methodologies across cycles. However, some caution is needed when interpreting long-term trends, particularly for reading, due to changes in the assessment framework introduced in 2018 and the transition to computer-based testing (OECD, 2023b, Annex A7). In this regard, the recent drop in scores appears to be particularly pronounced in the last two PISA cycles (2018 and 2022) rather than indicating a continuous decline over the entire period from 2009 to 2022. This suggests that the decline is a more recent phenomenon, potentially linked to broader social and educational disruptions, including the COVID-19 pandemic. Bulgaria, Cyprus, and Romania are the countries that achieved the lowest scores in 2022, while Northern European countries had the highest scores. The top positions in the three rankings are occupied by Estonia, Canada, and Finland for science; Estonia, Canada, and the Netherlands for mathematics; and Ireland, Canada, and the United States for reading.

*Table 3: Standardised test scores in PISA from 2009 to 2022 in mathematics, reading, and science*

| | | math | | | | | reading | | | | | science | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Country | 2009 | 2012 | 2015 | 2018 | 2022 | 2009 | 2012 | 2015 | 2018 | 2022 | 2009 | 2012 | 2015 | 2018 | 2022 |
| Western Europe | Ireland | 487 | 501 | 504 | 500 | 492 | 496 | 523 | 521 | 518 | 516 | 508 | 522 | 503 | 496 | 504 |
| Northern America | Canada | 527 | 518 | 516 | 512 | 497 | 524 | 523 | 527 | 520 | 507 | 529 | 525 | 528 | 518 | 515 |
| Northern America | United States | 487 | 481 | 470 | 478 | 465 | 500 | 498 | 497 | 505 | 504 | 502 | 497 | 496 | 502 | 499 |
| Oceania | New Zealand | 519 | 500 | 495 | 494 | 479 | 521 | 512 | 509 | 506 | 501 | 532 | 516 | 513 | 508 | 504 |
| Oceania | Australia | 514 | 504 | 494 | 491 | 487 | 515 | 512 | 503 | 503 | 498 | 527 | 521 | 510 | 503 | 507 |
| Western Europe | United Kingdom | 492 | 494 | 492 | 502 | 489 | 494 | 499 | 498 | 504 | 494 | 514 | 514 | 509 | 505 | 500 |
| Central and Eastern Europe | Estonia | 512 | 521 | 520 | 523 | 510 | 501 | 516 | 519 | 523 | 490 | 528 | 541 | 534 | 530 | 526 |
| Northern Europe | Finland | 541 | 519 | 511 | 507 | 484 | 536 | 524 | 526 | 520 | 490 | 554 | 545 | 531 | 522 | 511 |
| Central and Eastern Europe | Poland | 495 | 518 | 504 | 516 | 489 | 500 | 518 | 506 | 512 | 489 | 508 | 526 | 501 | 511 | 499 |
| Northern Europe | Denmark | 503 | 500 | 511 | 509 | 489 | 495 | 496 | 500 | 501 | 489 | 499 | 498 | 502 | 493 | 494 |
| Central and Eastern Europe | Czech Republic | 493 | 499 | 492 | 499 | 487 | 478 | 493 | 487 | 490 | 489 | 500 | 508 | 493 | 497 | 498 |
| Northern Europe | Sweden | 494 | 478 | 494 | 502 | 482 | 497 | 483 | 500 | 506 | 487 | 495 | 485 | 493 | 499 | 494 |
| Southern Europe | Italy | 483 | 485 | 490 | 487 | 471 | 486 | 490 | 485 | 476 | 482 | 489 | 494 | 481 | 468 | 477 |
| Western Europe | Austria | 496 | 506 | 497 | 499 | 487 | 470 | 490 | 485 | 484 | 480 | 494 | 506 | 495 | 490 | 491 |
| Western Europe | Germany | 513 | 514 | 506 | 500 | 475 | 497 | 508 | 509 | 498 | 480 | 520 | 524 | 509 | 503 | 492 |
| Western Europe | Belgium | 515 | 515 | 507 | 508 | 489 | 506 | 509 | 499 | 493 | 479 | 507 | 505 | 502 | 499 | 491 |
| Southern Europe | Portugal | 487 | 487 | 492 | 492 | 472 | 489 | 488 | 498 | 492 | 477 | 493 | 489 | 501 | 492 | 484 |
| Northern Europe | Norway | 498 | 489 | 502 | 501 | 468 | 503 | 504 | 513 | 499 | 477 | 500 | 495 | 498 | 490 | 478 |
| Central and Eastern Europe | Latvia | 482 | 491 | 482 | 496 | 483 | 484 | 489 | 488 | 479 | 475 | 494 | 502 | 490 | 487 | 494 |
| Central and Eastern Europe | Croatia | 460 | 471 | 464 | 464 | 463 | 476 | 485 | 487 | 479 | 475 | 486 | 491 | 475 | 472 | 483 |
| Western Europe | France | 497 | 495 | 493 | 495 | 474 | 496 | 505 | 499 | 493 | 474 | 498 | 499 | 495 | 493 | 487 |
| Southern Europe | Spain | 483 | 484 | 486 | 481 | 473 | 481 | 488 | 496 | | 474 | 488 | 496 | 493 | 483 | 485 |
| Central and Eastern Europe | Hungary | 490 | 477 | 477 | 481 | 473 | 494 | 488 | 470 | 476 | 473 | 503 | 494 | 477 | 481 | 486 |
| Central and Eastern Europe | Lithuania | 477 | 479 | 478 | 481 | 475 | 468 | 477 | 472 | 476 | 472 | 491 | 496 | 475 | 482 | 484 |
| Central and Eastern Europe | Slovenia | 501 | 501 | 510 | 509 | 485 | 483 | 481 | 505 | 495 | 469 | 512 | 514 | 513 | 507 | 500 |
| Western Europe | Netherlands | 526 | 523 | 512 | 519 | 493 | 508 | 511 | 503 | 485 | 459 | 522 | 522 | 509 | 503 | 488 |
| Central and Eastern Europe | Slovak Republic | 497 | 482 | 475 | 486 | 464 | 477 | 463 | 453 | 458 | 447 | 490 | 471 | 461 | 464 | 462 |
| Southern Europe | Malta | 463 | | 479 | 472 | 466 | 442 | | 447 | 448 | 445 | 461 | | 465 | 457 | 466 |
| Southern Europe | Greece | 466 | 453 | 454 | 451 | 430 | 483 | 477 | 467 | 457 | 438 | 470 | 467 | 455 | 452 | 441 |
| Central and Eastern Europe | Romania | 427 | 445 | 444 | 430 | 428 | 424 | 438 | 434 | 428 | 428 | 428 | 439 | 435 | 426 | 428 |
| Central and Eastern Europe | Bulgaria | 428 | 439 | 441 | 436 | 417 | 429 | 436 | 432 | 420 | 404 | 439 | 446 | 446 | 424 | 421 |
| Southern Europe | Cyprus | | | 437 | 451 | 418 | | 449 | 443 | 424 | 381 | | 438 | 433 | 439 | 411 |
| Western Europe | Luxembourg | 489 | 490 | 486 | 483 | | 472 | 488 | 481 | 470 | | 484 | 491 | 483 | 477 | |

The second data elaboration using PISA scores is reported in Figures 5a, 5b, and 5c, one for each subject of assessment. The analysis shows the average score in the four PISA waves, together with the percentage change from 2009 to 2022.

The Netherlands presents a clear example of declining student scores across all three subjects. In mathematics, although still among the top performers in 2022, the Netherlands has experienced a downward trend over time, with an overall score reduction of 6.24% between 2009 and 2022. In reading, it faced the largest decline among the OECD, with a reduction of 9.72% – almost 50 points between 2009 and 2022. In science as well, the Dutch students recorded a decrease of 6.55%. These trends are coherent with the patterns observed in many other countries. Focusing on mathematics, only a few countries show an increase from 2009 to 2022 with Ireland, Malta, Croatia, Latvia, and Romania improving their scores by 1.0%, 0.67%, 0.67%, 0.22%, and 0.22%, respectively. On the contrary, the most substantial declines are recorded in Finland (−10.45%), New Zealand (−7.76%), and Greece (−7.74%). Despite this, Finland still scores above the OECD average. Turning to reading scores, the Dutch system is followed by Greece (−9.27%) and Finland (−8.56%), while Ireland (+4.11%), Austria (+2.07%), and the Czech Republic (+2.26%) stand out for their improvements. Ireland has consistently maintained scores above 500, reinforcing its strong position in reading performance. Finally, regarding science, Malta and Latvia show slight improvements, with score increases of 1.01% and 0.02%, respectively. However, the overall trend remains negative, as most countries experienced a decline in science performance. Finland (−7.77%), the Netherlands (−6.55%), and the Slovak Republic (−5.77%) recorded the largest decreases.

*Figure 5a: PISA mathematics scores from 2009 to 2022 – absolute mean and percentage increase*

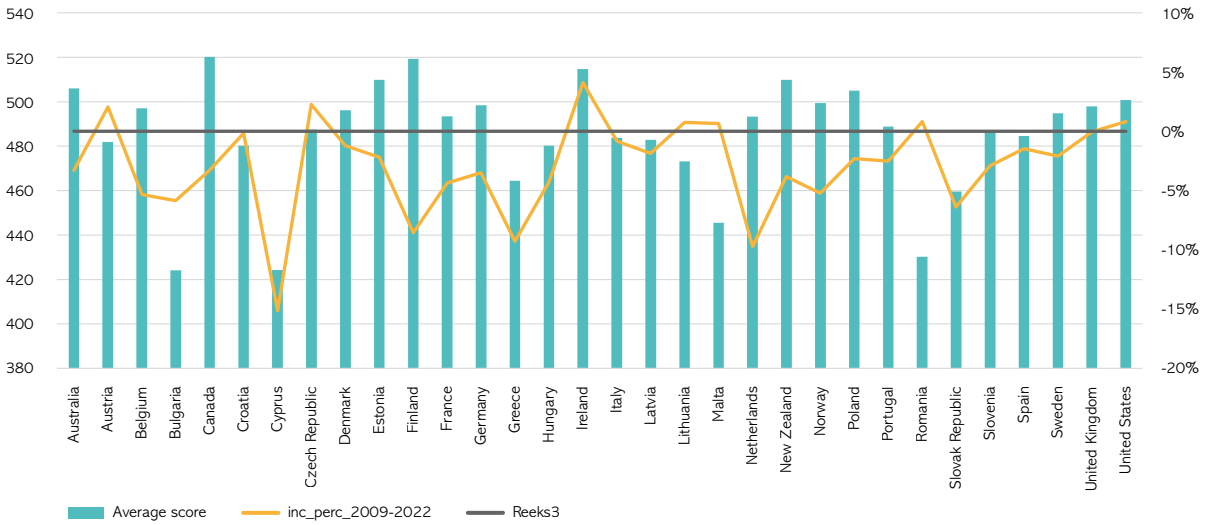



*Figure 5b: PISA reading scores from 2009 to 2022 – absolute mean and percentage increase*

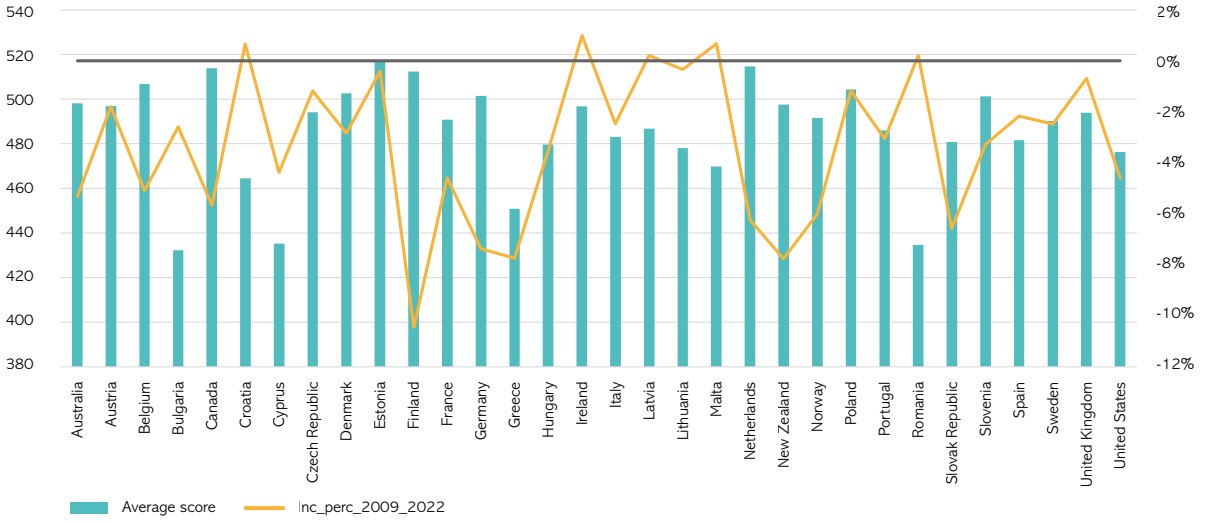
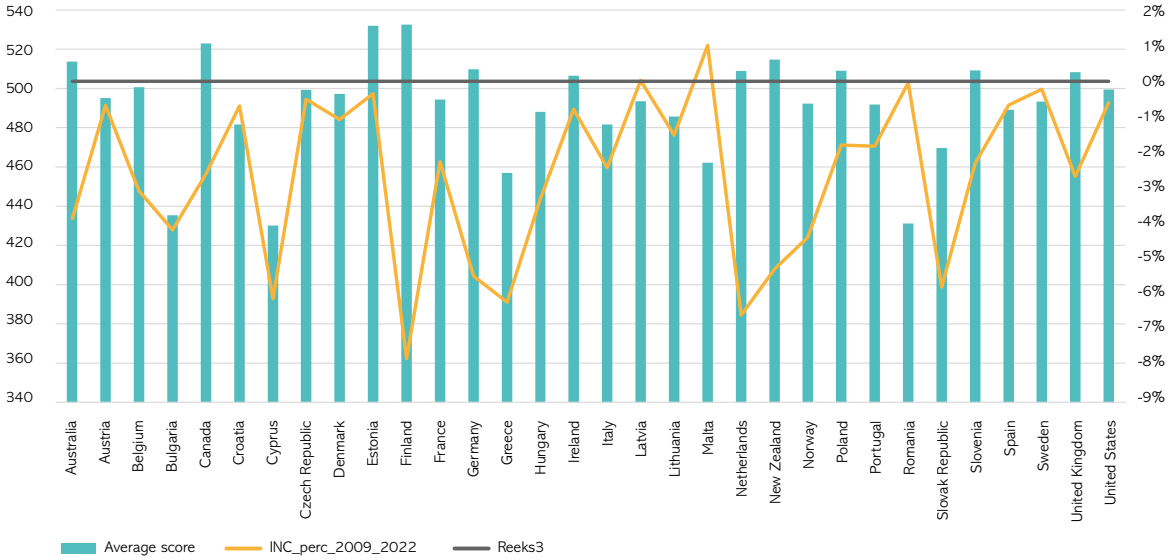



*Figure 5c: PISA science scores from 2009 to 2022 – absolute mean and percentage increase*



#### 4.2.3.2. ICCS indicators of civic knowledge, value beliefs, and attitudes

The general cognitive skills obtained through studying the traditional subjects discussed above enable people to find jobs and become active citizens. However, active citizenship shows different dimensions, beyond their academic performance achievement. In this view, the International Civic and Citizenship Education Study (ICCS) investigated how young people are prepared to undertake their roles as citizens in several countries in the second decade of the twenty-first century. The assessments, taking place in 2011, 2016, and 2022, cover students' knowledge and understanding of civic and citizenship, together with their value beliefs, attitudes, and activities. The 2016 and the 2022 assessments are a continuation of the one from 2009, showing the comparison of the three waves and giving an idea about how education systems evolved in shaping students' civic attitudes and values. ICCS targeted 8th grade students (enrolled in lower secondary school), involving 2,800 schools across 24 countries in its latest cycle. While 21 countries participated in 2009 and 13 in 2016, the ICCS 2022 edition expanded the number of participating countries to 19. To give the reader an overview, ICCS aims at investigating four spheres of civic and citizenship participation:

1. Students' knowledge and understanding of civics and citizenship and the factors associated with variations in this civic knowledge;
2. Students' current and expected future involvement in civic-related activities, their perceptions of their capacity to engage in these activities, and their perceptions of the value of civic engagement;
3. Students' beliefs about contemporary civil and civic issues in society, including those concerned with civic institutions, rules, and social principles (democracy, citizenship, and diversity), as well as their perceptions of their communities and threats to the world's future;
4. The ways in which countries organise civic and citizenship education, with a particular focus on general approaches, the curriculum and its delivery, and the processes used to facilitate future citizens' civic engagement and interaction within and across communities.

In this chapter, a selection of ICCS variables is used as outcome indicators: the civic knowledge measure (i), measures of attitudes towards equal gender rights (ii), and attitudes towards equal rights for ethnic groups (iii).

The ICCS civic knowledge reporting scale represents students' knowledge and understanding of concepts and issues related to civics and citizenship. The items measure different aspects of citizenship and society, including students' understanding of civic and political institutions, the functioning of government systems, and citizens' rights, as well as their ability to apply knowledge to concrete situations. The scale is standardised with an average score of 500 and a standard deviation of 100, allowing for international and temporal comparisons.

The indicator about attitudes towards gender rights, instead, is the mean of answers to the following statements student need to evaluate on a Likert scale: "Men and women should have equal opportunities to take part in government"; "Men and women should have the same rights in every way"; "Women should stay out of politics"; "When there are not many jobs available, men should have more right to a job than women"; "Men and women should get equal pay when they are doing the same jobs"; "Men are better qualified to be political leaders than women".

The indicator about beliefs towards equal rights for ethnic groups is calculated with the same procedure. The sentence to be evaluated by students are the following: "All ethnic groups should have an equal chance to get good jobs in [country name]"; "schools should teach students to respect members of all ethnic groups"; "members of all ethnic groups should be encouraged to run in elections for political office"; "all ethnic groups should have an equal chance to get a good education in [country]" (92%); and "members of all ethnic groups should have the same rights and responsibilities".
The main results from the 2022 assessment (Table 4) can be summarised as follows. The Netherlands shows a moderate score in civic knowledge (508), below countries such as Spain (510), France (508), and Italy (523), but still close to the average. In terms of attitudes, it shows better results in support for gender equality, with a score of 52, while the score for ethnic equality is lower, at 49, suggesting potential differences in perceptions of equality among demographic groups.
The highest scores in civic knowledge are shown by Sweden and Poland, with scores of 565 and 554 respectively, while the lowest are observed in Bulgaria (456) and Colombia (452). Malta, despite ranking lower in civic knowledge (490), exhibited one of the highest scores in attitudes towards gender and ethnic equality, scoring 54 and 52 respectively. Finally, although Estonia scores high in civic knowledge (545), it shows relatively lower support for equal rights, with both gender and ethnic equality scores at 51.

*Table 4: Performance in the ICCS test in 2022*

| Region | Country | | Country | Civic Knowledge Score | Gender Equality Score | Ethnic Equality Score |
|---|---|---|---|---|---|---|
| Central and Eastern Europe | Croatia | | Chinese Taipei | 583 | 58 | 58 |
| Central and Eastern Europe | Poland (*) | | Sweden | 565 | 56 | 57 |
| Central and Eastern Europe | Slovak Republic (*) | | Poland | 554 | 51 | 50 |
| Central and Eastern Europe | Slovenia | | Estonia | 545 | 51 | 51 |
| Central and Eastern Europe | Bulgaria | | Croatia | 531 | 54 | 52 |
| Central and Eastern Europe | Lithuania | | Norway | 529 | 52 | 56 |
| Central and Eastern Europe | Estonia | | Slovak Republic | 501 | 49 | 49 |
| Central and Eastern Europe | Latvia | | Netherlands | 508 | 52 | 49 |
| Northern Europe | Finland | | Lithuania | 509 | 49 | 54 |
| Northern Europe | Sweden | | Slovenia | 504 | 50 | 50 |
| Northern Europe | Norway | | Spain | 510 | 55 | 52 |
| Northern Europe | Denmark | | France | 508 | 56 | 54 |
| Oceania | New Zealand (*) | | Italy | 523 | 56 | 54 |
| Southern Europe | Italy | | Latvia | 490 | 48 | 48 |
| Southern Europe | Malta | | Cyprus | 459 | 51 | 50 |
| Southern Europe | Cyprus (*) | | Romania | | 50 | 52 |
| Southern Europe | Greece (*) | | Serbia | | 47 | |
| Southern Europe | Spain (*) | | Malta | 490 | 54 | 52 |
| Western Europe | Belgium (Flanders) | | Colombia | 452 | 48 | 51 |
| Western Europe | Netherlands | | Bulgaria | 456 | 46 | 49 |
| Western Europe | Austria (*) | | ICCS 2022 average | | 52 | 52 |
| Western Europe | Ireland (*) | | | | | |
| Western Europe | Luxembourg (*) | | | | | |

#### 4.2.3.3. Socio-emotional learning

In recent years, in addition to traditional test scores and civic engagement, increasing attention has been given to social emotional learning (SEL) as a core outcome of education systems. SEL refers to the set of processes through which individuals acquire skills to understand and manage emotions, set and achieve goals, feel and show empathy, establish positive relationships, and make responsible decisions[5]. These competencies are now considered foundational to academic success. A growing body of research has shown that SEL is associated not only with improvements in emotional and interpersonal skills, but also to higher academic performance and reduced behavioural problems (Taylor et al., 2017).

Despite growing interest, internationally comparable indicators to directly assess social SEL outcomes are still lacking. However, PISA 2022 provides several indirect metrics that can shed light on students' emotional and social development. One such metric is students' reported well-being, which is closely associated with SEL in the literature, as emotional regulation and self-awareness are key components of both constructs. In the Netherlands, for example, students report relatively high levels of subjective well-being, with an average score of 7.29 compared to the OECD average of 6.75 (on a scale from 0 to 10). Moreover, the proportion of students reporting low life satisfaction (below 4) is very small. The social climate in Dutch schools also appears favourable. The index of sense of belonging (with an average of 0 and a standard deviation of 1 across OECD countries) stands at 0.10 in the Netherlands, compared to the OECD average of −0.02.

Although comparable indicators are still limited, it is important to be aware that SEL is likely to become central in the future as one of the key dimensions of the education system.

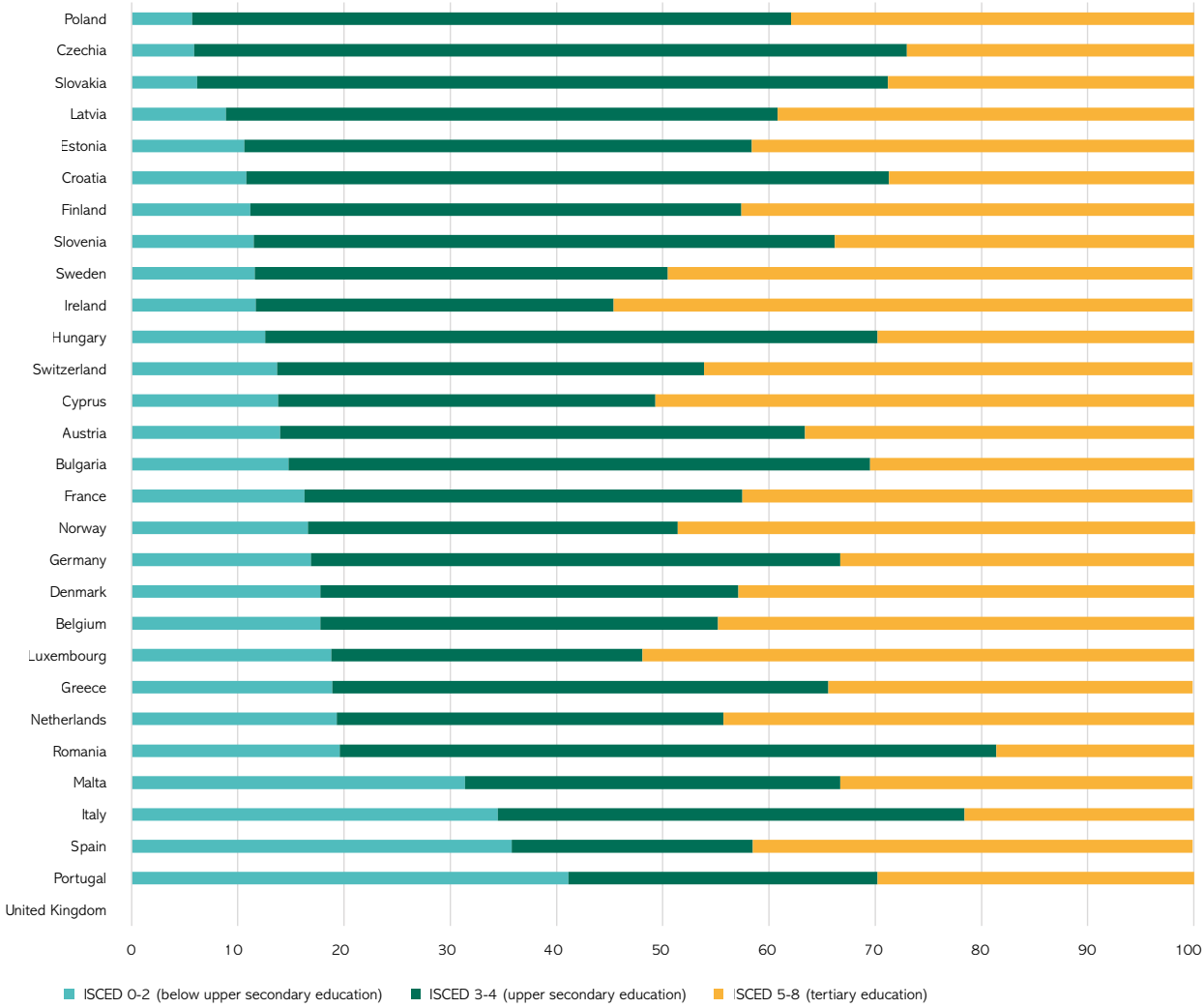
#### 4.2.3.4. Educational attainment

Another outcome indicator measures the highest level of education completed by the 25–64-year-old population. In Figure 6, the attainment levels are divided into below upper secondary, upper secondary, and tertiary education in 2023 (the latest available data). The idea behind this representation is to give an overview of the composition of educational completion among countries.

[5] See Fundamentals of SEL - CASEL.

The Netherlands is aligned with the average, with 19% of the population with below upper secondary education, 36% with upper secondary education, and 44% with tertiary education. Countries belonging to the Eastern and Central Europe, such as Lithuania, the Czech Republic, Poland, and the Slovak Republic show the lowest rate of primary educational attainment, while the highest are registered in Portugal (41%), Spain (36%), Italy (34.5%), and Malta (31%). When considering tertiary education attainment, Italy is among the last positions, with only 21% of the adult population with a degree. At the top of this ranking, Ireland (55%) and Luxembourg (52%) show the highest percentage of graduates among 25–64 year-olds.
Among the countries with the lowest share of 25–64 year-old population with tertiary education, Italy presents a sizeable share of the 25–64-year-old population with an educational attainment below upper secondary education (44%). In general, almost all countries display a higher share of the 25–64-year-old population with upper secondary education than below upper secondary education, with few remarkable exceptions –Spain (35% vs 23%) and Portugal (41% vs 29%).

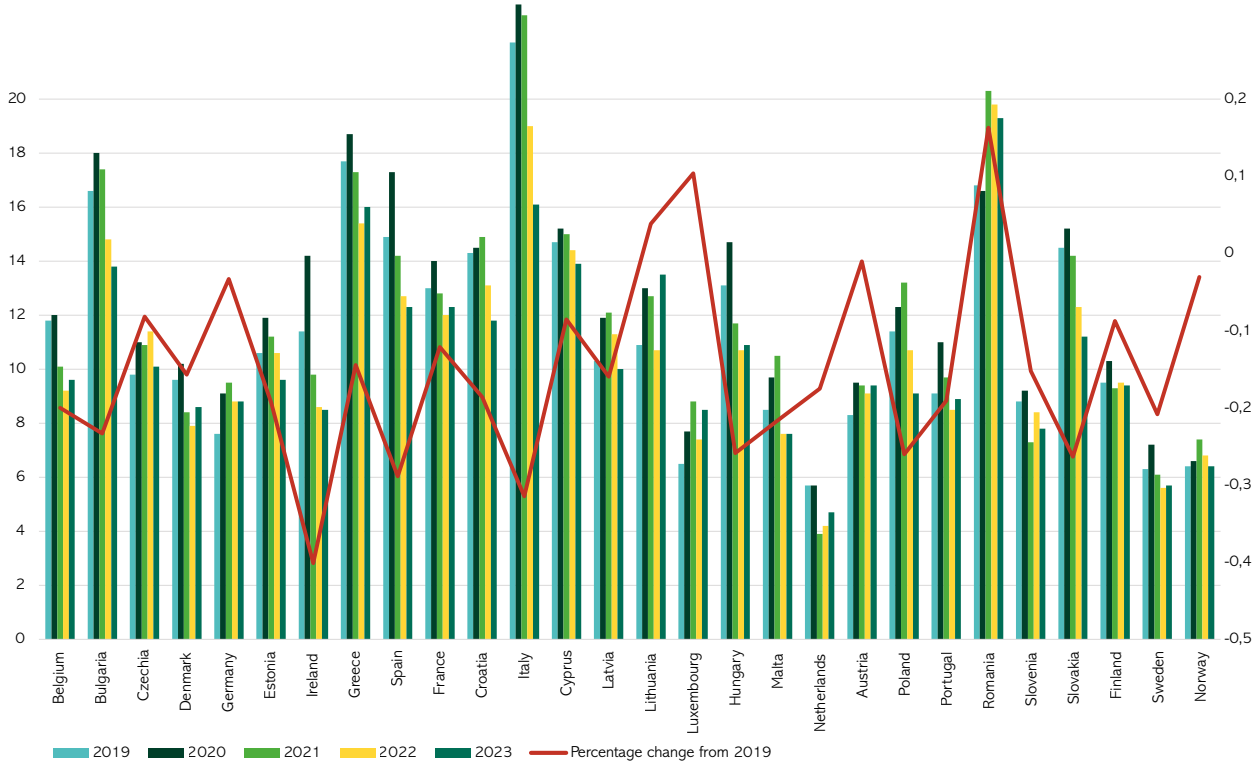
*Figure 6: 25–64 years old population by educational attainment level in 2023*




Another important indicator related to the educational system is the share of young people aged 15–29 in the EU who are NEET. Reducing this rate is one of the targets of the European Pillar of Social Rights; the goal is to lower the rate to 9% in 2030. This measure provides insights into the effectiveness of education systems in preparing students for the labour market and ensuring their participation in economic and social life.
Figure 7 illustrates the evolution of NEET rates across European countries over the last four years. The data reveal significant disparities among countries, with the Netherlands (4.7%) and Sweden (5.7%) registering the lowest NEET rates in 2023. In contrast, Romania and Italy showed the highest at 19.3% and 16.1%. These results place the Netherlands well below the European Pillar of Social Rights target of reducing the NEET rate to 9% by 2030.

However, it should be noted that the Netherlands' NEET rates recorded a small increase in 2023, after reaching its lowest level in 2021 (3.9%), suggesting that continuous attention is needed to sustain long-term improvements. The EU average is approximately 10.5%, showing an overall decreasing trend compared to pre-pandemic levels. Between 2019 and 2020, most countries experienced an increase in NEET rates influenced by the impact of the COVID-19 pandemic, which disrupted labour markets and education systems. However, by 2021 and 2022, many countries saw a significant recovery. Italy, for instance, decreased its NEET rate from 23.5% in 2020 to 16.1% in 2023, while Spain followed a similar trend, reducing its rate from 17.3% in 2020 to 12.3% in 2023. On the other hand, Romania remains one of the countries with the highest NEET rates in Europe. Some countries that initially experienced an increase in NEET rates, such as Lithuania and Luxembourg, have not yet fully recovered to 2019 levels. However, the general trend in NEET rates is encouraging, with most countries decreasing the rates. The persistence of disparities underscores the need for continued efforts to support youth integration into education and employment.

*Figure 7: NEET rates among young people (aged 15–24), 2019–2023*




### 4.2.4. Conclusion

The cross-country benchmarking analysis presented in this section provides an overview of the Dutch education system within the broader international context. Overall, the Netherlands performs well on many structural and outcome indicators. Public investment in education has remained stable as a share of GDP, while per-student spending has increased across all educational levels, particularly at the secondary level. This reflects a combination of demographic trends and increased levels of funding. In terms of outcomes, the Netherlands shows high levels of enrolment and upper secondary graduation, as well as one of the lowest NEET rates in Europe, already outperforming the EU 2030 target. However, some areas deserve closer attention. PISA scores reveal a recent downward trend across all subjects, especially in reading, where the Netherlands experienced the largest decline among OECD countries. These mixed results confirm the value of international benchmarking exercises for identifying both strengths and challenges. While the Dutch education system benefits from a solid institutional structure and delivers strong average performance, it also faces emerging issues that are common to many advanced economies. The second part of this chapter therefore shifts the focus from descriptive benchmarking to policy analysis. It explores selected challenges that are particularly relevant in the Dutch context, such as teacher shortages, educational inequality, and declining performance in reading and mathematics test scores, and discusses the main literature results and evidence-based practices from other systems that may offer useful insights and inspiration for future policy development.

# 4.3. EVIDENCE-BASED SOLUTIONS FOR TEACHER SHORTAGES

### 4.3.1. Introduction

The availability of qualified teachers is a key pillar of an effective education system. Teachers are instrumental in shaping students' learning outcomes, fostering equity, and ensuring societal progress. In many countries, however, education systems face increasing difficulties in attracting and retaining teachers; the Netherlands is no exception. Recent evidence underscores that teacher shortages are not only widespread but also persistent and increasingly unequally distributed across regions, sectors, and disciplines (OCW, 2023).

The urgency of the issue is evident from current statistics: as of 2023, the Dutch education system reports a shortage of approximately 9,800 full-time equivalent (FTE) teachers in primary education and 3,800 FTE in secondary education (OCW, 2023). In the major urban areas – commonly referred to as the G5 (Amsterdam, Rotterdam, The Hague, Utrecht, and Almere) – shortages are even more pronounced. This urban–rural divide is mirrored by disparities in subject-specific shortages: chronic shortages persist in core subjects such as mathematics, physics, chemistry, computer science, Dutch, and several foreign languages.

These shortages are not solely a matter of numbers but of educational quality and equity. Teacher shortages contribute to a reliance on underqualified personnel, increased workloads for existing staff, and frequent disruptions due to unfilled positions or ad hoc replacements. In disadvantaged schools – often serving students from lower socio-economic backgrounds – these issues are particularly acute. As documented in recent Dutch research, such schools are more likely to experience high staff turnover and are less likely to retain experienced teachers, thereby exacerbating educational inequalities (OCW, 2023).
Although recent policy efforts have led to a closing of the wage gap between primary and secondary education teachers, and the average gross monthly salary has increased significantly (e.g. from €4,000 in 2017 to €5,800 in 2023 in primary education), these financial incentives have not sufficed to reverse broader trends in teacher supply (OCW, 2023). Structural factors continue to undermine the attractiveness of the teaching profession. These include limited career progression opportunities, perceived high workload, high rates of part-time employment (with only 30% of primary teachers working 0.9 FTE or more), and a relatively high proportion of older teachers approaching retirement age (21% of primary school teachers are over 55). Furthermore, while enrolments in teacher education (e.g. Pedagogische Academie Basisonderwijs – PABO) have stabilised in recent years, dropout rates and delays in transitions to full-time teaching roles remain a concern.

Projections for the future are not reassuring. According to long-term labour market forecasts, teacher shortages in the Netherlands are expected to persist throughout the coming decade. While a short-term dip in primary education shortages may occur due to demographic changes, a subsequent rise is projected due to increased student numbers and ongoing retirements (OCW, 2023). In secondary education, shortages are expected to remain stable or even increase slightly, especially in science, technology, engineering, and mathematics (STEM)-related subjects.

Addressing these challenges is not straightforward. The dynamics of teacher shortages are shaped by a complex interplay of supply and demand factors including demographic trends, labour market competition, policy decisions, and societal perceptions of the profession. The Netherlands shares many of these challenges with other European countries, yet the severity of its regional and subject-specific shortages calls for targeted and evidence-based interventions.
This section aims to contribute to the policy debate by providing an overview of the situation in the Netherlands, benchmarking it against international best practices, and offering actionable insights based on a synthesis of recent literature. Drawing from both empirical evidence and comparative case studies, this section highlights strategies that can inform national and regional policies to better attract, retain, and support teachers in the Dutch context.

### 4.3.2. Best practice countries

While no system is entirely free of teacher shortages, some countries have lower levels of teacher vacancies.
This section highlights a few best practices and tries to identify why these countries avoided widespread shortages or significantly mitigated them, even under changing demographics.

#### 4.3.2.1 Finland

Finland maintains relatively high teacher qualification rates, yet the NLS (2023) report points to emerging teacher shortages, particularly in early childhood education (ECE). Stringent qualification requirements for ECE (bachelor's level training in pedagogy) have combined with increasing enrolments and policy reforms to heighten staff demand. Large cities, such as Helsinki, report shortfalls exceeding 40% for qualified ECE teachers in some districts (NLS, 2023). Under the Finnish Decree on qualification requirements (1998), a class teacher must hold a master's degree in primary education (Sahlberg, 2014). Municipalities and private schools typically advertise positions, with principals or heads of day care centres conducting interviews before a board formalises hiring. The NLS (2023) report confirms that only qualified teachers can receive permanent appointments in Finland; unqualified personnel can be recruited for no longer than a 12-month temporary period if no suitable applicants apply. Key factors and policy measures in Finland include first of all, the high-quality initial teacher education (ITE) programmes. Finland's high standards for teacher education historically helped stabilise supply. However, the NLS (2023) notes that ECE teacher education has been under-dimensioned for decades, resulting in a mismatch as ECE enrolment grows. Secondly, recent policy discussions revolve around increasing the annual intake of ECE teacher trainees and offering more permanent university funding lines (OECD, 2020). Despite continued competitiveness in teacher programmes overall, the NLS (2023) concludes that Finland must implement long-term workforce planning for ECE, strengthen teacher induction, and expand geographic incentives to ensure sustainable staffing.

#### 4.3.2.2 Singapore

Singapore consistently reports minimal teacher vacancy rates, with education authorities anticipating staffing needs years in advance (OECD, 2020). A key factor is the country's centralised workforce planning under the Ministry of Education, which tracks demographic and enrolment trends to align teacher supply with demand (Darling-Hammond et al., 2010). Furthermore, Singapore's well-defined career ladders (e.g. Master Teacher, Senior Specialist) offer clear progression paths. This system, combined with competitive salaries relative to other professions, signals that teaching can be a lifelong and rewarding career (EENEE-NESET, 2023). Schools also emphasise structured professional development and routine sharing of best practices, thus fostering a collaborative culture.

#### 4.3.2.3 Canada

Canada's overall teacher supply–demand balance has remained stable, though variations exist by province. Provinces such as Ontario have historically moderated teacher education enrolments based on labour forecasts, thus avoiding oversaturation in some areas and shortages in others. Many Canadian school boards also provide a comprehensive induction for newcomers. For instance, the New Teacher Induction Program in Ontario offers mentorship, additional training, and classroom feedback, lowering first-year attrition (Kutsyuruba et al., 2024). In tandem, compensation packages – especially in urban districts – remain competitive, preventing large-scale migration to other professions (EENEE-NESET, 2023).

#### 4.3.2.4 Denmark

Denmark has experienced persistent teacher shortages, particularly in public primary and lower secondary schools, where projections estimate a need for 13,000 additional teachers by 2030 (NLS, 2023). The shortage is even more pronounced in ECE, with a forecasted deficit of around 8,000 pedagogues by 2030 due to new child-to-adult ratio legislation. Danish law sets formal qualification requirements for teaching in public (*Folkeskole*) settings: a bachelor's in education (*folkeskolelærer*) or an approved equivalent. Municipalities oversee recruitment, but typically delegate final hiring to individual school heads (NLS, 2023). Private schools face no statutory requirement for teacher education, though most teachers employed there do hold recognised credentials. The Danish Union of Teachers (*Danmarks Lærerforening* – DLF) notes that raising salaries has become urgent especially for early childhood educators, who are among the lowest paid bachelor-level professionals in the public sector (NLS, 2023). Additional proposed measures include expanding *meritpædagog* (bridging programmes) for teaching assistants and unskilled staff, while improving mentorship for novices. To improve teacher supply, Denmark's Ministry of Children and Education aims to expand teacher education enrolment and strengthen induction programmes, especially in municipalities with acute shortages (NLS, 2023). The NLS (2023) also recommends re-recruiting the 28,000 qualified teachers currently not in teaching.

#### 4.3.2.5 Norway

Norway maintains relatively strict qualification requirements, and data indicate comparatively low percentages of unqualified teachers at the primary and secondary levels. Yet NLS (2023) emphasises that shortages persist in rural areas and in certain subjects, while ECE experiences an ongoing shortfall of qualified kindergarten teachers. Teacher qualifications are defined by the Norwegian Education Act and Kindergarten Act. Municipalities serve as employers, although the practical hiring authority typically resides with the heads of kindergartens or schools (NLS, 2023).

By law, an open application process is required, and only fully qualified teachers should receive permanent contracts. However, a temporary position can be offered if no fully qualified applicants emerge. Norway's teacher pay is relatively competitive, although cost of living and alternative career paths can deter potential candidates. Efforts to enhance teacher education – including more robust subject-specific training – and to retain older teachers beyond typical retirement ages are cited as key solutions (NLS, 2023). Despite the challenges, Norway's approach underscores the importance of tight qualification requirements, smaller class sizes, and supportive hiring practices. NLS (2023) concludes that bridging strategies, such as tuition-free or partially subsidised advanced training for unqualified staff, can reduce the reliance on temporary dispensations.

### 4.3.3. Evidence-based solutions and literature

Policymakers seeking to mitigate teacher shortages must address both attraction to the profession and retention of qualified teachers. The complexity of teacher shortages – encompassing demographic shifts, regional imbalances, and subject-specific gaps – demands a multilayered approach. This section synthesises interventions recommended in the EENEE-NESET report by De Witte et al. (2023), complemented by examples from across Europe and beyond, as well as the broader academic literature.

#### 4.3.3.1 Teacher-level interventions

**Salary and Financial Incentives**

Studies show higher teacher pay reduces turnover and boosts supply. Hendricks (2014) finds a 1% wage rise lowers turnover by 0.16 points, with the impact greatest for new teachers and fading after 19 years – so early-career rises are more cost-effective than across-the-board increases. Zarkin (1985) estimates a 20% salary increase would raise secondary-teacher supply 14% by drawing certified, inactive teachers back to classrooms. A discrete-choice experiment in England (Burge et al., 2021) suggests a 5% pay boost lifts retention at current schools by 5%. Overall, the literature confirms a positive wage–supply link but, despite these estimates, methodological limits and context-specific findings leave uncertainty about the cost-effectiveness of general increases; targeted financial incentives may yield better returns.

**Workload, Well-being, and Autonomy**

Excessive workload and burnout are key drivers of teacher attrition in countries across Europe (Carrizosa & De Witte, 2023). Multiple EU Member States have invested in teaching assistants to maintain the quality of education, and support teachers (e.g. Flanders, Bulgaria, Ireland, and Lithuania). English teachers would trade a 1% lighter workload for pay worth just 0.77% of salary (Burge et al., 2021). In theory, hiring an assistant who earns under 77% of a teacher's wage and can reliably take over routine tasks could boost job appeal more cheaply than a pay rise (De Witte et al., 2023). Yet Flemish student-teachers value four hours of weekly clerical help at only €83 a month – insufficient to cover an aide's cost (De Cort & De Witte, 2024), so the assistant model may not be economically justified everywhere. This measure has been associated with lower turnover and improved satisfaction. Autonomy can also be a major factor. Systems that grant teachers greater latitude in curriculum design, such as Finland, or in assessment choices, such as in parts of Sweden, report more robust teacher morale (OECD, 2020). Teachers who feel trusted to employ their professional judgment are likelier to remain in the profession, thus diminishing shortages (De Witte et al., 2024).

**Promotional Campaigns and Career Image**

Teacher shortages persist not merely due to poor job conditions but also because of perceptions of the profession. Media campaigns and outreach strategies, used notably in Portugal, rebranded teaching as an intellectually stimulating career path. Likewise, the Netherlands and France have tested marketing campaigns that emphasise societal impact, flexible work arrangements, and room for professional growth (EENEE-NESET, 2023). Although the measured long-term efficacy varies, initial increases in teacher education enrolments suggest that strategic communication about teaching can sway career choices among young graduates.

#### 4.3.3.2 School-level interventions

**School Leadership and Induction**

The role of principals and school leaders is pivotal in mitigating teacher shortages. Schools offering structured induction, mentoring support, and constructive performance feedback can substantially reduce first-year teacher attrition. Comprehensive induction programmes –particularly those pairing novice teachers with experienced mentors – are linked to improved teacher self-efficacy, job satisfaction, and retention rates (De Witte et al., 2023).
In addition, school leaders who foster collaborative cultures – encouraging peer observation, joint lesson planning, and professional learning communities – tend to see higher levels of teacher engagement (Bryant et al., 2023).

For instance, Ireland's Droichead programme (initial teacher induction) supports teacher development through mentorship and peer collaboration, substantially lowering dropout within the first three years of teaching (Teachers' Union of Ireland, 2022). Australian evidence (Burke et al., 2015) shows that would-be leavers value practical, day-to-day supports – shared resources, joint planning, co-teaching, and after-hours advice on discipline – whereas stayers value expert mentoring through lesson observation and reflective dialogue with veteran colleagues.

**Autonomy in Hiring and Remuneration**

Granting schools autonomy over hiring processes and, in some cases, limited flexibility in compensation can streamline vacancy-filling and foster better matches between teachers and local institutional goals (EENEE-NESET, 2023). While national pay scales remain standard in most European systems, local or regional top-ups are being piloted in certain Spanish autonomous communities, targeting rural schools with significant difficulties in attracting permanent staff (Eurydice, 2021).

**Professional Development and Learning Communities**

When professional development (PD) directly aligns with curriculum needs or local challenges, it can significantly boost teacher motivation. Continuing Professional Development (CPD) frameworks in Singapore and certain Canadian provinces offer iterative, job-embedded training, which improves classroom practice and cultivates a sense of professional mastery (OECD, 2020; EENEE-NESET, 2023). In many participating schools, professional learning communities promote peer-to-peer support, encourage reflective practice, and ultimately enhance teacher retention (Borman & Dowling, 2008). Moreover, PD can also create internal specialist roles (e.g. technology lead, literacy coach) that enable career advancement without leaving the classroom. In the UK, PD often leads to internal specialist roles – such as technology leads or literacy coaches – that allow teachers to advance without leaving the classroom. These vertical and lateral career pathways have been linked to improved retention (EENEE-NESET, 2023).

#### 4.3.3.3 System-level interventions

**Diversification of Career Structures**

Moving beyond individual schools, multiple European education systems are experimenting with diversified career frameworks. A well-known example is Singapore's three-track model, which includes a teaching track, a leadership track, and a specialist track. Such structures acknowledge the different strengths of teachers – some excel in classroom instruction, some in administrative leadership, and others in specialised research or pedagogical development. By recognising varied career ambitions, education systems can keep talented professionals within the profession instead of funnelling them all into one promotion pipeline (Kwek et al., 2023).

Several Eastern European countries (e.g. Estonia and Latvia) have introduced new teacher qualification frameworks to establish clearer stages of professional progression, from novice to senior mentor. Early data suggest that teachers who see a longer-term trajectory in their work are more likely to remain (Eurydice, 2021). For example, Estonia's Teacher Career Path model clearly delineates competencies expected at different career stages, linking them to both salary increments and leadership opportunities (EENEE-NESET, 2023).

**Strengthening ITE**

Evidence from diverse contexts, including the Netherlands, Poland, and Ireland, shows that teacher shortages often arise when ITE programmes do not align with contemporary classroom demands. This suggests that policymakers should bolster teacher education programmes in shortage areas – for instance, by offering scholarships to prospective mathematics or special needs teachers, and ensuring practicum components reflect real-world conditions (Gambi & De Witte, 2023). Collaborations between universities and school networks can facilitate practice-based training, such as the PD schools model in the United States or the dual training approach in Austria. These models integrate theory with intensive field experiences, thus better preparing candidates for the realities of teaching (EENEE-NESET, 2023). Research also suggests that robust mentoring during student teaching placements plays a substantial role in reducing early-career attrition (Borman & Dowling, 2008).

**Alternative Entry Routes and Return Pathways**

Teacher shortages can also be alleviated by supporting mid-career transitions and re-entry for those who have left the profession. In the United Kingdom's "Troops to Teachers" initiative, veterans receive structured pathways into teaching, bringing valuable real-world experience, particularly in STEM disciplines (EENEE-NESET, 2023). Likewise, in France, bridging programmes allow high-skilled professionals from technology or finance sectors to obtain teaching credentials more rapidly, encouraging career-switchers to fill persistent vacancies. Additionally, "return to teaching" campaigns – implemented in Germany – provide refresher courses and financial incentives for former educators to

re-enter the workforce (Martens, 2020). By simplifying administrative rehiring procedures and offering short induction updates, some regions have successfully tapped into this underutilised reservoir of experienced teachers.

**Technology-Enhanced Learning**

Finally, while digital solutions are by no means a substitute for qualified teachers, technology can complement the teacher workforce. Online and blended learning models have potential to mitigate shortages – particularly in rural or remote areas, where schools struggle to hire specialists in specific subjects. For instance, Jimenez & De Witte (2025) tested the effectiveness of an AI augmented learning path. They developed an autonomous AI tool that provided elaborated and personalised feedback to students. They observed that the AI tool improved the efficiency of education, and could mitigate the impact of teacher shortages. However, technology alone cannot rectify systemic vacancies; it must be coupled with pedagogical support, robust infrastructure, and teacher training in digital methodologies (OECD, 2020).

#### 4.3.3.4 Concluding remarks on evidence-based strategies

Teacher shortages derive from a variety of factors – ranging from demographic pressures to negative perceptions about teaching (EENEE-NESET, 2023). Policies focusing exclusively on a single dimension (such as pay) are often insufficient in isolation. Instead, coherent policy packages that combine teacher-level, school-level, and system-level interventions consistently yield better results over the long term (Borman & Dowling, 2008; Carrizosa & De Witte, 2023).

Central to success is the recognition that effective solutions must be both locally adapted and coordinated across multiple governance levels. For instance, introducing school autonomy over hiring will be ineffective without national frameworks that ensure competitive salaries or capacity-building for principals (Falch, 2011). Conversely, boosting teacher education enrolments will ring hollow if newly prepared teachers leave within a few years due to high workload or inadequate mentoring support.

By integrating evidence-based insights – such as structured induction, targeted financial incentives, career ladder diversification, and alignment between training institutions and schools – policymakers can move towards more stable, better-equipped, and more equitable teacher workforces. The goal is twofold: to ensure a sufficient quantity of qualified educators to meet rising demands, and to elevate the quality and prestige of teaching so that it remains an attractive, sustainable career choice.

### 4.3.4. Conclusion

Teacher shortages in the Netherlands represent a pressing and multifaceted challenge. Current data show not only a lack of qualified teachers – especially in large urban areas and specific subject domains – but also persistent imbalances in the distribution of existing staff. Low enrolments in teacher education, high rates of attrition, and an ageing workforce contribute to these shortages, putting pressure on already overstretched schools.

Key lessons derived from both national and international research highlight that improving teacher recruitment and retention requires a multilevel approach. Tackling the teacher shortages and their impact requires more than isolated interventions. It is the strategic alignment of interventions – targeting individual teachers, entire schools, and the education system – that delivers impact. Competitive salaries and targeted financial incentives can attract new entrants, but must be coupled with lower workloads, collaborative school environments, and robust PD to ensure teachers remain committed. Evidence suggests that promoting teacher autonomy, providing effective mentoring, and offering clear career pathways reduces turnover and stabilises workforce needs.

Moving forward, the Netherlands can benefit from deepening partnerships between universities and schools to ensure better alignment between teacher training and labour market needs. Equally important is continued support for alternative entry routes, along with innovative programmes to retain experienced teachers. Tackling these shortages in a systematic and evidence-based manner will be key to sustaining high-quality education and equitable outcomes for Dutch students.

# 4.4. EVIDENCE-BASED SOLUTIONS FOR REDUCING EDUCATIONAL INEQUALITY

### 4.4.1. Introduction

Equity is a core value and guiding principle in education policy, rooted in the idea that all individuals should have equal opportunities to reach their full potential regardless of their background (D'Inverno et al., 2025; De Witte et al., 2017). Over the twentieth century, as school enrolment increased, access to education expanded to previously excluded groups (De Witte & Tomini, 2017). Yet, disparities in educational achievement and learning outcomes, particularly along socio-economic lines, persist into the twenty-first century (OECD, 2023b). Although access to pre-primary and higher education has grown, gaps tied to gender, immigration status, location, disability, and other background factors have become more visible (Cherchye et al., 2010).

In the Netherlands, equity in education is defined by the belief that children with equal talent deserve equal opportunities and that a child's educational path should not be influenced by their family's background, economic situation, or special educational needs. This principle aligns with Article 1 of the Dutch Constitution, which prohibits discrimination in all forms (OECD, 2023a). Despite strong overall performance, the Dutch education system continues to struggle with inequalities, particularly for students from lower socio-economic backgrounds and those with a migrant background. Language barriers, socio-economic, and ethnic backgrounds along with the segregation exacerbated by the pandemic crisis constitute major threats to equity if not properly dealt with (OECD, 2020b).

Performance differences between immigrant and non-immigrant students in the Netherlands are largely linked to socio-economic factors and the language spoken at home. Only once these are accounted for, the performance gap in subjects such as mathematics and reading becomes statistically insignificant. The Netherlands remains one of the countries with a large initial gap between immigrant and non-immigrant students, partly explained by a higher share of disadvantaged students among the immigrant population (OECD, 2023b).

As of 2024, nearly 28% of the Dutch population has a migration background, either having been born abroad or having at least one parent who was. Recent increases are driven by arrivals from Ukraine and Syria, as well as continued migration from countries such as Turkey, Morocco, Suriname, and the Dutch Caribbean (Centraal Bureau voor de Statistiek, 2024). These demographic shifts have added pressure to the education system, especially in accommodating newcomers (Inspectie van het Onderwijs, 2024). Education policy in the Netherlands emphasises rapid acquisition of the Dutch language for newcomers. Since 2004, government funding for instruction in immigrant languages such as Turkish and Arabic has been withdrawn. Although cultural diversity is acknowledged in curriculum content, there is limited recognition of the educational value of students' mother tongues. Dutch remains the sole language of instruction, and the integration strategy continues to centre around language proficiency as a primary means of inclusion (Bilgili, 2019).

Schools face challenges, particularly at the secondary level, with many newcomers repeating grades, scoring lower on national assessments, and being disproportionately placed in the lowest educational tracks, which often limit their future educational opportunities (Bilgili, 2019). To this extent, early tracking in the education system represents another structural factor contributing to inequality and to the concentration of advantaged and disadvantaged students in different schools, limiting social interaction across groups and peer effects. In this context, reforms such as flexible pathways, de-stigmatisation of vocational tracks and equitable resource allocation across educational programmes may help mitigate the downsides of early tracking (OECD, 2023b).

Overall, while the Dutch education system performs well in many areas, targeted policies are needed to reduce inequalities and better support disadvantaged students (Inspectie van het Onderwijs, 2024). This section aims to contribute to the policy debate by providing an overview of the situation in the Netherlands, benchmarking it against international best practices, and offering actionable insights based on a synthesis of recent literature. Drawing from both empirical evidence and comparative case studies, the section highlights strategies that can inform national and regional policies to reduce educational inequality in the Dutch context.

### 4.4.2. Best practice countries

#### 4.4.2.1 Estonia

Estonia's education system is structured to provide all students with equal opportunities, regardless of their socio-economic status (D'Inverno et al., 2025). Notably, the country offers universal free school lunches and subsidised kindergarten, ensuring that children from disadvantaged backgrounds have access to essential educational resources from an early age. This approach has contributed to Estonia's high rankings in international assessments, such as PISA, by mitigating the impact of socio-economic disparities on educational outcomes[6]. To facilitate the integration of immigrants, Estonia launched the "Settle in Estonia" programme in 2015. This free and voluntary initiative provides newcomers with comprehensive support, including language courses, cultural orientation and information about public services, working, and studying[7]. Moreover, Estonia employs a comprehensive school system where students with varying abilities learn together, delaying division into vocational or upper secondary education until after basic education (OECD, 2023b).

Recognising the long-term benefits of early education, Estonia ensures that pre-primary education is accessible to the majority of children. In 2018, 95.1% of 15-year-olds confirmed participation in pre-primary education. This high participation rate positively impacts students' learning outcomes and is particularly beneficial for children from lower socio-economic backgrounds (OECD, 2020a). This is the result of a coherent and inclusive ECE system underpinned by strong national policies and sustained government investment. Since 2014, local governments have been legally required to provide preschool opportunities to all children aged 18 months to 7 years, including those with special educational needs, with the Estonian Lifelong Learning Strategy 2020 reinforcing the goal of at least one year of preschool education before school entry (OECD, 2020c). The system is predominantly public, ensuring equitable access across socio-economic groups, and remains affordable for families, with parental fees capped at 20% of the minimum wage, among the lowest in the OECD. High levels of public funding, supported by European structural funds, have expanded access and increased capacity, particularly in urban areas. Language support policies promote integration for non-Estonian speakers, and the overall approach emphasises children's well-being, and social and emotional development, reflecting a holistic vision of early education deeply embedded within Estonia's broader education framework. To address teacher shortages and ensure quality education, Estonia initiated specific teacher education programmes, such as Narva College – the only higher education institution in Estonia primarily focused on preparing teachers for Estonian schools where Russian is the language of instruction. This caters specifically for the needs of the Russian-speaking minority: the "Development of the Language Learning" programme supports Russian-speaking school teachers in studying Estonian with the help of language mentors to aid their PD. "Noored Kooli" (Young People to Schools) provides an alternative path to becoming a qualified teacher to reach more students (Donlevy et al., 2016).

#### 4.4.2.2 South Korea

South Korea has implemented several policies aimed at reducing educational inequality, particularly concerning students from low-income and immigrant backgrounds, often referred to as "multicultural students" (Lee et al., 2023). These students, as ethno-racial minorities with culturally distinct experiences and behaviours, bring diversity into the classroom. In response, government-led multicultural education has focused on addressing their perceived learning needs following the multiculturalist agenda of "embracing diversity" in schools. This includes programmes such as "Korean as a Second Language" and lessons aimed at promoting understanding of cultural differences.

Among different initiatives there is the "Education Welfare Priority Zone Program", that targets schools with a significant number of students from vulnerable social groups, including those from low-income families and multicultural backgrounds (Kim & Lee, 2020). The programme provides intensive support to enhance educational, cultural, and welfare services, aiming to bridge the educational gap.

Recognising the challenges faced by immigrant students, the government offers programmes such as "Rainbow Schools" to assist with language acquisition, cultural adaptation, and career development (Ghazarian, 2018). In February 2025, the South Korean government unveiled plans to improve education for students from multicultural families. The measures include expanding customised educational resources, enhancing teacher training, and introducing visa reforms to facilitate better integration and future employment opportunities for these students[8].

[6] https://www.theguardian.com/lifeandstyle/2024/mar/27/free-lunches-brain-breaks-and-happy-teachers-why-estonia-has-the-best-schools-in-europe
[7] https://www.settleinestonia.ee/programme
[8] https://www.koreatimes.co.kr/southkorea/society/20250211/south-korea-unveils-plans-to-enhance-education-for-students-from-multicultural-families

#### 4.4.2.3 Canada

Canada has introduced several policies to address educational inequality to improve access, support, and outcomes for all learners, especially for students from immigrant families and low-income backgrounds. Recognising the challenges faced by immigrant students, Canadian provinces have developed programmes to support English as an Additional Language (EAL) provision. For instance, in Alberta, immigrant parents have actively advocated for more equitable EAL policies, emphasising the need for inclusive practices that address linguistic barriers and promote social justice in education (Guo, 2021). Some provinces provide extra resources to schools in disadvantaged areas and focus on groups more likely to face exclusion, such as new immigrants, students from low-income families, indigenous youth, and students with special needs (UNESCO, 2020).

### 4.4.3. Evidence-based solutions and literature

This section synthesises the research on policy interventions aimed at fostering equal educational opportunity, particularly concerning school financing as discussed in De Witte et al. (2024), complemented by examples from across Europe and beyond, as well as the broader academic literature.

#### 4.4.3.1 School interventions

**Class-size Reduction**

While some believe smaller classes help learning, evidence is mixed. The STAR (student to teacher achievement ratio) experiment showed positive effects, but these are debated as some research found no extra benefit for disadvantaged students (Hoxby, 2000; Krueger & Whitmore, 2001; Nye et al., 2002; Ding & Lehrer, 2010). A Tennessee study showed a larger positive impact on black children (Shin, 2012). A Dutch study even found worse performance in smaller classes (Dobbelsteen et al., 2002). Overall, effects are usually small and not consistently proven and reducing class sizes is not seen as a very effective or efficient way to improve educational results (Mueller, 2013).

**Extra Funding for ICT – Materials**

Despite the assumption that better ICT helps, studies suggest little effect for investments in ICT to support disadvantaged students. A Dutch study found increased computer use but reduced test scores (Leuven et al., 2008). An Israeli lottery distributing computers also showed lower mathematics scores (Angrist & Lavy, 2002). A UK study found some positive effects in English and science, but not mathematics (Machin et al., 2007). The overall impact on traditional educational outcomes is unclear and costly.

**Extending Programmes**

Policies aim to improve skills by extending education length or teaching time. Extending compulsory education in Norway and Sweden reduced the impact of family background and increased equality (Aakvik et al., 2010; Palme & Meghir, 2005). In Norway the reform extended the compulsory years of schooling from seven to nine years. The school starting age stayed at 7, with the nine-year education structure split into two stages: the initial six years constituted primary education, followed by three years of lower secondary education designed to prepare students for entry into high school. Similarly, in Sweden the main elements of the reform were to increase the compulsory years to nine from seven or eight, to define a national curriculum and to abolish the tracking by ability.

However, increasing daily teaching time in the Netherlands showed no significant effect on test scores (Meyer & Van Klaveren, 2013). A study in southern Italy found extra instruction time in lower secondary school improved scores for the most disadvantaged, but overall effects were mainly due to the highest achievers (Battistin & Meroni, 2016). Simply extending programmes does not always yield expected results, but extending compulsory education seems to reduce inequality.

**Extra Funding for Staff in Schools Serving Disadvantaged Pupils**

Policies that aim to provide additional financial support to schools based on the proportion of disadvantaged students they serve represent a resource-driven approach intended to address inequalities in educational opportunities.

In Belgium, extra funding led to significant improvements only in spelling scores (Ooghe, 2011). A North Carolina study found positive effects on test scores, but the average improvement was not as high as for disadvantaged students (Henry et al., 2010). While these programmes might slightly improve overall outcomes, they are expensive and do not necessarily reduce inequality or lead to improved student outcomes if resources are not used effectively (D'Inverno et al., 2021; Badunenko et al., 2023).

#### 4.4.3.2 Teacher interventions

**Teachers' Working Conditions**

Across Europe, many teachers report feeling only somewhat prepared to work with students from diverse linguistic and cultural backgrounds. This highlights the need for better teacher training that focuses on addressing the needs of disadvantaged students as well as for newly arrived students. Key areas for development include intercultural education and building skills for linguistically responsive teaching (Koehler et al., 2022).

Policies aim to improve working conditions through additional funding for personnel in schools, particularly those serving minority students. However, a Dutch study found that additional funding to improve working conditions in schools with a high percentage of minority students did not significantly impact student achievement (Leuven et al., 2007). Research in New York City suggests that improving school safety, academic expectations, and teacher relationships can reduce teacher turnover, which in turn may increase student achievement (Kraft et al., 2016). Additionally, a study in Israel found that a 50% increase in the principal's salary led to improvements in students' grades (Lavy, 2008). However, the overall causal evidence on the effects of improved teaching rooms is limited.

**Teachers' Wages**

Increasing teachers' pay has been shown to reduce teacher turnover, particularly among inexperienced teachers (Hendricks, 2016). However, the direct causal link between teacher, pay, and student performance is challenging to establish, with studies showing mixed results (Hanushek, 2003). One approach to promote equity involves providing higher salaries in schools with many disadvantaged students to reduce turnover of experienced teachers.
A North Carolina programme offering bonuses to teachers in high-poverty or low-test-score schools reduced teacher turnover, especially among experienced teachers (Clotfelter et al., 2008). However, the effect of this bonus on student test scores was not measured. While higher wages in disadvantaged schools can increase equity by attracting and retaining more experienced (and thus more expensive) teachers, the impact on student outcomes needs further investigation.

**Teachers' Incentives**

Many policies aim to reward teachers who demonstrate the biggest impact on student achievement (value-added). Studies in India and Israel found that both individual and school-based incentives led to significant improvements in student performance (Lavy, 2008; Muralidharan & Sundararaman, 2011). Springer et al. (2016) showed that retention bonuses for effective teachers in disadvantaged schools had a significant positive effect on retention rates in Tennessee, while Steele et al. (2010) found that a California fellowship programme successfully attracted more teachers to low-performing schools with relatively low teacher turnover among participants. Teacher incentives can be more efficient than general wage increases by focusing on retaining and rewarding the most effective teachers in disadvantaged schools, thus potentially increasing equity. However, recent evidence from the Netherlands suggests that salary bonuses for teachers in disadvantaged schools had no significant effect on teacher retention or recruitment in the first year, possibly due to the late implementation and limited visibility of the policy (Visser et al., 2024).

**Group Incentives**

These programmes provide financial benefits to all or a subset of teachers in a school. Lavy (2002) found that in Israel, schools competing for bonuses based on year-to-year improvement in test scores showed significantly higher improvements than a control group. When comparing school-based and teacher-based incentives, the teacher-incentive programme was found to be more efficient in that context. However, Springer et al. (2012) showed that a Texas performance-pay programme for middle school teacher teams had no significant effects on teacher practices or student achievement. Overall, empirical evidence on the effects of group incentives is limited and unclear, requiring further research (Tirivayi et al., 2014).

#### 4.4.3.3 Student interventions

**Vouchers**

An alternative policy approach to support disadvantaged students involves providing additional resources directly to their families, often through school vouchers. These vouchers typically cover some or all school-related expenses, such as tuition fees, and are meant to give families more choice in selecting a school. The goal is to promote equity by enabling disadvantaged students to access a wider range of educational opportunities. Parents are generally free to decide whether to use the voucher and which school to apply it to. The idea behind this system is that it could create more competition among schools, with the expectation that schools delivering better results will attract more students. However, recent studies, including one in Italy, have not found strong evidence to support this assumption (Agasisti, 2011).

Overall, the impact of voucher programmes on student achievement appears mixed, and their effectiveness seems to vary depending on the context in which they are implemented (Urquiola, 2016). Key success factors include whether private schools demonstrate higher productivity rather than simply selecting higher-ability students, the extent to which student sorting is minimised, and thoughtful programme design, such as targeted vouchers, equitable payment schemes, and restrictions on selective admissions, which can enhance competition and improve outcomes for disadvantaged students.

**Conditional Cash Transfer Programmes**

Conditional cash transfer (CCT) programmes, like school vouchers, are designed to support disadvantaged families, but they operate differently. Instead of being limited to covering school expenses, CCTs provide monthly cash payments to low-income households, as long as their children are enrolled in and regularly attend school. Some versions of these programmes also include penalties for non-attendance. A key focus of many CCT initiatives is improving equity, with several specifically targeting girls' education. Studies show that CCT programmes are generally effective in reducing dropout rates and boosting daily attendance (Dee, 2011). Because they target the poorest households and promote both enrolment and progression in school, CCTs contribute to equity and adequacy in education.

### 4.4.4. Conclusion

Educational inequality is a challenge related not only to socio-economic and immigration background, but also to gender and the structure of the education system (OECD, 2023b). The combination of performance-targeted and socio-economically-targeted approaches should be adopted in systems like that in the Netherlands, where the correlation between these elements and performance is strong.

Actionable forms of interventions might cover different areas. First, teacher PD in intercultural education and inclusive pedagogy is crucial to ensure that all students are supported in their learning and to meet the needs of increasingly diverse classrooms. Language policy also plays a crucial role in equity by ensuring that all linguistic groups have fair access to quality education and the support they need to succeed. It often involves measures such as mandating instruction in an official or national language, providing targeted language support and immersion programmes for minority or non-native speakers, training bilingual teachers, and implementing curricula that promote both language acquisition and cultural inclusion, all aimed at reducing language barriers and improving educational equity. Recognising and valuing students' home languages can contribute to more inclusive and effective learning environments. Integration and support to families with low socio-economic backgrounds must be equally valued. Efforts to reduce segregation, strengthen peer connections, and involve families are vital. Expanding access to quality education for marginalised groups is key to promoting equal opportunities. Multicultural education also needs to move beyond a simplistic divide between "host" and "multicultural students". Instead, schools should foster spaces where all learners can explore their identities and challenge established norms of belonging and difference (Leet et al., 2023).
Finally, reducing educational inequality requires long-term and sustained investment. According to Bruce Baker's framework (Baker, 2025), promoting a more equitable funding system means designing a system where resources are distributed to ensure all children have equal opportunity to achieve common, adequate outcome goals, regardless of their circumstances. Educational equity is achieved when all children have equal opportunity to achieve common outcome goals, while educational adequacy is achieved when those outcome goals are sufficient for children to become productive, self-determined, and civically engaged adults. To promote equity, the following should be considered:

1. Ensure that funding systems are progressive rather than regressive, directing more resources to schools/districts with greater needs.
2. Identify and account for risk or need factors (economic disadvantage, language proficiency, disability status) that adversely affect educational outcomes.
3. Mitigate inequities caused by local wealth, income, or voter preferences – funding should not be determined by local tax capacity.
4. Calculate the actual costs required to achieve desired outcomes across different settings and student populations.
5. Translate complex cost analyses into practical policy alternatives such as weighted funding formulas.

The framework presents a two-part approach: first evaluating "what is" (current spending patterns in relation to needs and fiscal neutrality), then modelling "what should be" (cost modelling to determine appropriate spending levels). Ultimately, an equitable funding system ensures that resources are distributed based on actual needs of students rather than arbitrary factors such as where they live, delivering the funding necessary for each district and school to provide appropriate educational programmes and services for all children.

# 4.5. EVIDENCE-BASED SOLUTIONS FOR EARLY CHILDHOOD EDUCATION AND CARE

### 4.5.1. Introduction

Access to high-quality, affordable early childhood education and care (ECEC) is critical in supporting both child development and parental workforce participation in the Netherlands. ECEC refers to different types of childcare and early education provided by someone other than the parents, typically for children aged 0 to 6. It has been linked to positive outcomes in primary and secondary school, total years of education, highest level of education achieved, and employment and earnings. These benefits are especially strong for children from low socio-economic backgrounds, indicating that ECEC may help reduce socio-economic inequality (Dietrichson et al., 2020).

ECEC participation among children in the EU has been steadily rising and most children now attend formal care or preschool. In 2023, in the Netherlands 93.0% of children aged 3 and above took part in ECEC, which is slightly above the EU average of 92.5%, but still below the EU's target of 96% participation by 2030 (Source: Eurostat, [educ_uoe_enra21]; European Commission, 2024b). Moreover, the Netherlands has the highest participation rates in ECEC for children under 3 along with Denmark (Source: Eurostat, [tps00185]; European Education and Culture Executive Agency, 2025).

Of particular importance for low-income families is the so-called ECEC gap, which measures the time between the end of paid parental leave and a guaranteed ECEC place. The Netherlands reports an above average childcare gap among the OECD countries (OECD, 2024b). In addition, as in almost all OECD countries, the proportion of children at risk of poverty or social exclusion in formal childcare or education is consistently lower than that of children who are not at risk, but the Netherlands report one of the largest gaps for children below the age of 3, at over 35 percentage points (European Commission, 2024a; OECD, 2024b). A specific type of ECEC in the Netherlands is the voorschoolse educatie programme, which supports children aged 2.5 to 4 who are at risk of falling behind in their development (European Commission, 2024b). The goal is to give these children a strong foundation before they enter primary school. However, a recent study shows that around 30% of the facilities offering this programme are experiencing staff shortages, affecting about 25% of their total workforce (Bakker et al., 2023). National projections suggest that by 2031, the shortage could grow to 7,700 workers, five times the current gap. The staff are required to have a high qualification level during pre-primary education (children aged 3 and over), but not for the first phase. In addition, educational guidelines are provided only for settings working with children aged 3 and over, but not under 3, although its importance has been widely acknowledged (European Education and Culture Executive Agency, 2025)[9]. Free-of-charge and compulsory ECEC is granted only for the last year before primary school (European Commission, 2024a).

ECEC faces several persistent challenges that affect its overall effectiveness and accessibility (OECD, 2025). One of the most pressing issues is the shortage of qualified staff, particularly in programmes designed for disadvantaged children (European Commission, 2023). Alongside staffing problems, ensuring that the workforce is well-trained and supported with ongoing PD remains a significant concern. Access and equity are also major challenges. Not all children, especially those from low-income families, migrant backgrounds, or rural areas have equal opportunities to benefit from ECEC. This unequal access can deepen existing social and educational disparities even before children enter primary school. In many places, affordability adds another layer to the problem. High costs may prevent families, particularly those already facing financial difficulties, from enrolling their children in early education programmes. Quality across ECEC services varies widely and ensuring consistent standards remains difficult. Differences in provision between regions or types of facilities can lead to uneven experiences for young children. For children from diverse cultural or linguistic backgrounds, ECEC programmes may not always be suited to their needs, which can limit their development and make integration harder. Moreover, the lack of reliable data on participation, outcomes, and quality makes it challenging for policymakers to design effective strategies or measure the impact of current efforts. Finally, the transition from ECE to primary school is often overlooked, even though it plays a key role in shaping children's educational trajectories. Vulnerable children, in particular, may need more support during this shift to ensure they start school on an equal footing with their peers.

[9] Council recommendation of 22 May 2019 on high-quality early childhood education and care systems (OJ C 189,5.6.2019, p. 4), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019H0605(01)

This section seeks to support the policy discussion by outlining the current state of ECEC in the Netherlands, comparing it with international best practices and presenting practical recommendations drawn from recent research to tackle the main challenges in ECEC in the Dutch context.

### 4.5.2. Best practice countries

#### 4.5.2.1 Japan

In Japan, government investment in ECEal institutions relative to GDP increased by 42% between 2015 and 2021. Nevertheless, it allocates relatively limited government funding to ECE (0.1% of GDP, compared to 0.8% on average across the OECD) (OECD, 2024a). Several policies and practices have been implemented in Japan to enhance ECEC by establishing a unified system, ensuring qualified staff, providing curriculum standards, and promoting continuous PD through training, reflection, and collaborative dialogue focused increasingly on the perspectives and voices of children (Sakaue & Ogawa, 2016; Matsui, 2021). As a result of ECEC reforms, all private ECEC institutions in Japan became government-dependent in 2021 (OECD, 2024c).

Japan has been in a transitional stage from a traditional dual system (kindergartens under the Ministry of Education, Culture, Sports, Science and Technology – MEXT), and day nurseries under the Ministry of Health, Labour and Welfare (MHLW) towards a comprehensive support system. A key element of this was the creation of ECEC Centres (Nintei Kodomoen) in 2006, which function as both kindergartens and day nurseries, aiming to provide equal access to education and childcare and that received the status of both public education and welfare facilities from April 2015. Children can begin attending day care centres from birth, while kindergartens typically accept children from age 3[10].

Teacher conferences have become popular since the 1990s, as a form of case study where teachers discuss various resource materials (records, photos, videos) to improve their practices, shifting from teacher-centred to child-centred approaches, and there is a growing focus on these conferences on encouraging self-expression and considering children's perspectives (Matsui, 2021).

#### 4.5.2.2 Norway

In Europe only six EU Member States (Sweden, Denmark, Germany, Estonia, Slovenia, and Finland) together with Norway have no ECEC gap. Norway is one of the nine countries in Europe where the participation rate of children aged 3 and over is currently above the 2030 target of 96% (European Education and Culture Executive Agency, 2025). Norway and Sweden, together with five more European countries, are the only countries integrating the four dimensions of ECEC policy integration (European Education and Culture Executive Agency, 2025). To this extent, first, Norway's ECEC system is marked by a unified governance structure under one main authority. Second, every child has the right to a place in ECEC from an early age. Third, each group of children is supported by staff with a bachelor's degree in education. Finally, the same educational guidelines apply throughout the entire ECEC period.

Norwegian educational authorities have supported efforts to improve the quality of ECEC in several ways. In response to recommendations from the OECD's 2015 report (Early Childhood Education and Care Policy Review Norway, 2015), a number of political measures were introduced as discussed by Størksen et al., 2024. One key change was the tightening of teacher-to-child ratios in 2018. Currently, the minimum requirement is one staff member for every three children under the age of three and one for every six children aged three to five (Størksen et al., 2024). The Norwegian Directorate of Education has contributed by defining different aspects of quality on its national website (https://www.udir.no/in-english/), where short videos are also provided to illustrate good practice. Quality in ECEC is further promoted through official web content, national strategies, and white papers. Additional funding has been made available to support staff training and competence development.

There is increasing awareness of the role guided play can have in improving educational interactions and supporting children's learning (Størksen et al., 2024). In Norway's play-based ECEC system, the "playful learning curriculum", introduced through a one-day training session for teachers and supported by online resources, led to a clear improvement in five-year-old children's mathematics skills. The study indicates that even in an environment where play is already a core part of teaching, a structured and age-appropriate curriculum can further support early mathematics development, especially when existing curriculum guidelines are not very specific in countries such as Norway (Størksen et al., 2023).

[10] https://www.city.matsudo.chiba.jp/InternationalPortal/vi/forforeignresidents/childrearingsupport.files/ChildcareSystem_Eng.pdf

#### 4.5.2.3 Sweden

Sweden has reached the 2030 EU-level target of at least 96% children in ECEC (European Commission, 2024a). Sweden is one of the only seven EU countries that guarantee a place in ECEC for every child from an early age (6–18 months), often immediately after the end of childcare leave (European Commission, 2024a) and invests the most in ECEC together with Iceland (European Education and Culture Executive Agency, 2025). In Sweden, there is a two-year gap between when paid parental leave typically ends and when children become eligible for free ECE. Starting at age 1, all children in Sweden have the right to attend publicly funded ECEC. From the age of 3, they are guaranteed at least 15 hours per week of ECEC at no cost (European Education and Culture Executive Agency, 2025).

Sweden has undertaken initiatives to support immigrants in ECE by establishing policies that recognise the preschool's crucial role in the integration process. The preschool holds a specific responsibility for refugee children and their families and is considered as a foundational element in the broader societal integration of immigrant children and their families in Sweden (Lunneblad, 2017; Migdad et al., 2025). In addition, as in other Nordic countries, there is a formalised role of ECEC that includes a statutory right to parental involvement and to impact what happens in kindergartens and schools (Migdad et al., 2025).

### 4.5.3. Evidence-based solutions and literature

This section synthesises interventions recommended in the report of the expert group on quality investment in education and training (European Commission, 2022), complemented by existing literature reviews (Melhuis et al., 2015; Van Huizen & Plantenga, 2018; Dietrichson et al., 2020) with examples from across Europe and beyond, as well as the broader academic literature.

Establishing a clear causal link between ECEC attendance and later outcomes is difficult, as participation is not mandatory until age 5 in most EU countries. This leaves the decision of whether their children attend up to the parents, leading to differences in the characteristics of children who do and do not participate (European Commission, 2022).

For instance, children from low socio-economic backgrounds are generally less likely to attend ECEC. Early evidence from US experimental programmes shows strong benefits for disadvantaged children, but these findings may not fully translate to EU countries due to differences in programme design, quality, and universal access. Recent studies in Europe use quasi-experimental methods to assess large-scale programmes, showing positive but varied effects.

While research on ECEC quality, such as staff qualifications, ratios, and curriculum is limited, existing evidence points to its importance for child development.

#### 4.5.3.1 Teacher-level interventions

Teacher-level interventions explore, in particular, topics such as initial training and CPD. The importance of comprehensive initial training for staff is highlighted as an important determinant of process quality. The quality of childcare, including staff qualifications, is crucial for the effectiveness of ECEC. There is limited robust evidence on how teaching staff quality or different pedagogical approaches affect outcomes, but qualitative studies highlight the importance of quality (Melhuis et al., 2015).

Regarding CPD, effective methods identified by researchers include active learning methods, centre-embedded delivery, and personalised feedback through coaching or mentoring (Egert et al., 2018; Brunsek et al., 2020). Moreover, high-quality ECEC, such as universal programmes with regulations ensuring a high adult/children ratio as seen in Denmark or Norway, are associated with positive effects.

#### 4.5.3.2 Child-level interventions

Child-level interventions cover different topics, particularly concerning the age of entry into ECEC and its effects on development and inequalities. A significant body of research in early childhood development and the evaluation of ECEC programmes considers the role of starting age in their findings on child outcomes and the mitigation of inequalities.

Quality ECEC from a certain age (often starting around age 3 years in many European contexts) yields developmental benefits for cognitive and language development. Ulferts et al. (2019) report small but positive lasting effects on mathematics as well as language and literacy. Research shows that earlier and longer exposure to ECEC benefits low socio-economic status children, and lowering the kindergarten enrolment age (e.g. to 3 years) could support children of low socio-economic status mothers (Szabó-Morvai & Lovász, 2024). The benefits of ECEC are consistently greater for disadvantaged children than for children of advantaged backgrounds, in particular in socio-emotional and cognitive skills (Szabó-Morvai et al., 2023). Despite these advantages, universal childcare programmes often fail to attract these children despite subsidies (European Commission, 2022; OECD, 2025). Moreover, the literature from neuroscience, paediatrics, and psychology raises concerns regarding potential impacts on social and emotional development and health about the ECEC enrolment at very early ages (under one year), particularly with long hours (OECD, 2025).

#### 4.5.3.3 School-level interventions

School-level interventions explore topics such as curriculum alignment facilitating smooth transitions to primary school, the benefits of play-based learning, and the effects of different curricular approaches on children's development. This includes supporting pedagogical practices that are adapted to children's diverse needs throughout early and middle childhood, and promoting coordination between ECEC and primary school staff to ease transitions. Furthermore, there is an emphasis on integrating ECEC and primary school through aligned curricula and pedagogical approaches, potentially building on play-based learning from ECEC into the early years of primary school.
The development of a child-centred and comprehensive curriculum framework that addresses all aspects of children's development and includes structured components within a play-based approach is also a key focus, ideally guiding practices across ECEC and the initial years of primary education.
Regarding the development of a child-centred and comprehensive curriculum framework, research informs the discussion on supporting equity and inclusion in and through ECEC, placing particular focus on policy levers such as pedagogy and curriculum design. Shuey et al. (2019) provide a brief review and case studies on curriculum alignment.
The importance of play-based learning is also highlighted, with scientific evidence suggesting that reducing play and focusing solely on academic skills from an early age is not beneficial for children's overall development and well-being (Hirsh-Pasek et al., 2008).
Concerning the effectiveness of skill-specific curricula, the evidence suggests that while whole-child curricula may enhance the classroom environment, skills-focused and structured curricula appear to be more effective in directly improving specific academic skills such as mathematics and literacy (Jenkins et al., 2018). The study by Rege et al. (2024) further highlights the potential of structured curricula to have lasting impacts, particularly in mathematics and especially in lower-quality preschool settings.

#### 4.5.3.4 System-level interventions

System-level interventions involve combining universal and targeted approaches to ensure a baseline of support for all children, while directing additional resources to those most in need. A critical aspect is guaranteeing sufficient and sustained public funding across all early childhood years, as current systems often experience a drop in spending between ages 1 and 3. To improve workforce quality, interventions focus on designing funding mechanisms that support adequate wages and incentivise staff retention, particularly in disadvantaged areas. As reviewed by Dietrichson et al. (2020), there are studies calculating benefits-to-cost ratios for universal preschool programmes in Uruguay, the United States (Georgia and Oklahoma), and Spain, and found ratios clearly above one, indicating that the benefits outweighed the costs. Benefit–cost analyses typically include the direct cost of the programme for taxpayers and parents (net of decreased out-of-pocket spending) and suggest that the examined universal preschool programmes were a worthwhile investment. Moreover, even when programme costs are increased to account for deadweight losses of taxation, the benefit-to-cost ratios in the analysed studies remained above one. Similarly, the report by the European Commission (2022) shows that providing high-quality ECEC for disadvantaged children is a cost-effective policy. Evidence from both US experimental programmes and universal programmes in EU countries shows that it brings consistent short- and long-term benefits, and it also helps narrow the gap between high- and low socio-economic status families.

### 4.5.4. Conclusion

ECEC plays a key role in lifelong learning, personal development, and future employability, especially for disadvantaged children. However, many countries face ongoing and sometimes intertwined challenges such as budget limitations, staff shortages, and inconsistent training. Barriers to access, including cost, availability, administrative complexity, and lack of information disproportionately affect children from disadvantaged and immigrant backgrounds. Fragmented governance and coordination issues also make it difficult to ensure consistent quality across various ECEC settings, particularly as private providers expand (OECD, 2025). Building trust with underserved communities, reducing administrative burdens, and identifying vulnerable children for targeted support are also critical but complex tasks.

To tackle these issues, coordinated policies are needed to focus on sustainable funding, workforce development, and inclusive access. High-quality programmes with strong adult–child interaction have shown to improve long-term outcomes, particularly for disadvantaged children. Addressing staff shortages requires a mix of short- and long-term strategies: making ECEC careers more attractive through better pay, work conditions, and PD opportunities, as well as improving access to training and career pathways. Collaborative planning, inclusive recruitment, and stronger support for leadership roles can help stabilise and grow the workforce while maintaining quality standards.

# 4.6. EVIDENCE-BASED SOLUTIONS FOR IMPROVING PISA MATHEMATICS TEST SCORES

### 4.6.1. Introduction

Mathematics proficiency is a key indicator of students' ability to solve problems and think critically, skills which are essential for success in many academic and professional fields, crucial for engaging in society and for addressing real-life challenges (OECD, 2016; Hillmayr et al., 2020). The Netherlands has faced challenges in improving its performance in mathematics as measured by the PISA tests. In an increasingly globalised world, ensuring that Dutch students perform well in mathematics is crucial for their future opportunities and the competitiveness of the workforce (Slavin et al., 2009).

In the latest PISA 2022 assessment, the Netherlands showed strong performance in mathematics with scores higher than the OECD average and with 73% of students achieving at least the minimum level of proficiency, significantly above the OECD average of 69%. This proficiency level (Level 2) reflects the ability to interpret and recognise how simple situations can be represented mathematically. However, average 2022 results were down compared to 2018 in mathematics, as well as in reading and science (OECD, 2023e). Generally, the average performance was lower in 2022 than in any previous PISA assessment (since 2003) and marked a negative trajectory over time, with results behind the national performance standards defined for mathematics by the Meijerink Commission (Koninklijke Nederlandse Akademie van Wetenschappen, 2009; Scheltens et al., 2013; Bartelet et al., 2016).

Between 2018 and 2022, the gap between the high-achieving (top 10%) and low-achieving (bottom 10%) students widened in mathematics as well as in reading and science (OECD, 2023e). In mathematics, almost all students became weaker, but low achievers declined more than high achievers. Some 15% of students in the Netherlands were top performers in mathematics (Level 5 or 6), compared to the OECD average of 9%.

The PISA assessment shows that the socio-economic background is relevant when assessing student performance in mathematics. Socio-economic status accounted for 15% of the variation in mathematics performance in PISA 2022 in the Netherlands in line with the OECD average. Socio-economically advantaged students (top 25%) outperformed disadvantaged students (bottom 25%) by 106 points in mathematics, greater than the OECD average difference of 93 points. Between 2012 and 2022, the gap in mathematics performance between the top and bottom 25% of students in terms of socio-economic status widened. In mathematics, the average performance difference between immigrant and non-immigrant students was 58 points in favour of non-immigrant students. After accounting for socio-economic backgrounds, the difference was 27 points, with half of the students with an immigrant background classified as socio-economically disadvantaged (OECD, 2023e).

The Netherlands has one of the largest shares of students in schools that group students within their classes by ability for some subjects (77.4%), and that group students into different classes for all subjects (37.2%) (Table II.B1.4.26, OECD 2023f). The score difference in mathematics between students grouped into different classes by ability for some or all subjects and students not grouped for any subject is equal to −31. After accounting for students' and schools' socio-economic profile the score difference is equal to −19 and it is statistically significant (Table II.B1.4.30, OECD 2023f).
The PISA 2022 report noted a decline in the parental involvement in learning. Only 23% of students were in schools where the principal reported that at least half of the parents discussed their child's progress with a teacher on their own initiative (48% in 2018) and 59% of students were in schools where parents discussed progress on the teacher's initiatives (61% in 2018). Concerning the support of digital services, the PISA 2022 report showed that 33% of the students become distracted when introducing digital tools compared to the OECD average of 30%, although they are less likely to be distracted when the use of mobile phones is not allowed (OECD, 2023e).

Among OECD and partner countries with available data, the Netherlands had one of the lowest indexes of mathematics anxiety, but it also reported low teacher support and one of the lowest shares of students who consider mathematics to be one of their favourite subjects (OECD, PISA 2022 Database, Tables I.B1.2.1 and I.B1.2.16., Table V.B1.3.11).

The Netherlands also had one of the lowest shares of students whose teacher asked them to think about how new and old mathematics topics were related, in more than half of the lessons (Table V.B1.3.26, OECD, 2023c). In addition, the Netherlands had one of the highest shares of students who frequently extract mathematical information from diagrams, graphs, or simulations and feel confident in doing so, although it had one of the lowest shares of students who frequently interpret mathematical solutions in the context of a real-life challenge (OECD, 2023c).

As of 2020, more than 1,550 funding requests had been dealt with by the Ministry of Education, Culture and Science to recover learning losses in the aftermath of Covid (Kortekaas-Rijlaarsdam et al., 2020). Several interventions have been implemented, for example: extended school days and summer schools to provide additional instructional time focused on language and arithmetic, targeting students who had fallen behind; additional support during school hours to help students catch up in core subjects; and collaboration with external partners to enhance programme effectiveness and focus on socio-emotional developments. However, findings from the latest PISA assessment highlight the need for more effective and targeted interventions to enhance student performance in mathematics and other core subjects.

This section seeks to inform the policy debate by outlining the situation in the Netherlands, comparing it to international best practices, and presenting actionable insights from the recent literature. Based on empirical evidence and comparative case studies, this chapter identifies strategies that can support national and regional policies aimed at improving student performance in mathematics in the Dutch context.

### 4.6.2. Best practice countries

#### 4.6.2.1 Singapore

Singapore consistently ranks at the top in PISA mathematics scores, and it is one of the very few exceptions showing improvement over time (OECD, 2023d). Its success is attributed to a highly structured curriculum that integrates content knowledge with skills, processes, and – importantly – attitudes and values, while offering the possibility to cover optional advanced mathematics topics. This country has invested in strong teacher training programmes that emphasise pedagogical skills in teaching mathematics and promote "collective efficacy" as a core practice among educators, which is believed to promote higher levels of student achievement and teacher satisfaction (OECD, 2024d). In addition, it is characterised by a focus on mastery learning where students thoroughly understand mathematical concepts before moving on to a real-world relevance. The PISA 2022 report showed that Singapore had one of the highest shares of students who frequently feel confident in extracting mathematical information from diagrams, graphs, or simulations (OECD, 2023d).

#### 4.6.2.2 Estonia

Estonia has made significant improvements in its PISA mathematics scores, consistently ranking among the top countries in the Western world. The country's success stems from its comprehensive education reforms, which include a focus on teacher quality, a coherent national curriculum that promotes conceptual understanding, and a balanced curriculum coverage where the number of topics remains relatively consistent and aligned with global trends (OECD, 2024d).
Including digital literacy in the mathematics curriculum helps students not only understand mathematical concepts, but also to use digital tools to solve real-world problems. Estonia is one of the few countries leading in this area, with about 70% of its curriculum including digital skills, although mathematics is not the main subject where digital literacy is taught.

#### 4.6.2.3 Finland

Finland's model of education emphasises a deep understanding of mathematics rather than rote learning. It is noted as one of the countries that demonstrates both high performance in mathematics and lower levels of mathematics anxiety (OECD, 2024d). In addition, Finland places strong emphasis on teacher autonomy, with teachers required to have a master's degree and ongoing PD. This system encourages critical thinking and problem-solving skills in mathematics, and offers elective pathways in mathematics in upper secondary education, contributing to consistently high PISA scores.

### 4.6.3. Evidence-based solutions and literature

The literature proposes several evidence-based solutions to improve student mathematics performance that can be clustered in the following five groups: 1) teacher-led interventions, 2) parent-led interventions, 3) peer-led interventions, 4) digital- and technology-based interventions, and 5) external organisation-led interventions, as discussed and illustrated in the following.

#### 4.6.3.1 Teacher-led interventions

There are various strategies that teachers can implement to foster meaningful learning in mathematics. However, a central focus should be the promotion of a favourable learning environment, where the quality of communication is closely monitored, and efforts are made to spark students' interest by connecting mathematical content to real-world contexts (Koskinen & Pitkäniemi, 2022). Teachers should actively engage students in the learning process through guided instruction and support the integration of relevant and relatable contexts into their teaching. To achieve this, policy frameworks must play a supportive role, encouraging educators to bridge mathematical concepts with real-life phenomena that resonate with students and enhance their understanding. This section discusses different strategies where the teachers play a fundamental role to foster the learning of students in mathematics.

**One-to-one Tutoring**

This intervention focuses on individualised tutoring from a qualified teacher or a teaching assistant to address specific learning gaps. Providing individualised attention, targeted feedback, and tailored support have been proved to be one of the most effective strategies to mitigate learning loss (Higgins et al., 2016; Kortekaas-Rijlaarsdam et al., 2020; Koskinen & Pitkäniemi, 2022). However, this strategy is relatively very expensive and effective only if delivered by experienced and well-trained teaching assistants, leading to a preference for strategies that involve a larger – albeit still limited – number of students, as discussed below (Higgins et al., 2016).

**Focus on Smaller Groups**

Small-group tuition, defined as one teacher working with two to five pupils, enables focused and individualised instruction. This approach is often used to support lower attaining learners or those falling behind, but it can also serve as a general strategy to ensure effective progress or to tackle challenging topics. Evidence indicates that effectiveness is greatest when groups are small (Bonesrønning et al., 2022). Similarly, smaller class sizes allow for more individualised attention and differentiated instruction. During school hours, remedial teaching can offer valuable additional support. Di Tommaso et al. (2024) have shown that the absence of pressure and competition, facilitated by the small-group setting, is believed to particularly benefit girls and is useful to narrow the mathematics gender gap. The collaborative nature of the small groups, where students are encouraged to share and compare ideas, aligns with the principles of active and cooperative learning.

In terms of attainment grouping, students with similar levels of current achievement may be grouped together for specific lessons (setting) or as whole classes (streaming or tracking), based on the assumption that teaching is more effective with a narrower range of ability (Higgins et al., 2016). However, research shows that while this may benefit higher attaining pupils, it tends to be detrimental to those with mid-range or lower attainment and does not appear to raise the attainment of disadvantaged students, who are more often assigned to lower groups. Furthermore, scholars have noted that ability grouping and subject choice frequently exacerbate socio-economic inequalities in education. While mixed-ability grouping poses more challenges for teachers, ability grouping may negatively impact student self-confidence and reinforce existing disparities (Francis et al., 2017; Johnston et al., 2025).

**Teacher PD**

Training for teachers should focus on improving didactical and pedagogical skills, including instruction that adapts to the classroom. Positive outcomes were seen in studies on PD related to classroom management and organisation, as for example cooperative learning (Slavin & Lake, 2008; Slavin et al., 2009; Pellegrini et al., 2021). Investing in teacher PD has a major and enduring impact for the whole class, especially when pursued with a particular focus on coping with large differences among students (Ansyari et al., 2022a, 2022b, 2020; Compen et al., 2019). However, teachers are already in short supply and the time needed to invest in their PD makes the actual implementation challenging (Higgins et al., 2016).

In addition to pedagogical training, it is also important to invest in both cognitive and social skills for teachers, as these appear to complement each other (Grönqvist & Vlachos, 2016). Teachers with high cognitive and social skills tend to promote better student achievement. In contrast, high cognitive skills paired with low social skills can negatively affect students. Similarly, social skills are more effective when supported by strong cognitive abilities. Different teacher skills can influence different types of students in different ways, underlining the complexity of teacher effectiveness and the importance of considering how student–teacher matches impact learning outcomes (Grönqvist & Vlachos, 2016).

**Homework**

Homework, when assigned and managed by teachers to reinforce classroom learning, shows a small but positive relationship with achievement in mathematics. However, its effectiveness depends on various factors such as grade level, geographical location, and how homework is measured. This means that homework does not have the same

impact for all students or in all contexts (Maldonado et al., 2022). Research shows that indicators such as homework completion, homework grade, and effort are more strongly associated with achievement than the frequency or amount of time spent on homework. Simply assigning more homework or expecting students to spend longer on it does not necessarily lead to better results (Fan et al., 2017).

The quality of homework also matters, in particular with respect to task selection and cognitive challenge. When students view homework as well-chosen and interesting, their motivation and effort increase, which benefits class-level performance. While challenging tasks can reduce motivation at an individual level, cognitively demanding assignments given at the class level are linked to higher achievement in mathematics (Dettmers et al., 2010).

**Increase in Instructional Time**

Extra teaching time, whether through longer school days or years, or additional sessions before or after school, can help students in core subjects such as language and mathematics. This support is often provided by subject teachers and aimed at specific groups. However, the impact of these measures varies widely across studies, suggesting that additional time is not always used effectively (Meyer & Van Klaveren, 2013; Higgins et al., 2016). Targeted programmes tend to show more consistent results, though even here, the outcomes differ depending on how the programmes are designed and implemented.

Research shows that increasing instruction time is most beneficial in schools facing serious learning challenges. In such environments, assigning students to individualised activities appears more effective than simply increasing time. In particular, the most disadvantaged students are those who benefit most from extra instruction, while others may see little to no improvement. This highlights the importance of tailoring interventions to the students most in need to avoid wasted resources, especially when funding comes from sources such as EU development and social funds (Battistin & Meroni, 2016).

Findings also suggest that extra instruction time has a greater effect on mathematics achievement than on language. Students who receive additional support in mathematics not only perform better, but also develop a more positive attitude towards the subject. Gender differences are also significant: girls who receive extra mathematics instruction show gains in both mathematics and language. Despite this, gender is often overlooked in designing interventions, though it clearly plays an important role in shaping outcomes (Meroni & Abbiati, 2016).

#### 4.6.3.2 Parent-led interventions

When it comes to children's learning, the focus is shifting from parental involvement in schools towards parental engagement. While involvement refers to simply taking part in school-related activities, engagement implies a deeper connection and a sense of commitment from parents for a more balanced partnership between parents and schools, where both play active roles in supporting student learning (Goodall & Montgomery, 2014).

Parental support can take two main forms: home-based and school-based strategies (Boonk et al., 2018). Home-based involvement covers actions supporting learning within the home environment and includes activities such as helping with homework, discussing school matters, monitoring progress, and setting academic expectations. School-based involvement involves parents being physically present at school, attending meetings, school events or volunteering, going on class trips, and participation in school functions (Boonk et al., 2018). Distinguishing between these two types is important when looking at their effects on student performance and they differ significantly from school-based support in their nature and influence. Research shows that academic socialisation such as parents setting clear academic expectations is one of the most effective factors to student success. School involvement also shows a positive impact, while home-based help such as assisting with homework is generally positive, though less consistently so (Kim, 2022).

Recent developments have made parental engagement even more essential. School closures during COVID-19 highlighted the need for parents to take a more active role in learning. At the same time, new technologies – especially AI – are changing the way education works. These shifts call for a deeper look at how schooling systems engage parents, challenging practices that keep them at a distance (Kent et al., 2022).

**Home-based Strategies**

Encouraging parents to engage in structured learning activities at home can positively influence student outcomes. Different studies define parental involvement in various ways, including communication about school (Maldonado & De Witte, 2021), supervision at home, help with homework, expectations, and general attitudes towards education (Wilder, 2014). Ongoing educational conversations between parents and children, such as discussing schoolwork, and academic goals and related matters, are linked to improved mathematics performance. Parental encouragement and emotional support also contribute to better homework habits, which in turn are associated with higher achievement

and lower dropout rates. Homework support, in particular, ranges from direct help with tasks to creating a supportive environment and helping children to stay organised and focused (Ribeiro et al., 2021). When parents show high aspirations and expectations, students often respond with improved academic performance, especially in mathematics throughout high school (Boonk et al., 2018).
However, while many forms of parental involvement are helpful, not all have positive effects. Excessive control or pressure, such as constant monitoring of homework, interfering with tasks, or applying academic pressure, can negatively impact students' confidence, motivation, and performance. High parental involvement that feels intrusive can lead to conflicts and reduce students' academic self-efficacy (Fiskerstrand, 2022).

**School-based Strategies**
Initiatives aimed at helping parents support their children's learning often include parental engagement programmes, involvement in school activities, and communication with teachers. However, being engaged in a child's learning does not always mean being engaged with the school. Some parents, especially those from minority backgrounds or facing economic difficulties, may strongly support their children's education but face barriers to participating in school life. As described in Goodall and Montgomery (2014), these barriers can include scheduling issues, lack of access to facilities, or unfamiliarity with school expectations. It is important for schools to recognise that a single approach to parental engagement will not work for everyone. Parents differ in their needs, challenges, and understanding of what engagement means. Teachers, often working under time pressure, may make assumptions about parents based on limited information, especially when there are differences in cultural background, life experience, or social capital between families and the school.

#### 4.6.3.3 Peer-led interventions
Together with one-to-one tuition, teacher PD, and parent engagement, peer-led activities and peer tutoring are considered in the literature to be among the most effective strategies for mitigating learning loss (Kortekaas-Rijlaarsdam et al., 2020). While the costs related to these initiatives are relatively low, many studies show moderate to high average effects (Higgins et al., 2016).

**Peer Tutoring**
Peer tutoring involves students working in pairs or small groups to support each other's learning during or after school hours (Higgins et al., 2016). This can include same-age tutoring or cross-age tutoring, where an older student helps a younger one. Structured study groups, where students support each other under teacher supervision, are also part of this cooperative learning approach.
Peer tutoring tends to be most effective when used to reinforce learning rather than to introduce new material.
To this extent, while it has great potential, it cannot be considered as a substitute for professional tutoring (Nickow et al., 2024). Studies have found positive outcomes for both peer and cross-age tutoring (Slavin et al., 2009). It is particularly beneficial for students from disadvantaged backgrounds and for low achievers. However, its success depends on ensuring the quality of peer interaction, such as using structured questioning guides (Higgins et al., 2016). These approaches may also be cost-effective and offer added benefits if tutors gain academically or socially. Nonetheless, maintaining consistent quality and ensuring that both tutors and tutees benefit can present ethical and practical challenges (Nickow et al., 2024).

**Learning by Teaching**
Learning by preparing to teach and learning by teaching denote a method where students learn by planning to explain or effectively explaining material to others. This approach improves understanding, promotes metacognitive thinking, and boosts academic performance, especially in areas such as mathematics. Students who prepare to teach tend to structure problems better, use more effective learning strategies, and demonstrate deeper engagement (De Cort & De Witte, 2024). Tools such as concept mapping and instructional videos help students organise and express their understanding, and technology (e.g. tablets and apps) can support this process. The benefits are more pronounced when students also teach the material, not just prepare it (Fiorella & Mayer, 2016; Muis et al., 2016). This aligns with the idea that actively explaining content (especially in front of a real or perceived audience) promotes better learning than passive strategies such as summarising or reviewing.

Using video creation as a homework activity, where students record themselves teaching a topic, has also proved effective and enjoyable (Hoogerheide et al., 2019). Compared to traditional methods such as restudying or summarising, creating teaching videos leads to better test performance and more mental effort during learning, which indicates deeper cognitive processing. This effect may be due in part to the social presence students feel when preparing to teach an audience.

Importantly, this method requires careful teacher planning, especially in larger or more complex classes. Teachers take on a new role, not just as content experts but as facilitators who guide, support, and inspire students while encouraging responsibility and active learning. This shift reflects a broader move in education towards more student-centred, participatory teaching methods (Kolbe, 2025).

#### 4.6.3.4 Digital- and technology-based interventions

Given the widespread use of the internet and digital devices among young students, technology-based learning approaches offer promising and cost-effective ways to support education. However, the overall effectiveness of these tools remains moderate, and their long-term impact on learning is still not fully understood. One commonly used strategy is blended learning, which combines traditional in-person instruction with digital tools to increase student engagement and personalise learning (Cheung & Slavin, 2013). Recently, the use of artificial intelligence in education (AIED) has also gained attention, offering new possibilities for tailoring instruction and providing real-time support to both students and teachers (Holmes & Tuomi, 2022). Computer-assisted instruction (CAI) programs, digital tools designed to support teachers and online tutoring, are among the main practices in this area, all aiming to enhance learning experiences and outcomes in different ways.

**CAI programs**

Digital tools such as CAI have shown to significantly improve student learning outcomes, especially when used to complement traditional classroom instruction (Cheung & Slavin, 2013; De Witte et al., 2015; Iterbeke et al., 2021; Iterbeke et al., 2022). Supplemental CAI targeting specific student needs tends to have the strongest impact.
These tools often provide various forms of feedback, ranging from basic right/wrong indicators to more in-depth instructional explanations (Hillmayr et al., 2020, Magalhães et al., 2020). Intelligent tutoring systems are a more advanced type of CAI and use artificial intelligence to personalise instruction based on student performance. While ITS programs are generally effective, those applied in humanities and social sciences have shown greater success compared to those used in mathematics (Ma et al., 2014). Dynamic mathematical tools such as GeoGebra™ allow students to interactively explore complex concepts, supporting deeper learning through experimentation together with ITS (Hillmayr et al., 2020). Importantly, the benefits of digital tools are amplified when used alongside other teaching methods rather than as stand-alone solutions. The teacher plays an important external motivation role and differential ITS effects might occur depending on the students' initial mathematics performance level and the specific mathematics domain (Bartelet et al., 2016).
Despite the benefits, digital distractions remain a concern. Students, and especially girls, can be more vulnerable to distractions from peer interactions or multitasking with technology (Xu, 2015). To address this issue, educators should help students elaborate their own perspectives on how families and teachers can support them, particularly by fostering productive homework environments and encouraging student effort (Xu, 2015). Creating a culture of peer support and sharing strategies to manage distraction can also help. Involving students in shaping classroom tech-use policies and promoting self-regulation strategies can lead to more effective and respectful use of technology in learning environments (Park et al., 2025).

**Tools for Teacher Support**

Technology can support teachers in managing classroom dynamics and improving learning efficiency. For example, approaches such as classroom orchestration characterise strategies to help teachers guide student activity, manage time, and respond to learning needs during lessons. To assist with orchestration, many student-focused AIED tools, especially intelligent tutoring systems, include teacher-facing interfaces or dashboards. These are often based on open learner models, which provide a real-time view of what individual students or groups have accomplished, including their progress, struggles, and misconceptions (Holmes & Tuomi, 2022). By giving teachers access to this dynamic information, these tools help make classroom interventions more targeted and well-timed. Although the overall effects on learning outcomes are limited, such technologies offer valuable support in helping teachers respond more effectively to students' needs during the learning process (VanLehn et al., 2021).

**Online Tutoring**

Virtual tutoring, whether one-to-one or in small groups, has become an effective and scalable way to support students through digital platforms. One promising model involves using volunteers as online tutors, significantly lowering costs since tutor wages often constitute the largest portion of the total expenses for a programme. Online delivery also removes barriers such as travel time, expands the pool of potential tutors beyond local areas, and allows for greater flexibility in scheduling. Additionally, it enables better matching of tutors and students based on shared interests or subject expertise (Kraft et al., 2022). Compared to in-person tutoring, which often disrupts school hours and requires extra coordination, virtual tutoring – especially when offered after school – presents fewer logistical challenges for

schools and teachers. Programmes have also found that using small-group formats, such as two students per tutor, can maintain similar effectiveness to one-to-one sessions while improving scalability and lowering costs. Pairing students from the same grade or class supports peer motivation and helps build a more connected learning environment (Gortazar et al., 2024).
In some cases, tutoring is delivered by qualified teachers rather than volunteers, particularly for subjects such as mathematics, where evidence suggests that professional educators are more effective. To ensure equitable access, students who lack the necessary technology at home should be provided with tablets and internet access. Comprehensive tutor training should also be a key part of a programme design, helping ensure quality instruction (Gortazar et al., 2024).

#### 4.6.3.5 External organisation-led interventions

**High-dosage Mathematics Tutoring**

High-dosage tutoring (HDT) programmes aim to provide structured and intensive academic support, often during the school day and in collaboration with external organisations (De Ree et al., 2023). These programmes typically involve small groups, usually two students per tutor, meeting several times per week over the school year. A key goal is to offer personalised instruction that reinforces and practises mathematics skills introduced in the classroom.
To reduce costs, these programmes often rely on paraprofessional tutors instead of certified teachers. Tutors receive basic training and follow structured lesson plans, coordinating with teachers to align content. Research shows that this approach can meaningfully improve mathematics achievement, with students spending most of their time actively solving problems under tutor supervision. The social aspect of tutoring, working in consistent pairs and building relationships, also helps create a comfortable environment that supports learning. Recent evaluations of HDT, including programmes inspired by Saga Education in the US and adapted in the Netherlands, suggest that these interventions are effective and potentially scalable across different education systems. Although initial implementation costs can be high (around €3,000–€4,000 per student annually), cost–benefit analyses indicate that long-term returns, in terms of increased lifetime earnings, could outweigh the investment. These findings also highlight that the academic gains are not primarily due to mentoring or emotional support, but to changes in the instructional model itself (Guryan et al., 2023). As tutoring programmes continue to expand, alternative versions such as hybrid models (which combine in-person support with CAI) and reduced-frequency formats are being tested to make high-impact tutoring more affordable and widely accessible (De Ree et al., 2023).

**Volunteer Tutoring**

Volunteer tutoring programmes, especially those organised by external agencies or community initiatives rather than peers, have gained attention as a low-cost alternative to professional tutoring. Informal support among students or volunteers can help expand access, especially where limited budgets make it difficult to hire professional tutors. While this approach increases the reach of tutoring interventions, particularly in underserved areas, there is still little reliable evidence on how effective volunteer-led programmes are in improving mathematics outcomes. Despite the growing interest and implementation of such programmes, many schools may be adopting volunteer tutoring without a solid understanding of the actual impact. To address this gap, it would be valuable for educators to develop volunteer-based initiatives that focus specifically on early mathematics skills, while researchers conduct studies to evaluate their effectiveness (Ritter et al., 2009).

**Sport Participation and Outdoor Adventure Learning**

Sport and adventure-based activities, often organised by external groups or school extracurricular programmes, can play a supportive role in student development, mainly by promoting discipline, teamwork, and motivation. However, research shows that their direct impact on academic performance is generally moderate. In the case of sports programmes, effectiveness often depends on factors such as the duration and intensity of the programme, as well as the outcomes being measured – not just academic achievement, but also self-esteem and student motivation (Van Klaveren & De Witte, 2015). Adventure learning programmes have shown mixed results, with more recent studies – using stronger research methods – reporting smaller effects than earlier ones. Despite this, both older and newer studies generally find some positive impact on academic outcomes. Qualitative research also suggests that students often view these experiences as valuable, particularly in terms of attitude and personal growth (Higgins et al., 2016). Additionally, informal social interactions outside the classroom, such as conversations on the school bus, have been shown to positively influence learning, especially in mathematics during the teenage years, underscoring the importance of out-of-school environments in shaping educational outcomes (Lenard & Silliman, 2025).

**Summer and Holiday Schools**

Holiday or summer school programmes, typically arranged by external organisations, aim to provide students with additional learning support during school breaks. As discussed by Higgins et al. (2016), these programmes are commonly used in both primary and secondary education to address learning gaps, especially in language, mathematics, and English, and to support students' social and emotional development. In primary education, the emphasis tends to be on catching up in language and arithmetic, while in secondary education, the focus shifts more towards mathematics and English. Most of these programmes are tailored to individual student needs and are often designed by the school's own subject teachers. While such initiatives can be effective in the short term, particularly for disadvantaged students, they also present several challenges. They are time- and resource-intensive to run, and engaging families, especially parents, can be difficult.

### 4.6.4. Conclusions

Declining test scores in mathematics is a central concern in many countries, including the Netherlands. To improve students' mathematics performance, both national and international research outlines a wide range of strategies, including curriculum reforms on both content and delivery (OECD, 2024d). Modern curricula need to integrate digital skills, data literacy, and problem-solving alongside traditional topics. It is crucial to consider the structured nature of mathematics, the pressures of exams, and the reliance on textbooks. Student attitudes – particularly mathematics anxiety – can hinder learning, so fostering confidence and promoting a growth mindset should be central to any reform effort. Teachers need proper preparation and support to implement these changes effectively. Policy should focus on creating alignment across the curriculum, assessments, textbooks, and teaching methods. Encouraging teacher involvement in curriculum design and promoting student ownership are essential for achieving long-term success. Reforms should also support interdisciplinary learning and offer students clear choices. Without addressing both teacher and students' needs, reforms risk being ineffective or unsustainable.

In addition to curriculum development and teaching practices, the importance of school infrastructure should not be overlooked. Recent studies show that investing in school facilities, such as improved classrooms and better learning conditions, can have a significant positive impact on mathematics performance, particularly for lower-achieving students (Belmonte et al., 2020). This highlights the need to prioritise capital investments as a key factor in improving student outcomes.

To effectively boost mathematics performance, the Netherlands can benefit from integrating curriculum reform, teaching practices, and infrastructure improvements, ensuring that all elements work together to create a supportive learning environment. This requires ongoing investment in teacher development, access to quality resources, and a policy framework that emphasises the importance of student understanding and engagement.

# 4.7. EVIDENCE-BASED SOLUTIONS FOR IMPROVING PISA READING TEST SCORES

### 4.7.1. Introduction

The PISA 2018 assessment and analytical framework, which was also employed in PISA 2022, defines reading literacy as "understanding, using, evaluating, reflecting on, and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society" (OECD, 2019). Reading skills are closely linked to educational attainment, workforce readiness, and economic growth making the assessment and evaluation of students' reading literacy essential. Moreover, in today's digital landscape, where information is abundant but not always reliable, the ability to critically evaluate sources and distinguish credible information from disinformation has become more important than ever (Suarez-Alvarez, 2021).

Dutch students have traditionally performed above the OECD average in PISA reading scores. However, their reading proficiency has declined in recent years, placing the Netherlands below the OECD average. Low reading literacy represents a concern as it is fundamental to students' academic success and lifelong learning. Enhancing reading outcomes could improve overall educational performance and provide Dutch students with critical skills for their future.
This section provides a detailed analysis of PISA reading scores data for the Netherlands and some high-performing countries. In addition, to identify best practices and effective policy strategies, a literature review examines the main factors associated with high and low proficiency in reading.

### 4.7.2. Best practice countries

According to the most recent PISA results, many OECD countries have experienced a decline in reading performance. However, some education systems have managed to keep high levels or even improve their students' outcomes. This section explores four high-performing countries (Ireland, Estonia, Finland, and Canada), that have performed well in reading literacy.

#### 4.7.2.1 Ireland

In recent years, Ireland has made significant progress in PISA reading scores. The country has implemented several targeted reforms to strengthen literacy from the early years of schooling. In particular, the National Literacy and Mathematics Strategy 2011–2020 introduced clear targets for student achievement, emphasising phonics-based instruction, early detection of reading difficulties, and improvement of teaching quality. The initial targets set by the strategy were successfully achieved and new ones have since been set, based on PISA results (Shiel et al., 2022), underlining a continued attention to educational outcomes. Further specific focus was placed on student engagement mechanisms, strengthening teaching skills, and promoting parental involvement. These combined efforts enabled Ireland to achieve high PISA results and to become one of the best performing countries.

#### 4.7.2.2 Finland

Finland is an example of a country that consistently ranks high in PISA reading results. A key strategy of the success can be found in the commitment to educational equity. The school system is fully publicly funded and free of charge, and it ensures equal learning opportunities across the country. This model has produced the lowest between-school variation in PISA reading scores among OECD countries, 7% of the overall variance (Ahonen, 2021). Furthermore, the performance of Finnish students is supported by a strong investment in teacher training; teachers work with high professional autonomy and are highly qualified. Furthermore, the Finnish school culture promotes student well-being, social cohesion, and lifelong learning (OECD, 2020c). These factors contribute to high reading achievement and Finland's reputation as a global model of equitable and effective education.

#### 4.7.2.3 Estonia

Estonia has emerged as a top-performing country in PISA reading. The strong performance is the result of a coherent, long-term set of policy measures focusing on quality, equity, and modernisation (Tire, 2021). Estonia has also pursued a clear digital vision for education. National programmes such as the "Tiger Leap" initiative and the "Lifelong Learning Strategy 2020" have promoted the integration of digital technologies, emphasised student-centred learning, and

established ambitious performance goals. In addition, Estonia implemented mandatory external examinations at the end of basic education, aligning with the competences measured by PISA. Assessment culture, educational equity, digitisation, and early intervention have enabled Estonia to become a model of effective education.

#### 4.7.2.4 Canada

Canada is another country that demonstrates a high-performing education system. In particular, Canada is able to combine a high level of equity (small differences in achievement related to socio-economic status) with broad inclusion, having a very high percentage of 15-year-old students achieving basic skills in reading OECD (2023b). Inclusion occurs especially with a broad focus on students from immigrant backgrounds in Canada, who achieve reading results equal to or higher than native peers OECD (2023f). In Canada, the education system is decentralised, but high educational standards are widespread everywhere, showing that a well-structured decentralised system can achieve excellent results on a national scale.

### 4.7.3. Relevant data on the Netherlands and best practice countries

To gain a deeper understanding of the key issues and the main characteristics of the students' results in reading and mathematics, we present a selection of key statistics.

Figure 8 shows the trend in PISA reading scores for the Netherlands from 2009 to 2022. A decline in reading proficiency over this period is evident. Although the negative trend is common across many OECD economies, especially in the post-pandemic period, the Duch context deserves special attention. First, the country's average score has moved from above to below the OECD average over the years, experiencing one of the most significant declines in reading performance between PISA 2018 and 2022, with a drop of 25 PISA points. As Figure 9 shows, the decline is also evident for the top-performing countries. The graph shows the evolution of PISA reading scores from 2009 to 2022 for selected high-achieving education systems (Finland, Canada, Estonia, and Ireland).

*Figure 8: Trends in PISA reading scores in the Netherlands and the OECD average (2009–2022)*

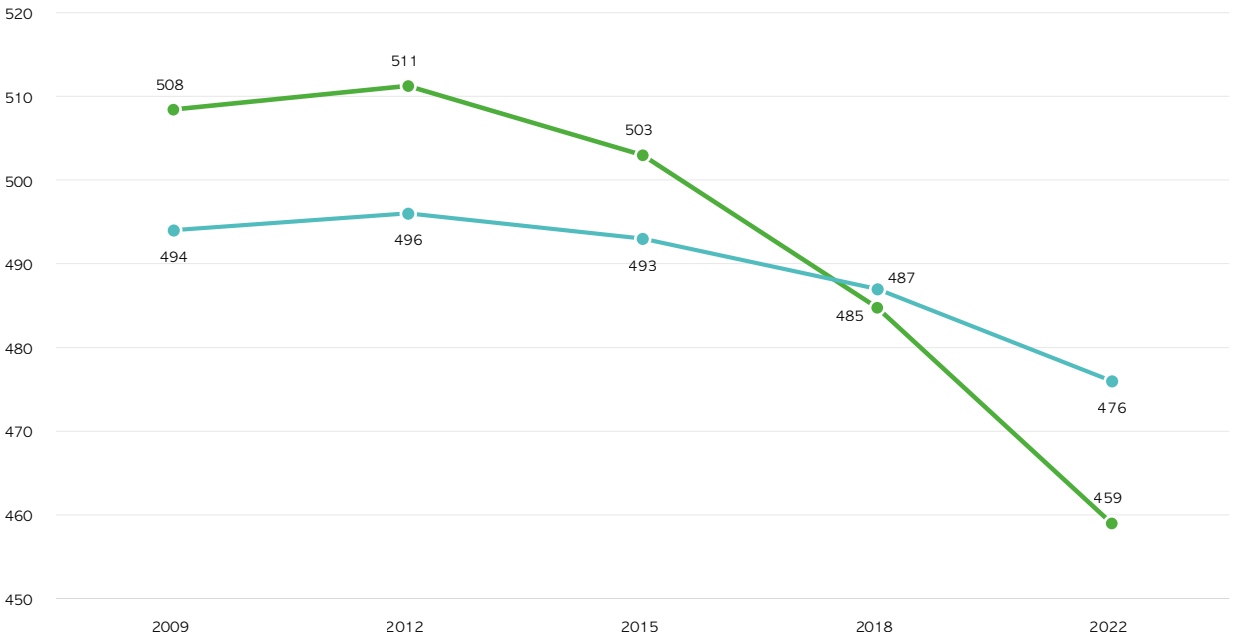
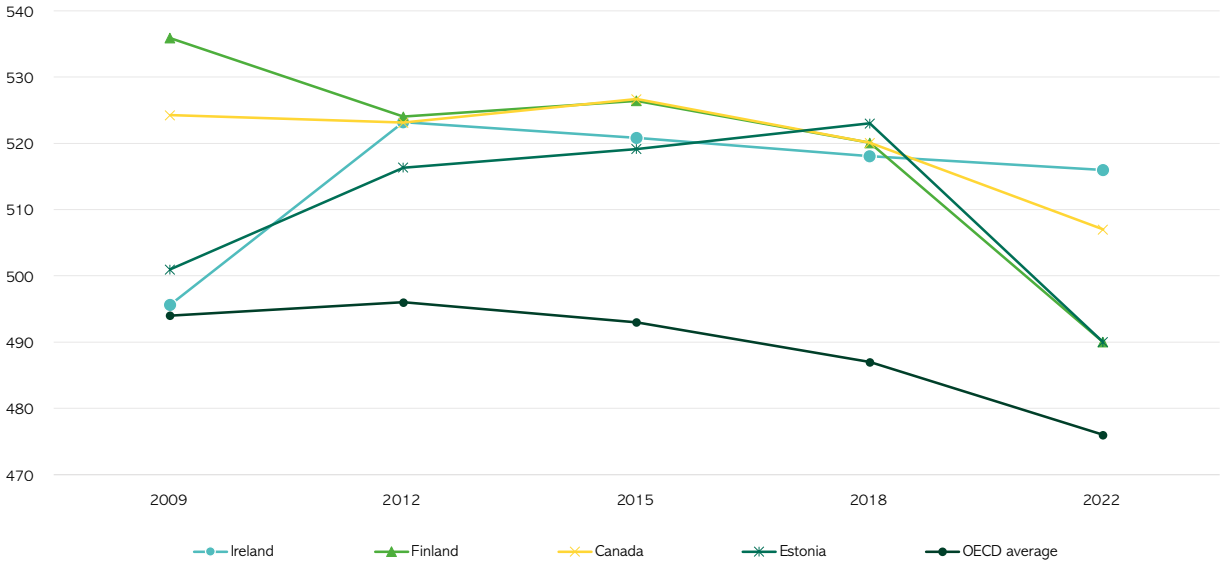


*Figure 9: Trends in PISA reading: top-performing countries and the OECD average (2009–2022)*




However, over the years, these countries have consistently outperformed the OECD average, although Finland and Estonia – two of the countries with the highest scores in reading performance – experienced a significant drop between 2018 and 2022, reflecting the widespread post-pandemic learning disruptions that affected many education systems. Despite this drop, the countries remain among the top performers in reading. Canada, on the other hand, maintained relatively stable reading scores for much of the period with a decline in 2022. Ireland, in contrast, has exhibited a more stable trend, with only moderate variations over the years. Ireland's reading performance in 2022 suggests a certain resilience, as it continues to maintain a high level of achievement.

Examining the results in greater detail, Table 5 presents several key PISA reading indicators for the Netherlands and several high-performing countries (Canada, Estonia, Finland, and Ireland), and the OECD average. The data provide insights into different aspects of reading performance, such as overall student achievement, gender differences, and the distribution of low and top performers.

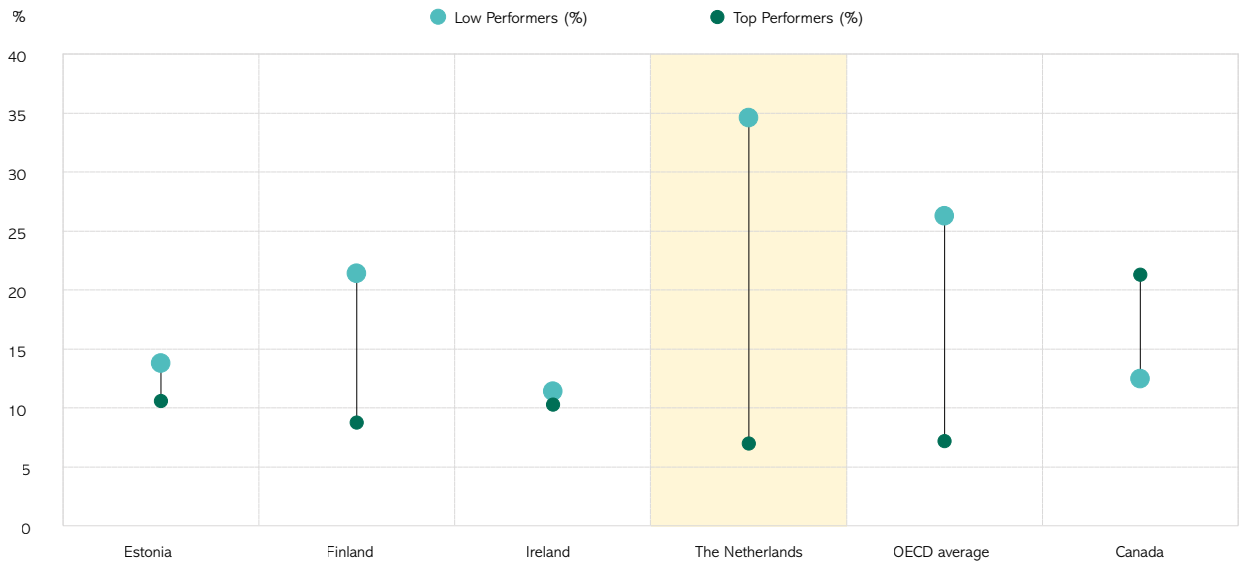
The Netherlands has the highest proportion of low-performing students (34.6%), significantly above the OECD average (26.3%) and much higher than countries such as Ireland (11.4%) and Estonia (13.8%). Additionally, low-performing boys in the Netherlands (39.3%) face particularly severe challenges compared to other countries, whereas the share of top-performing students remains one of the lowest among the selected countries. The gender gap is instead in line with the OECD average. Finally, Figure 11 presents shares of low-performing and top-performing students across selected countries in detail, showing that the contrast between low-performing and high-performing students is not only determined by average performance, but also by the balance of the distribution of performance in the student population. In some countries, such as Ireland, the percentage of low-performing students is very close to that of high-performing students, suggesting a relatively balanced distribution. Canada even has a higher percentage of high achievers than low achievers. On the other hand, the Netherlands shows a much wider gap, with a particularly high share of low-achieving students. This long tail of low achievement highlights a key challenge: efforts must now focus on targeted strategies to support struggling students.

*Table 5: Key PISA reading indicators*

| Dimensions of the reading score | Canada | Estonia | Finland | Ireland | Netherlands | OECD avg. |
|---|---|---|---|---|---|---|
| Student performance in reading (mean score) | 507 | 511 | 490 | 516 | 459 | 476 |
| Boys' performance in reading (mean score) | 495 | 498 | 468 | 507 | 447 | 464 |
| Girls' performance in reading (mean score) | 519 | 525 | 513 | 525 | 473 | 488 |
| Gender difference in reading performance, score-point difference (boys–girls) | −24 | −27 | −45 | −18 | −26 | −24 |
| Difference in reading performance between the 90th and the 10th percentiles (in score points) | 278 | 240 | 270 | 227 | 303 | 262 |
| Low performers in reading (percentage of students scoring below Level 2) | 18.1 | 13.8 | 21.4 | 11.4 | 34.6 | 26.3 |
| Top performers in reading (percentage of students scoring at Level 5 or 6) | 13.6 | 10.6 | 8.8 | 10.3 | 7 | 7.2 |
| Low-performing boys in reading (percentage of boys scoring below Level 2) | 21.8 | 17.5 | 28.2 | 14.5 | 39.3 | 30.7 |
| Top-performing boys in reading (percentage of boys scoring at Level 5 or 6) | 12 | 8.5 | 6 | 9.4 | 5.8 | 6.2 |
| Low-performing girls in reading (percentage of girls scoring below Level 2) | 14.4 | 9.9 | 14.3 | 8.2 | 29.6 | 21.7 |
| Top-performing girls in reading (percentage of girls scoring at Level 5 or 6) | 15.3 | 12.9 | 11.6 | 11.2 | 8.1 | 8.2 |
| Short-term change in mean reading performance (2018 to 2022, in score points) | −13 | −12 | −30 | −2 | −26 | - |

*Note: Source, Education GPS – Student performance (PISA 2022), Education GPS - Netherlands - Student performance (PISA 2022); the last column shows the OECD average.*

*Figure 10: Difference between the percentage of low and top performers in PISA reading scores*



### 4.7.4. Evidence-based solutions and literature

Reading skills are crucial not only for academic success, but also because they are closely linked to career opportunities and active participation in society. A growing body of literature has analysed the factors influencing students' reading performance using PISA data. These studies have highlighted the role of various determinants, including students' socio-economic background, family support, teaching strategies adopted, teaching quality, and student motivation (Hopfenbeck et al., 2018). In addition to factors associated with higher or lower PISA reading scores, another stream of literature has focused on strategies and interventions aimed at improving reading skills. What follows is a review of the main strategies, grouped by type of intervention: targeting at-risk students and personalised tutoring, technology-based interventions, and parental engagement.

#### 4.7.4.1 Targeting at-risk students and personalised tutoring

One of the most effective strategies for improving reading achievement among struggling students is individual or small-group tutoring. A meta-analysis by Slavin et al. (2011) across 607 studies found consistently positive average effects for tutoring interventions, with one-to-one formats yielding the strongest results. These programmes are particularly beneficial for socio-economically disadvantaged students, as confirmed by Dietrichson et al. (2017) and Neitzel et al. (2021), who also emphasised the effectiveness of interventions when tutoring is frequent, explicit (e.g. phonics and vocabulary instruction), and closely aligned with classroom instruction. Similarly, Gersten et al. (2020) found that structured literacy interventions in the early years of school led to significant improvements in basic reading skills when applied consistently and according to plan. For this reason, public policies should prioritise large-scale tutoring programmes, despite such interventions being resource intensive.

#### 4.7.4.2 Technology-based interventions

There is growing attention to the opportunity that digital tools and technology-based interventions can have on students' reading skills. Computer-assisted software can adapt to the specific needs of children, offering activities with engaging graphics and interactive elements that complement classroom instruction. Multiple interventions with different technologies have been analysed in the literature, and the target skills considered to be phonics (Li et al., 2020), fluency (Barber et al., 2018), and comprehension (Horne, 2017). Messer and Nash (2018), for example, studied the effects of using a computer program, Trainertext, which used a visual mnemonic to train phonological awareness. The results indicated that the participants significantly outperformed the control group in all measures. In the same vein, Horne (2017) studied the effect of using the Comprehension Booster programme, which addresses fluency and comprehension in reading and understanding texts at different levels of difficulty. Again, the treated group significantly outperformed the control group in terms of fluency and comprehension. Despite numerous positive results, some studies suggest that it is not the use of technology per se that produces effects, but the quality of pedagogical integration and adherence to the specific needs of students (Ni et al., 2022).

#### 4.7.4.3 PD for teachers

Professional development (PD) is another key ingredient to enhancing instructional practices and improving student literacy outcomes. A growing body of research underscores the importance of equipping teachers with evidence-based strategies to foster foundational reading skills. Wasik and Hindman (2011) demonstrated that intensive and sustained PD for teachers significantly improved classroom quality, and children's receptive vocabulary and phonological sensitivity. The intervention not only enhanced teachers' conceptual knowledge but also provided practical instructional strategies that directly affected the learning environment and children's early literacy development.

Extending this evidence, a comprehensive meta-analysis by Didion et al. (2020) reviewed 28 studies conducted between 1975 and 2017 to evaluate the impact of teacher PD on students' reading achievement from kindergarten eighth grade. Their findings confirmed that teacher PD has a moderate yet significant positive effect on student reading outcomes. The study highlighted the general efficacy of PD across diverse programmes and contexts, but also emphasised the need for better-designed studies to explore which PD characteristics are most impactful. These studies support the idea that targeted, research-based PD is a powerful policy for improving literacy instruction and student achievement, especially when it is intensive and closely tied to classroom practices.

#### 4.7.4.4 Parental engagement

Family involvement in a child's education is widely recognised as one of the key factors influencing academic performance. Positive family influence on children's development has beneficial effects from the earliest years of life. Exposure to books in early childhood is closely linked to the development of vocabulary and listening comprehension. Moreover, parental engagement in reading activities significantly supports the acquisition of early literacy skills, which in turn predict word reading abilities by the end of the first grade and reading proficiency in third grade (Sénéchal &

LeFevre, 2002). The relationship is often explained by the dual mechanism of the increasing perception of the student's cognitive competence and the quality of the student–teacher relationship (Topor et al., 2010). Recent studies confirm the multifaceted impact of parental involvement. Çalışkan and Ulaş (2022) found that structured reading activities with parental involvement significantly improved fourth grade students' reading comprehension, motivation, and attitude towards reading. This highlights how direct parental engagement contributes to the cognitive and affective dimensions of literacy development. However, van Bergen et al. (2017) point out that not all associations between home literacy environment and children's reading achievement are necessarily causal. Their study, which involved parent–child triads, found that when parental reading fluency was taken into account, most home literacy variables lost predictive power, except for the number of books in the home. This suggests that some effects commonly attributed to the home environment may instead reflect hereditary parental traits, underlining the importance of considering both environmental and genetic factors when interpreting the family's role in literacy development.

### 4.7.5. Conclusion

The decline in reading performance among Dutch students, as reflected in the PISA data from 2009 to 2022, introduces critical concerns about the effectiveness of current literacy policies and classroom practices. Although the decreasing trend is common in many countries, the negative trend in the PISA reading score for Dutch students appears particularly severe. The PISA average reading score moved below the OECD average in 2022, and more than one-third of students performed below the basic proficiency level.

Comparisons with high-performing countries such as Ireland, Finland, Estonia, and Canada reveal that policy focus, educational equity, and investment in teacher quality are key factors in maintaining high reading outcomes.

The analysis of PISA indicators shows that the Dutch system suffers from both low overall performance and a highly unequal distribution of results, with a long tail of low achievement. Countries such as Ireland and Canada show that it is possible to achieve both high performance and relative equity, limiting the share of low performers while maintaining a strong cohort of top achievers. This can and should be one of the future goals of the Dutch education system, focusing more strongly on disadvantaged students and implementing targeted measures to reduce the percentage of low performers.

Evidence from the literature confirms that effective solutions for improving reading must be multidimensional and targeted at the early levels of education. Interventions such as structured and frequent tutoring, especially for socio-economically disadvantaged students, have shown strong positive effects. PD for teachers plays a pivotal role, especially when it is intensive, research-based, and aligned with classroom practice. Technological tools, when well-integrated pedagogically, can complement instruction and support personalised learning. Additionally, parental engagement remains a powerful predictor of early literacy development, though its effects are influenced by both environmental and heritable factors.

Improving reading proficiency in the Netherlands will require a national, coordinated effort focused on equity, early intervention, teacher empowerment, and family engagement.

# 4.8. EVIDENCE-BASED SOLUTIONS FOR INCLUSIVE EDUCATION AND SUPPORT FOR DIVERSE LEARNERS

### 4.8.1. Introduction

The development of an inclusive education system has become a central priority for education systems across the world. Key documents such as UNESCO's Salamanca Statement (1994), the new Education 2030 Framework for Action and the Sustainable Development Goal 4 sustain the right to inclusive education for all students, emphasising inclusion and equity as the basis for quality education. However, translating the principles into practice remains a challenge, with many families of children with special educational needs (SEN) still concerned about the quality of their children's education. Despite increasing policy attention, children with SEN continue to be less likely to obtain high-level academic qualifications and face challenges in the labour market, as well as in achieving positive social outcomes (Jordan & Prideaux, 2018; OECD, 2023a). In this context, it is essential that countries invest in the implementation of policies aimed at supporting the academic, social, psychological, and physical development of students, focusing on the acquisition of skills and knowledge during their education (Mezzanotte, 2020).

The European Agency for Special Needs and Inclusive Education (EASNIE) has defined inclusive education as the "provision of high-quality education in schools that value the rights, equality, access, and participation of all learners" (EASNIE, 2018). Although a shared conceptual framework exists, there remains considerable differences in policies and practices across different Member States. These differences reflect the historical evolution of national education systems, and the multiple definition of SEN. Each country has developed its own definition, leading to divergent policy approaches and practical implementations (Brussino, 2020). Currently, in Europe, approaches to the education of students with SEN can generally be grouped into three models: (i) full inclusion of all students in mainstream education; (ii) separate education for most children with SEN; (iii) hybrid approaches combining elements of both systems. Traditionally, the Netherlands has maintained a strong separation between ordinary and special education, falling under the second model. However, recently the country has been progressively moving away from this tradition, evolving towards a more inclusive and hybrid educational model (Cera, 2015). It is important to emphasise that the concept of inclusive education goes beyond the mere physical integration of students into mainstream classrooms. It requires the creation of educational environments in which every student actively participates in the community and learns alongside their peers. Therefore, inclusion must be intended in a broad sense, referring to all students with SEN, physical or cognitive disabilities, learning disorders, language difficulties, or socio-economic disadvantage, whose needs require additional support to fully benefit from mainstream education (EASNIE, 2018).

This section examines the issue of establishing an inclusive education system with a focus on diverse learners. After a focus on best practices that can be learnt from other countries, an analysis of the literature evidence on interventions to promote an inclusive system is discussed, analysing the literature data on the topic.

### 4.8.2. Best practice countries

Several countries are recognised for their commitment to inclusive education. Among these, Finland, Canada, and Italy provide detailed models that may guide policy and practice.

#### 4.8.2.1 Finland

Finland is recognised for its inclusive education system, which is considered egalitarian, non-selective, and comprehensive. The Finnish system recognises the importance of identifying and addressing learning disabilities early and providing appropriate resources and interventions to minimise the need for special education (Sahlberg, 2014). A strong focus is placed on teacher training and PD. CPD opportunities ensure that teachers are always up to date with the latest research and best practices in inclusive education (Niemi, 2015). Moreover, the Finnish education system's strong commitment to inclusion is evident in its flexible curriculum and assessment frameworks. A key feature of this approach is the implementation of individual learning plans, which establish tailored goals and strategies designed to support each student's unique educational needs and promote equitable learning outcomes. Furthermore, Finnish schools incorporate the principles of the Universal Design for Learning (UDL), to ensure that teaching methods and classroom environments are accessible to all students from the outset.

#### 4.8.2.2 Canada

Canada is widely recognised for its commitment to inclusive education, although approaches vary by province. The country follows a decentralised model, with provincial governments responsible for developing inclusive education policies tailored to the needs of local communities. In 2009, Inclusive Education Canada (IEC) was established as an autonomous organisation with the objective of promoting quality education for all students in inclusive schools and classrooms. IEC advocates for the creation of inclusive, welcoming, and supportive learning environments that guarantee equal opportunities for all students, regardless of their background or abilities. Although progress is uneven across provinces, some regions such as Ontario and British Columbia have implemented particularly effective inclusive education models. Both provinces mandate the use of individualised education plans for all students who need support, with the help of multidisciplinary teams involving teachers, special education specialists, and families. They also invest in PD programmes focused on inclusive pedagogy and the application of UDL principles in all classrooms (Milford et al., 2022).

#### 4.8.2.3 Italy

The Italian education system is noted for its strong legal and cultural commitment to the inclusion of SEN students. Law 517 of 1977 mandated the integration of students with disabilities into mainstream schools. The country integrated into the system the use of support teachers (*l'insegnanti di sostegno*) within regular classrooms, allowing students with disabilities to learn alongside their peers. These support teachers collaborate with general educators to implement personalised learning strategies. The European Agency for Special Needs and Inclusive Education highlights Italy as an exemplary case where co-teaching, peer tutoring, and family engagement are deeply embedded in everyday school practices (EASNIE, 2020). However, challenges remain for the Italian system, particularly regarding large class sizes and regional disparities in the allocation of resources and specialised training, which can affect the consistency of inclusive practices across the country.

### 4.8.3. Evidence-based solutions and literature

The literature over the past decades has produced numerous studies on strategies that promote an inclusive and supportive environment for all students, fostering the academic success of SEN students. This section examines some of these strategies, grouped into key macro groups: teacher training and PD, cooperative classroom teaching, family involvement, and technology and adaptive supports.

#### 4.8.3.1 Teacher training and PD

Teacher PD is recognised as an essential element in building an inclusive education system that is responsive to students' needs. A meta-analysis (Donath et al., 2023) aggregated the results of 342 studies focusing on inclusive education. The results show that teacher training has positive effects on multiple levels. After training, teachers demonstrate significantly increased knowledge about inclusion and improved teaching skills for diverse classrooms. In addition, improvements were also found in teachers' attitudes, reducing negative biases or concerns.
Finally, small to moderate improvements in students' academic performance and behavioural outcomes are also reported. In the same direction, Lautenbach and Heyder (2019), highlight that targeted interventions during pre-service teacher education, especially those combining theoretical instruction with direct field experience, are effective in fostering more positive attitudes towards inclusion.
However, Sims and Fletcher-Wood (2020) argue that while there is a consensus on certain characteristics of effective PD, such as being sustained, collaborative, and subject-specific, this consensus may be based on studies with methodological weaknesses. They emphasise the need for more rigorous evaluations to accurately identify the features of PD that truly impact student outcomes.

#### 4.8.3.2 Cooperative teaching in the classroom (co-teaching)

Cooperative teaching or co-teaching refers to an organisational model in which two teachers share responsibility for teaching and assessment for the same class. In an inclusive context, the most common form of co-teaching is the pair consisting of a curricular teacher and a support or special needs teacher, working together to instruct a group that includes pupils with special needs. The idea is that by combining skills the two teachers can differentiate teaching more effectively and provide support to those in need without removing them from the classroom.

Research on co-teaching indicates several benefits. From the perspective of students with disabilities, having two teachers in the classroom can result in greater individual attention and immediate adjustments during the lesson rather than ex post. A meta-analysis of co-teaching interventions (Murawski & Swanson, 2001) reported a positive effect on the academic performance of students with special needs, especially in mathematics and reading.

More recent studies confirm that students with disabilities in co-teaching classes show progress comparable to that achieved in special classroom settings, without compromising the performance of peers without disabilities. For example, research conducted in Canada (Tremblay, 2013) compared the mathematics and reading achievement of classes adopting co-teaching versus traditional special classrooms. Pupils in the first case, including those with learning disabilities, achieved significantly higher scores on standardised tests than peers in classes without co-teachers. Recent studies further support these conclusions, showing that co-teaching can enhance the academic achievement of students with disabilities when high-quality collaboration and effective instructional strategies are in place. However, simply placing two teachers in the same classroom is not sufficient and the success of the interventions depends on careful planning and strong collaboration (King-Sears et al., 2021).

#### 4.8.3.3 Family involvement

Family involvement in the education of students with special needs is widely recognised as a key success factor. Active parental participation is associated with better academic outcomes, greater motivation to learn, and fewer behavioural problems among students overall (Musendo et al., 2023; OECD, 2025). Collaboration between families and schools is particularly critical for students with disabilities, as educational goals are more effectively achieved when both environments work in synergy, sharing methodologies and reinforcing progress.

Sheridan et al. (2011), in a randomised trial of a parental engagement intervention designed to promote school readiness among disadvantaged preschoolers, found statistically significant differences in favour of the treatment group. Children whose families participated in the intervention showed greater improvements in language use, and reading and writing skills compared to controls, highlighting the critical role of family involvement in early academic development. Further, Sheridan et al. (2019) conducted a meta-analysis examining the effects of family–school interventions on children's social-behavioural competence and mental health. Their findings revealed significant positive effects with communication, collaboration, and strong parent–teacher relationships being particularly influential. These results indicate the substantial benefits of family–school partnerships and the importance of tailoring interventions to the specific needs of diverse families and communities.

#### 4.8.3.4 Technology and adaptive supports

Assistive technology and other adaptive supports can play a crucial role in accommodating diverse learning needs. Assistive technologies such as software, apps, communication devices, and visual schedules can help students with disabilities participate actively in general classrooms. Empirical studies show that integrating assistive technology can improve educational access and outcomes for students with special needs. Fernández-Batanero et al. (2022), in a literature review, underline how technology enhances the inclusion and accessibility of students with disabilities. However, they also identified significant barriers, such as insufficient teacher training, lack of information, and accessibility challenges. Alongside technology, other adaptive supports such as curricular accommodation and specialist support services are critical. Empirical evidence supports providing accommodation such as extra time, simplified instructions, or sensory breaks to students who need them, as these adjustments enable equitable learning outcomes without compromising high expectations (Hustus et al., 2021).
Equipping classrooms with appropriate assistive technologies and ensuring that students receive the necessary accommodation are effective strategies to break down barriers to inclusion. However, implementation is not without challenges, including insufficient training and support for teachers (Howard-Bostic et al., 2015; Dell et al., 2020), as well as limited funding, which often prevents schools from providing assistive technology to all students who need it. These findings suggest that positive outcomes can only occur alongside a corresponding investment in teacher training, adequate resources, and systemic support for inclusive practices.

#### 4.8.3.5 Peer-mediated interventions

A set of studies focused on approaches that involve training or guiding classmates without disabilities, to provide academic and social support to students with SEN within general education classrooms. A literature review by Brock and Huber (2017) found that peer support arrangements are an evidence-based practice for promoting social interactions for secondary students with severe disabilities. In the same direction, a randomised controlled experiment has been implemented to examine the efficacy of peer support arrangements to improve academic and social outcomes for students with severe disabilities in high school general education classrooms (Carter et al., 2016). Compared to students exclusively receiving adult-delivered support, students participating in peer support arrangements experienced increased interactions with peers, increased academic engagement, more progress on individualised social goals, increased social participation, and a greater number of new friendships. Importantly, the involvement of peers as intervention agents had no negative effects on peers' own learning. Peer helpers often maintain, or even improve their academic engagement through these experiences (Bowman-Perrott et al., 2013; Travers & Carter, 2022).

This evidence suggests that peer-mediated interventions are a functional inclusive strategy to enrich the learning and social belonging of students with disabilities, contributing substantially to more inclusive and supportive classroom communities.

#### 4.8.3.6 Social emotional learning (SEL) programmes

SEL programmes are designed to develop students' skills in emotional regulation, empathy, interpersonal relationships, and responsible decision-making. SEL initiatives are recognised as essential tools to foster inclusive school environments that support the success of all learners, including students with SEN, learning difficulties, socio-economic disadvantages, or cultural and linguistic diversity. Research shows that SEL programmes improve students' social interactions, reduce behavioural problems, and enhance academic outcomes (Durlak et al., 2011). By promoting a positive school climate and strengthening social belonging, SEL initiatives contribute to the active participation and integration of diverse learners within mainstream classrooms, reinforcing the goals of inclusive education.

### 4.8.4. Conclusion

The development of an inclusive education system has become a central goal of many countries around the world. Besides the main issues related to a sufficiently comprehensive definition of students with SEN and the structure of the education system that includes all students in mainstream schools, the inclusiveness process stems from the implementation of policies with a diverse range of interventions intended to sustain and help all students.
The literature highlights several key strategies that effectively support the inclusion of students with SEN. The ongoing PD of teachers, cooperative teaching models, active engagement of families, integration of assistive technologies, and peer-mediated interventions demonstrate that building an inclusive education system is not limited to the physical placement of students with SEN in mainstream classrooms. It involves creating learning environments in which all students can fully participate, interact, and achieve academic and social success. Evidence shows that well-supported, well-staffed, and adequately resourced mainstream schools can promote both equity and excellence. Policies must therefore focus on investing in teacher preparation, promoting collaborative practices, ensuring access to technological and adaptive tools, and building strong partnerships with families.

# 4.9. GENERAL CONCLUSION

Relying on a benchmarking analysis, this chapter has highlighted a number of critical challenges currently facing in many Western education systems. Among the most pressing are persistent teacher shortages, comparatively high levels of educational inequality, under-participation in ECEC – particularly among minority and immigrant children – and declining performance in key academic areas such as mathematics and reading. These issues are not isolated; they reflect complex systemic dynamics that require multifaceted and coordinated policy responses.

Drawing on comparative insights from countries often regarded as exemplars – such as Finland, Estonia, Canada, and Singapore – the chapter illustrates that effective responses typically involve integrated policy packages that address both structural and pedagogical dimensions. In particular, strategies that invest in the teaching profession are consistently associated with better outcomes. These include strengthening initial teacher education, improving the quality and accessibility of PD, creating diversified career pathways, and ensuring competitive remuneration.

Moreover, addressing educational inequality demands targeted support for disadvantaged populations, both at the school level and across the broader education system. In the Netherlands, students from lower socio-economic and immigrant backgrounds face significant barriers to educational success. Evidence from Estonia and South Korea suggests that early interventions – such as universal access to high-quality ECEC, language support programmes, and inclusive curricular approaches – can mitigate these disparities. Importantly, these interventions are most effective when delivered through coordinated governance structures that ensure alignment across funding, curriculum, teacher training, and accountability systems.

The decline in Dutch students' performance in PISA assessments, especially in reading, signals the need for renewed attention to curriculum design and instructional quality. Countries that have succeeded in maintaining or improving academic achievement often combine foundational knowledge with critical thinking, problem-solving, and civic education. This is complemented by the use of data-driven interventions and sustained support for low-performing schools and students. Furthermore, efforts to build trust with underserved communities – through parental engagement, culturally responsive pedagogy, and inclusive communication – are crucial for fostering equitable educational environments.

Despite the progress made in certain areas, there remains a limited understanding of how specific policy interventions translate into improved outcomes, particularly within the European context. The Netherlands can therefore benefit not only from adopting international best practices, but also from investing in the continuous evaluation of domestic reforms. A systematic and evidence-based approach – grounded in comparative data, robust policy experimentation, and stakeholder collaboration – will be essential to ensure that all students, regardless of background, can access high-quality education and develop the competencies needed to thrive in a rapidly changing world.

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