Thematic Chapter

"Basic Skills and Skills Shortages"

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The Vienna Institute for International Economic Studies (wiiw)
Rahlgasse 3, A-1060 Vienna, Austria

www.wiiw.ac.at

Maryna Tverdostup
tverdostup@wiiw.ac.at

Scientific supervision: Robert Stehrer
Robert.Stehrer@wiiw.ac.at

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1 Introduction and Policy Relevance

The availability of strong basic skills, being reading, mathematics, science, and increasingly digital and citizenship skills, is a decisive factor for the economic and social development of the Danube Region. Human capital is not only a driver of productivity and growth[1], but also a cornerstone for inclusive societies and democratic resilience[2]. In the context of the Danube Region, with its diverse economic structures, demographic pressures, and migration dynamics, the development of foundational and citizenship skills among youth is directly linked to the ability of labour markets to adapt and remain competitive. Evidence from the European Commission (2024) shows that shortages in key occupational groups, including health, education, digital, green technologies, are sizeable and the mismatch between the skills of graduates and the needs of employers is a recurring challenge.[3]

International research has consistently highlighted that skills acquired during adolescence form the basis for later educational and labour market trajectories. Youth with strong literacy and numeracy skills not only achieve higher educational attainment, but also enjoy better employment prospects, higher wages, and greater occupational mobility.[4] By contrast, weak performance in core domains is associated with early school leaving, unemployment, and social exclusion. Studies on inequalities in education further show that socio-economic status, parental education, and immigrant background strongly shape skill acquisition and can perpetuate intergenerational cycles of disadvantage.[5]. For the Danube Region, where several countries still struggle with high rates of low achievement in reading and mathematics, tackling these inequalities is not only a matter of fairness but also of economic necessity.

At the same time, the drivers of skill development extend beyond family background. Research documents the importance of school factors, such as teacher quality[6], classroom climate and student-teacher relations and participation in extracurricular activities that

[1]For more evidence on the role of human capital in economic development, refer to (i) Hanushek, E. A., & Woessmann, L. (2012). Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation. *Journal of economic growth*, 17(4), 267-321; (ii) Dalloshi, P., & Kyqyku, D. (2023). Digital skills as an impetus for the acceleration of economic digitalization: EU perspective. *Corporate Governance and Organizational Behavior Review*, 7(3), 365-374.

[2]`https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/11/oecd-skills-outlook-2023_df859811/27452f29-en.pdf`

[3]`https://op.europa.eu/webpub/eac/education-and-training-monitor/en/`

[4]Psacharopoulos, G., & Patrinos, H. A. (2018). Returns to investment in education: a decennial review of the global literature. Education Economics, 26(5), 445-458.

[5]For more detailed evidence, refer to (i) Chmielewski, A. K. (2019). The Global Increase in the Socioeconomic Achievement Gap, 1964 to 2015. *American Sociological Review*, 84(3), 517-544.; (ii) Schnepf, S. V. (2007). Immigrants' educational disadvantage: an examination across ten countries and three surveys. *Journal of population economics*, 20(3), 527-545.

[6]Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014). Measuring the impacts of teachers II: Teacher value-added and student outcomes in adulthood. *American economic review*, 104(9), 2633-2679.

nurture creativity and problem-solving.[7], Recent work also emphasises the role of psychological constructs, such as growth mindset and sense of belonging in shaping student motivation and resilience.[8] These dimensions, captured for the first time in PISA 2022 on a large scale, are highly relevant for understanding how young people develop the broader "citizenship skills" needed in dynamic and uncertain labour markets.

As the Danube Region seeks to strengthen basic and citizenship skills among its youth, this thematic chapter also aligns directly with the European Union's strategic commitments. In particular, the EU's *2025 Action Plan on Basic Skills*, part of the broader Union of Skills Strategy, sets out coordinated steps to elevate proficiency in reading, mathematics, science, digital, and civic skills across Member States[9]. This Action Plan emphasises support for early years through adulthood, invests in educators through peer learning and mentoring, and launches a *Basic Skills Support Scheme* aimed at underachieving students, along with tools like apprenticeships toolkits and European School Alliances to scale effective practices. By benchmarking performance and exploring drivers of disparities, using PISA 2022 data, this chapter contributes tangible diagnostic evidence that can guide where national and regional efforts should be targeted within the Danube Region. It complements the EU's call to "boost basic skills teaching and learning", especially in digitally mediated and citizenship-oriented domains[10]. Moreover, these priorities are closely aligned with *Priority Area 9 (PA9) of the EU Strategy for the Danube Region "People and Skills"* , providing empirically grounded guidance for essential measures, including inclusive and high-quality schooling, teacher professional development, digital and vocational education integration, and mechanisms for cross-border peer learning and policy transfer.

From a policy perspective, the link between youth skills and labour market outcomes is critical. The European Skills Agenda[11] highlights that by 2030, at least 60% of adults should participate in training each year, but this ambition presupposes that young people enter adulthood with strong foundations that enable lifelong learning. Studies show that early mastery of literacy, numeracy, and problem-solving predicts later capacity to upskill and reskill.[12] On the contrary, skill deficits at age 15 often persist into adulthood, contributing to structural skills shortages.[13] This is particularly acute in the Danube Region, where demographic ageing and outward migration create additional pressures on

[7] https://www.oecd.org/en/publications/pisa-2022-results-volume-iii_765ee8c2-en.html

[8] Yeager,D.S.,&Dweck,C.S.(2020).Whatcanbelearnedfromgrowthmindsetcontroversies?.\protect\unhbox\voidb@x\bgroup\edefAmericanpsychologistmerican psychologist, 75(9), 1269.

[9] https://education.ec.europa.eu/education-levels/school-education/basic-skills

[10] https://education.ec.europa.eu/education-levels/school-education/basic-skills

[11] https://employment-social-affairs.ec.europa.eu/policies-and-activities/skills-and-qualifications/european-skills-agenda_en

[12] https://www.oecd.org/en/publications/ageing-and-skills_5k9csvw87ckh-en.html

[13] For more evidence, refer to Hanushek, E. A., Schwerdt, G., Woessmann, L., & Zhang, L. (2017). General education, vocational education, and labor-market outcomes over the lifecycle. *Journal of human resources*, 52(1), 48-87.

the supply of skilled labour.[14]

The broader labour market context underscores the policy relevance of the topic covered in this thematic chapter. Employers in the Danube Region increasingly report difficulties in filling vacancies in ICT, engineering, and health professions.[15] Skill shortages are partly a result of technological change and the green transition, but also of insufficient basic and transversal skills among school leavers. Weaknesses in foundational skills reduce the effectiveness of vocational and higher education systems, as students struggle to complete advanced training. Moreover, disparities in youth skills across countries risk deepening regional divides and limiting cross-border labour mobility, which is otherwise an important adjustment mechanism in the EU single market.

This thematic chapter therefore pursues three interconnected objectives. First, it maps the performance of Danube Region countries in basic and citizenship skills, benchmarking them against Danube EU Member States, Danube EU candidate countries, and the EU-27 average. Second, it investigates the drivers of performance gaps using econometric analysis of student-level PISA 2022 data, controlling for students-, family- and school-level characteristics. Third, it derives policy-relevant insights, highlighting country clusters and identifying levers that can reduce skills inequalities and mitigate future shortages.

Finally, by focusing on the period leading up to and following the COVID-19 pandemic, as well as the disruptions caused by Russia's war against Ukraine, this report also acknowledges the broader socio-economic shocks that have shaped educational outcomes and labour markets in the region. The findings therefore aim to support policymakers in designing resilient education and training systems that can both address immediate skills shortages and prepare for longer-term transitions, including digitalisation, green transformation, and demographic change.[16].

2 Data

The analysis relies on data from the *Programme for International Student Assessment (PISA) 2022*, conducted by the OECD.[17] PISA assesses the knowledge and skills of 15-year-old students every three years across OECD and partner countries, using a two-stage stratified sampling design that ensures national representativeness. In addition to direct cognitive assessments, PISA collects extensive background information through

[14] https://www.etf.europa.eu/en/publications-and-resources/publications/key-indicators-education-skills-and-employment-2022

[15] https://www.ela.europa.eu/sites/default/files/2023-09/ELA-eures-shortages-surpluses-report-2022.pdf

[16] https://www.etf.europa.eu/sites/default/files/2024-02/Green%20paper_2023%20-%20edited.pdf

[17] https://www.oecd.org/en/publications/pisa-2022-technical-report_01820d6d-en.html

student, school, and parent-level questionnaires. The thematic chapter focuses on the twelve countries of the Danube Region for which PISA 2022 data are available: Austria, Bulgaria, Croatia, Czechia, Germany, Hungary, Romania, Slovakia, and Slovenia, as well as the EU candidate countries Montenegro, the Republic of Moldova, and Serbia. The analysis also benchmarks country-specific outcomes against the averages for the EU-27, the Danube Region EU Member States, and the Danube Region EU candidate countries.

A distinctive feature of PISA 2022 is the renewal of several domains that align closely with the European skills agenda.[18] In addition to the long-standing focus on mathematics, reading, and science, the 2022 cycle introduced a new domain of creative thinking and expanded measures of growth mindset, sense of belonging, and ICT competence. These additions reflect the growing recognition that beyond literacy and numeracy, young people require transversal competences such as digital skills, adaptability, creativity, and social competences in order to thrive in rapidly changing labour markets and democratic societies. This conceptual broadening alligns with the priorities of the European Education Area[19] and the Council Recommendation on Key Competences for Lifelong Learning[20], which emphasise both strong foundational skills and the acquisition of digital and citizenship competences as cornerstones of the EU's human capital strategy.

Seven outcome measures are analysed throughout this thematic chapter, grouped into four *basic skills* and three *citizenship skills*:

- **Basic skills**:

    1. *Mathematics* (PV1MATH–PV10MATH): performance-based test scores, scaled to OECD mean = 500, SD = 100, with observed student values typically between 200 and 800.
    2. *Reading* (PV1READ–PV10READ): performance-based test scores, same scaling and range as mathematics.
    3. *Science* (PV1SCIE–PV10SCIE): performance-based test scores, same scaling and range as mathematics.
    4. *ICT competence (ICTCOM)*: an index of self-reported ability to perform ICT-related tasks (e.g., creating a presentation, using spreadsheets), derived from student questionnaire responses. Standardised to OECD mean = 0, SD = 1.

- **Citizenship skills**:

[18] `https://employment-social-affairs.ec.europa.eu/policies-and-activities/skills-and-qualifications/european-skills-agenda_en`

[19] `https://education.ec.europa.eu`

[20] `https://education.ec.europa.eu/focus-topics/improving-quality/key-competences`

1. *Sense of belonging (BELONG)*: an index of students' self-reported connectedness to school, derived from questionnaire items. Standardised (OECD mean = 0, SD = 1).
2. *Growth mindset (GROWTH)*: an index of students' beliefs in the malleability of intelligence, based on questionnaire items. Standardised (OECD mean = 0, SD = 1).
3. *Creative thinking (CREATCOMP)*: a performance-based domain introduced in PISA 2022, assessing originality and idea generation. Standardised (OECD mean = 0, SD = 1).

3 Basic Competences in the Danube Region: Descriptive Overview

We begin by examining descriptive estimates of student competences in the Danube Region, covering four basic skills (mathematics, reading, science, ICT competence) and three citizenship skills (sense of belonging, growth mindset, creative thinking). The overview presents average outcomes for the total student population as well as by gender, allowing us to identify systematic divides between boys and girls. Benchmarking against EU-27, Danube Region EU Member States, and Danube Region candidate countries provides a comparative frame for interpreting country-level differences.

3.1 Basic skills: mathematics, reading, science, and ICT competence

The cognitive domains of mathematics, reading, and science show a consistent pattern (see Figures 1 through 3). EU Member States of the Danube Region generally perform close to the EU-27 average, while EU candidate countries cluster at the lower end of the scale. In mathematics, Austria, Czechia, and Slovenia sustain results close to the European average, while Bulgaria, Romania, and EU Candidate Countries perform considerably below. Reading follows a similar pattern, with Czechia, Austria, and Germany at the top of the regional distribution, Romania, Bulgaria, and the EU candidate countries at the bottom. Science outcomes reinforce these divides, as Slovenia and Czechia achieve scores above the EU average, while the Republic of Moldova and Montenegro are positioned much lower.

ICT competence, measured as students' self-assessed ability to perform digital tasks, presents a somewhat different profile (see Figure 4). Here, EU Member States of the

region report lower averages than the EU benchmark, with only Croatia achieving a positive value. Austria and Germany, despite comparatively strong academic results, also show weaker self-confidence in ICT skills. Data for non-EU countries are not available, but the general trend indicates that digital self-competence lags behind traditional cognitive domains across much of the region.

Taken together, the four domains of basic skills reveal a strong divide between EU Member States and EU candidate countries of the Danube Region. The EU group clusters around the EU average, whereas non-EU countries fall substantially behind in mathematics, reading, and science. ICT competence adds a further challenge, as even some higher-performing EU Member States report comparatively low levels of digital confidence among students.

3.2 Citizenship skills: sense of belonging, growth mindset, and creative thinking

The three citizenship skills highlight patterns that are partly distinct from the cognitive outcomes (see Figures 5 through 7). Sense of belonging at school varies widely across the region. Austria and Germany display comparatively high levels of reported connectedness, while Bulgaria, Slovakia, and Czechia record some of the weakest outcomes. EU candidate countries such as Serbia and Montenegro, despite weaker academic performance, show relatively positive results on this dimension, indicating more favourable school climates in terms of social inclusion.

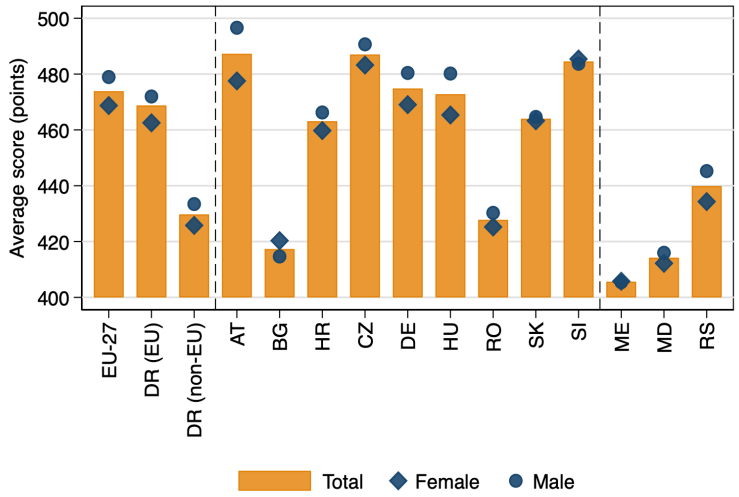
Growth mindset emerges as a consistent weakness. In nearly all countries, students are less likely to believe that intelligence can be developed through effort, with negative values recorded across the region. While the extent differs, the pattern is uniform, as students in both EU Member States and EU candidate countries of the Danube Region hold less adaptive beliefs compared to the OECD benchmark.

Creative thinking, assessed for the first time in PISA 2022 through direct problem-solving tasks, produces a more diverse landscape. Some EU Member States, notably Slovenia and Slovakia, record below-average results, while several EU candidate countries, including Montenegro, and the Republic of Moldova, perform comparatively better. This contrast sets creative thinking apart from the other domains, as strong cognitive performance does not necessarily coincide with high levels of creative competence.

3.3 Regional divides

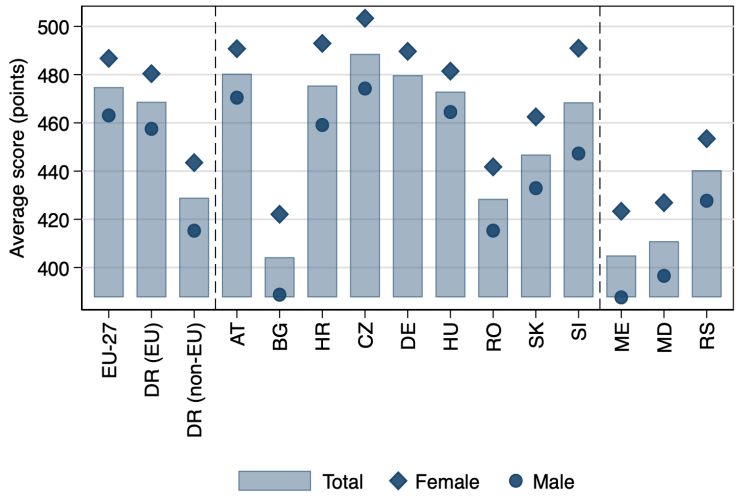
Across the seven domains, the EU/non-EU divide remains the most salient feature of the results. In the basic skills, EU countries largely cluster around the EU-27 average,

Figure 1: Mathematics total score and by gender, PISA 2022



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Mathematics is performance-based assessments reported on the PISA scale (OECD mean=500, SD=100), with observed student scores typically ranging between 200 and 800. PISA sampling and replicate weights were used in all estimations.

Figure 2: Reading total score and by gender, PISA 2022

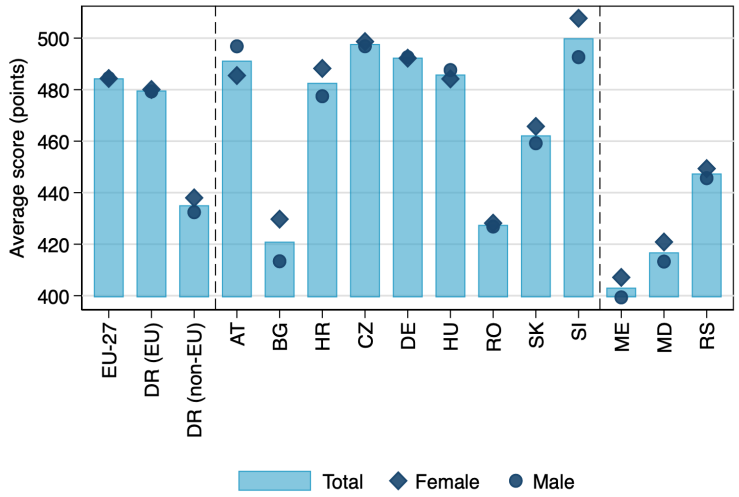


Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Reading is performance-based assessments reported on the PISA scale (OECD mean=500, SD=100), with observed student scores typically ranging between 200 and 800. PISA sampling and replicate weights were used in all estimations.

whereas non-EU members consistently record weaker outcomes in mathematics, reading, and science. This gap is persistent across domains and translates into marked differences in educational opportunities and attainment between the two groups. ICT competence further complicates the picture, as even strong EU performers record below-average self-assessments, pointing to a broader regional challenge in digital skills development.

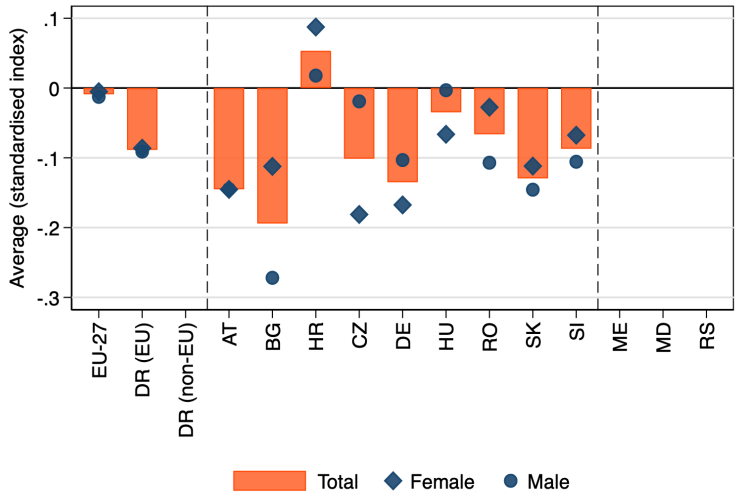
For the citizenship skills, the contrasts are less uniform but still noteworthy. Growth mindset is consistently weak across the region, regardless of EU membership, while sense

Figure 3: Science total score and by gender, PISA 2022



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Science is performance-based assessments reported on the PISA scale (OECD mean=500, SD=100), with observed student scores typically ranging between 200 and 800. PISA sampling and replicate weights were used in all estimations.

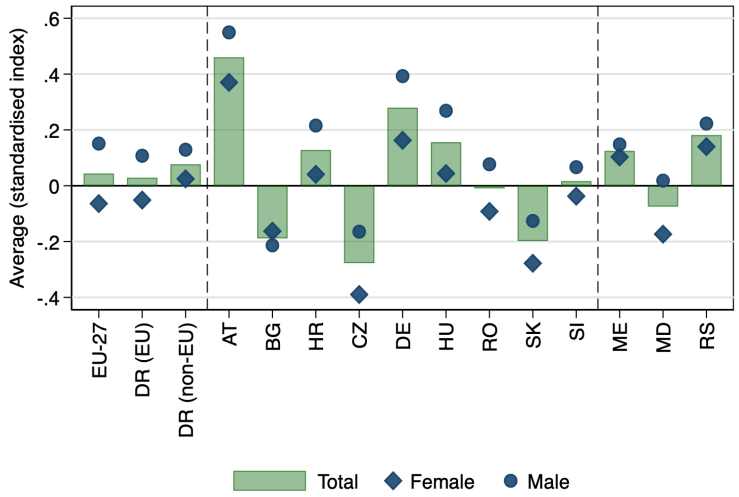
Figure 4: Self-reported ICT competence total and by gender, PISA 2022



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: ICT competence index is based on student self-reports and is standardised (OECD mean=0, SD=1), with values generally spanning –3 to +3. PISA sampling weights were used in all estimations.

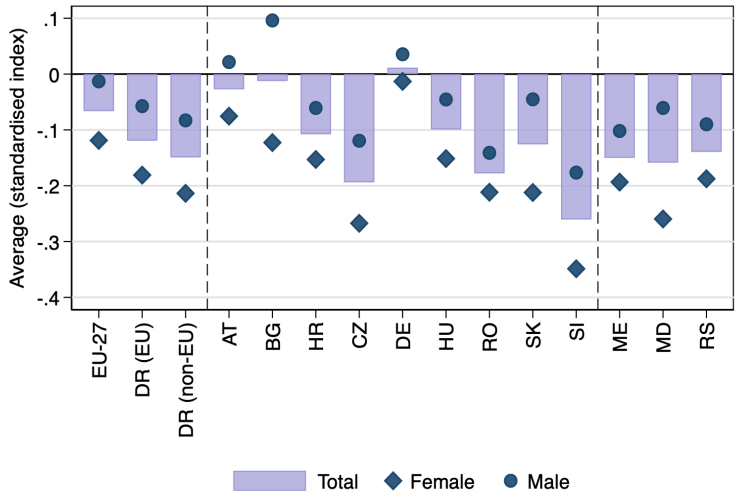
of belonging and creative thinking display more variation. In these domains, several EU candidate countries achieve relatively favourable results, in some cases outperforming EU Member States of the region. This pattern underscores that competences beyond the traditional academic domains do not always align with the broader EU/non-EU divide, but instead reveal a more diverse and sometimes unexpected set of strengths and weaknesses across the Danube Region.

Figure 5: Self-reported sense of belonging total and by gender, PISA 2022



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Index for feeling of belonging is based on student self-reports and is standardised (OECD mean=0, SD=1), with values generally spanning –3 to +3. PISA sampling weights were used in all estimations.

Figure 6: Self-reported growth mindset total and by gender, PISA 2022



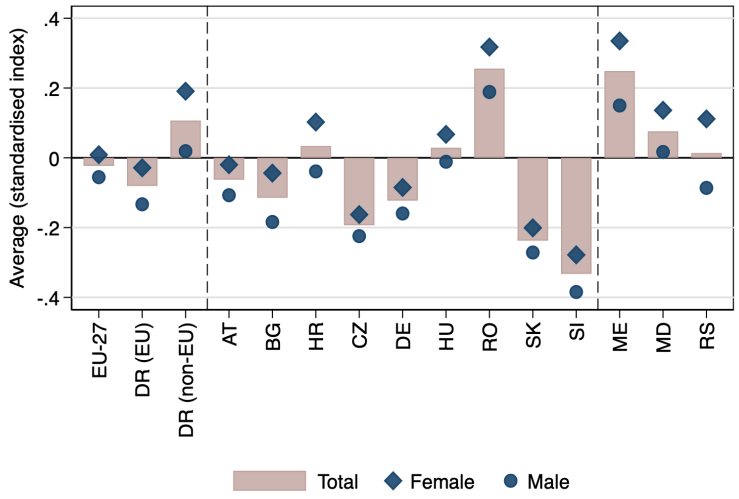
Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Index for growth mindset is based on student self-reports and is standardised (OECD mean=0, SD=1), with values generally spanning –3 to +3. PISA sampling weights were used in all estimations.

3.4 Gender differences

The PISA 2022 data reveal marked and systematic gender gaps across the Danube Region, with patterns that are broadly consistent across countries but differ in magnitude and, in a few cases, in direction.

In basic skills, girls outperform boys in reading without exception across the region (see Figure 2). The female advantage is substantial in several systems and remains pronounced on average in both EU Member States and EU candidate countries of the Danube Region.

Figure 7: Creative thinking total and by gender, PISA 2022



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Creative thinking index is derived from a new direct assessment and is standardised (OECD mean=0, SD=1), with values generally spanning –3 to +3. PISA sampling weights were used in all estimations.

By contrast, mathematics shows a male advantage in most countries, yet not uniformly so, with girls exceed boys in Bulgaria and Slovenia, and the gender gap is close to zero in Montenegro (see Figure 1). Results in science diverge from the conventional stereotype, as girls hold the advantage in most systems, with male leads confined to Austria and Hungary and near parity in Czechia, Germany, and Romania (see Figure 3). Taken together, these patterns point to a persistent subject-specific specialisation, with female strengths in literacy and, on average, science and male strengths in mathematics.

Self-assessed ICT competence presents a mixed picture among EU Member States of the Danube Region, with male advantages in Czechia, Germany, and Hungary, and female advantages in Bulgaria, Croatia, Romania, Slovenia, and Slovakia, with Austria being close to parity (see Figure 4). Overall, gender differences in ICT confidence are modest in size but not uniform, suggesting that digital self-perceptions are shaped by country-specific contexts rather than a single regional pattern.

Turning to the citizenship skills, sense of belonging at school is typically higher among boys across the region, with the sole counterexample of Bulgaria where girls report slightly stronger connectedness (Figures 5). Growth mindset shows the most consistent pattern, with boys report higher beliefs in the malleability of intelligence in every Danube country, with gaps that are modest but pervasive in both EU Member States and EU candidate countries (see Figure 6). Finally, creative thinking favours girls across all countries in the region, with particularly pronounced female advantages in Montenegro and Serbia (see Figure 7).

In summary, the gender divide intersects with the broader EU/non-EU differences but

does not map onto them one-to-one. While the female lead in reading is universal and the male lead in mathematics is common but not universal, science and ICT competence display greater heterogeneity across countries. Belonging and growth mindset is higher among boys, whereas girls reveal higher creative thinking across the region. These results highlight that gendered patterns of skill acquisition are a defining feature of student performance across the region, intersecting with the broader EU/non-EU divides described above.

4 What Drives Disparities in Basic Competences: Empirical Analysis

4.1 Empirical Method

To examine which student-, family-, and school-level characteristics[21] are most strongly associated with student skills and drive cross-country differences we estimate a regression model on PISA 2022 student-level data for the countries of the Danube Region. The analysis applies a common linear specification, estimated separately for each country and each of the seven outcome domains. This approach allows us to identify systematic patterns while accounting for cross-country variation. Namely, the following specification is estimated:

$$S_{i,c}^{j} = \alpha + \beta^{j} X_{i,c} + \gamma^{j} Y_{i,c} + \delta^{j} Z_{i,c} + \varepsilon_{i,c}, \tag{1}$$

where $S_{i,c}^{j}$ denotes the outcome of interest for student i in country c, with $j \in \{1, \ldots, 7\}$ representing the seven skill domains (four basic skills: mathematics, reading, science, ICT competence; and three citizenship skills: sense of belonging, growth mindset, creative thinking). The explanatory variables are grouped into three blocks: $X_{i,c}$ including student-level controls; $Y_{i,c}$ covering family-level controls; $Z_{i,c}$ incorporating school-level factors. The choice of the control variables is alligned with that commonly used in the education economics literature[22] and include variables as specified in Table 1.

[21] The labels for three groups of variables used in the analysis follow PISA survey structure, with the data collected via student, parents, and teacher questionnaires.

[22] See (i) Hanushek, E. A., Schwerdt, G., Wiederhold, S., & Woessmann, L. (2014). Returns to skills around the world. *European Economic Review*; (ii) Chmielewski, A. K. (2019). The global increase in the socioeconomic achievement gap, 1964 to 2015. *American sociological review*, 84(3), 517-544.

Table 1: Control variables included in the regression models

Variable	Description
Student-level controls	
Gender	Indicator for female students.
Immigrant background	indicator for first-generation immigrants.[23]
Programme level	ISCED level of the programme attended.
Skipping classes	Indicator of absenteeism or skipping lessons.
Family-level controls	
Family assessment	Parents' assessment of the student's school performance.
ESCS index	Composite index of economic, social, and cultural status.
Siblings	Indicator for presence of siblings in the household.
Parental occupation	Highest parental occupation (categorical, ISCO).
Parental education	Highest parental education level (categorical, ISCED).
Home possessions	Index of educational and cultural resources available at home.
Family support	Indicator for parental support with schoolwork.
School-level controls	
Teacher-student relations	Index of perceived teacher support and fairness.
School learning activities	Index of engagement in learning activities at school.[24]
Science participation	Participation in extracurricular science activities at school.
Creative writing participation	Participation in creative writing activities at school.

All regressions are estimated separately by country, using the final student weights (`W_FSTUWT`) to ensure nationally representative estimates. For mathematics, reading, and science test scores outcomes, variance estimation additionally applies the 80 replicate weights (`W_FSTR1-W_FSTR80`) with balanced repeated replication (BRR) and Fay's adjustment, as recommended in the PISA technical standards. This approach yields unbiased point estimates and valid standard errors, consistent with OECD guidelines.

The empirical analysis is based on a total of more than 43,700 student observations with all data discussed in Table 1 available from the twelve Danube Region countries included in PISA 2022. Country-specific sample sizes vary between just over 2,600 students in Bulgaria and around 5,400 students in Czechia. Medium-sized samples, available for Austria (3,602), Germany (3,091), Hungary (3,545), Romania (4,198), and Slovakia (3,442), while Croatia (3,821) and Slovenia (4,319), also provide robust coverage. Among

[23]Following the OECD definition, first-generation immigrants are those born outside a survey country.

[24]The indicator is derived from PISA 2022 student and school questionnaires, capturing the extent to which schools offer remedial lessons, peer-support schemes, digital or project-based learning opportunities, and other structured activities that help sustain students' engagement in learning.

the EU candidate countries, sample sizes are 2,822 in Montenegro, 3,614 in the Republic of Moldova, and 3,277 in Serbia.

4.2 Empirical Results: Factors Associated with Student Performance

This subsection presents estimation results following the specification discussed in Section 4.1. To visualise the findings in a comparative way, we employ heat maps that summarise the estimated coefficients across countries and skill domains. The colour shading indicates the magnitude and direction of associations, while coefficients that are statistically significant at the 1% or 5% level are shown in bold. This presentation highlights the most robust relationships between student competences and student-, family-, and school-level factors, while allowing an accessible overview of cross-country variation within the Danube Region.[25]

Mathematics

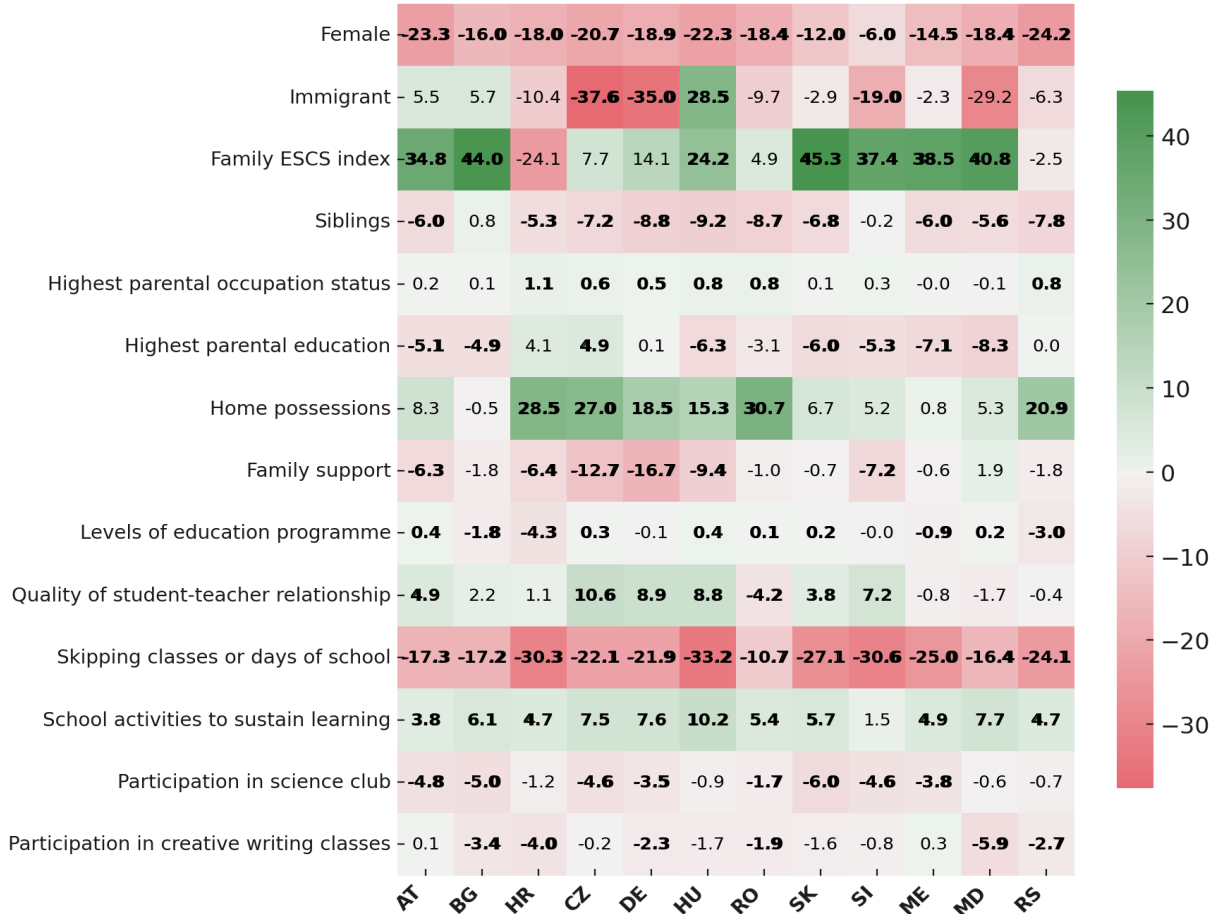
The regression results for mathematics show several consistent patterns across the Danube Region (Figure 8). Since the dependent variable is a test score, coefficients depicted on Figure 8 are expressed in PISA scale points. They can be interpreted as the expected point difference in performance associated with a one-unit change in the explanatory variable, holding all other factors constant. A difference of 40-50 points corresponds roughly to one year of schooling. Positive coefficients therefore indicate higher expected performance in points, while negative coefficients imply lower achievement.

The most stable predictor is school engagement. In all countries except Slovenia, students who report being more actively involved in school learning activities achieve significantly higher mathematics scores. This positive association is observed in Austria, Bulgaria, Croatia, Czechia, Germany, Hungary, Romania, Slovakia, Montenegro, the Republic of Moldova, and Serbia, underlining the importance of sustained classroom participation.

Family background remains another strong predictor. Higher socio-economic status, measured through the ESCS index, is positively and significantly associated with mathematics skills in Austria, Bulgaria, Hungary, Slovakia, Slovenia, Montenegro, and the Republic of Moldova, but negatively in Croatia. Similarly, material and cultural resources at home (home possessions) are significant positive predictors in Austria, Croatia, Czechia, Germany, Hungary, Romania, and Serbia, while parental occupational status shows significant positive effects in Croatia, Czechia, Germany, Hungary, Romania, and

[25] Complete regression estimation tables are available upon request.

Figure 8: Determinants of student outcomes in **mathematics** in the Danube Region: country-specific regression estimates



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Test outcome in mathematics is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in test score points). Coefficients indicate expected score point difference in performance associated with a one-unit change in the explanatory variable. Positive (green) values represent increases; negative (red) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models.

Serbia. These findings confirm that household resources continue to play a substantial role in shaping learning outcomes.

By contrast, some factors are systematically negative. Being female is associated with lower mathematics scores in all twelve Danube countries, confirming a persistent gender gap in this domain. Skipping classes or days of school is also strongly and negatively linked to mathematics achievement in every country, highlighting the cost of absenteeism. Students with more siblings likewise score significantly lower in all countries, except Bulgaria and Slovenia, suggesting that resource dilution within families may affect learning opportunities. In Austria, Croatia, Czechia, Germany, Hungary, and Slovenia, higher reported family support is negatively related to mathematics performance, which likely reflects compensatory support targeted to lower-achieving students.

Other school-level indicators also matter. The quality of student-teacher relationships is positively associated with mathematics outcomes in Austria, Czechia, Germany, Hungary, Slovakia, and Slovenia, while negatively in Romania. The level of the education programme attended shows mixed effects - positive in Austria, Czechia, Hungary, Romania, Slovakia, and the Republic of Moldova, but negative in Bulgaria, Croatia, Montenegro, and Serbia, reflecting different tracking structures across education systems. Participation in science clubs is negatively associated with mathematics outcomes in Austria, Bulgaria, Czechia, Germany, Romania, Slovakia, Slovenia, and Montenegro, while participation in creative writing classes is negatively associated in Bulgaria, Croatia, Germany, Romania, the Republic of Moldova, and Serbia, patterns that again may reflect selection effects, with weaker students disproportionately engaged in remedial or extracurricular activities.

Country differences are notable. For example, in Austria, Czechia, and Hungary the combination of socio-economic resources, student-teacher relations, and programme level produces particularly strong positive associations with mathematics outcomes. By contrast, in Bulgaria, Romania, and Serbia, the negative effects of absenteeism and low parental education dominate. While the broad patterns are regionally consistent, the magnitude and combination of predictors vary across national contexts.

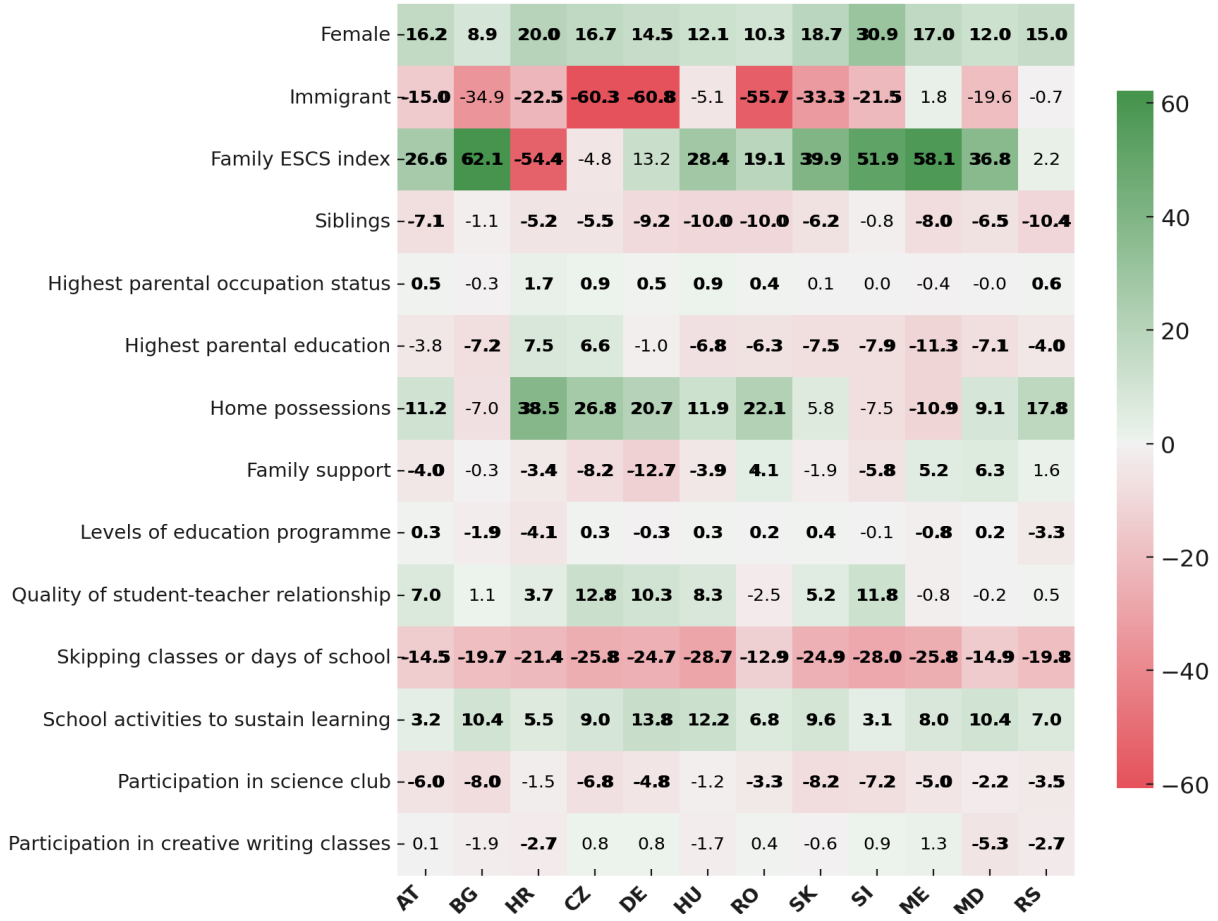
Reading

The regression results for reading reveal strong and consistent associations across the Danube Region (Figure 9). Interpretation of regression coefficients is the same as for Figure 8. Gender is the most stable predictor as in every country girls significantly outperform boys, confirming the well-documented gender gap in literacy.

Socio-economic background is also central. A higher family ESCS is positively associated with reading outcomes in Austria, Bulgaria, Hungary, Romania, Slovakia, Slovenia, Montenegro, and the Republic of Moldova, though negative in Croatia. Home possessions show significant positive effects in Austria, Croatia, Czechia, Germany, Hungary, Romania, the Republic of Moldova, and Serbia, while parental occupational status is positive in Austria, Croatia, Czechia, Germany, Hungary, Romania, and Serbia, but negative in Montenegro. Interestingly, once other family factors are controlled for, parental education turns negative in most countries (including Austria, Bulgaria, Hungary, Romania, Slovakia, Slovenia, Montenegro, the Republic of Moldova, and Serbia), suggesting complex within-family dynamics. Larger families also correlate with lower reading scores, as having more siblings is a significant disadvantage in ten countries, with the exceptions of Bulgaria and Slovenia.

School-level factors appear consistently favourable. Student-teacher relationships are positively linked to reading performance in Austria, Croatia, Czechia, Germany, Hungary,

Figure 9: Determinants of student outcomes in **reading** in the Danube Region: country-specific regression estimates



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Test outcome in reading is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in test score points). Coefficients indicate expected score point difference in performance associated with a one-unit change in the explanatory variable. Positive (green) values represent increases; negative (red) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models

Slovakia, and Slovenia, while negative only in Romania. Participation in school learning activities is strongly positive in all twelve countries, underlining the benefits of active engagement. On the contrary, absenteeism is universally detrimental, with negative effects in every case. Some extracurricular activities show counterintuitive patterns, as participation in science clubs correlates negatively with reading in Austria, Bulgaria, Czechia, Germany, Romania, Slovakia, Slovenia, Montenegro, the Republic of Moldova, and Serbia, while creative writing activities are negative in Croatia, the Republic of Moldova, and Serbia, likely reflecting selection of weaker students into remedial or compensatory programmes.

Country-level variation is notable. In Austria, Czechia, Germany, and Hungary, the combination of socio-economic resources and supportive teacher-student relations under-

pins strong reading outcomes. In Bulgaria and Romania, socio-economic disadvantage and larger families weigh heavily on achievement. Meanwhile, in Montenegro, the Republic of Moldova, and Serbia, absenteeism emerges as the dominant negative factor, although family support shows some positive associations with reading performance.

Science

The regression results for science reveal robust and regionally consistent patterns (Figure 10). School engagement stands out as the most reliable driver, as participation in school learning activities is positively linked to higher science scores in all countries except Slovenia. Supportive student-teacher relationships also show strong positive effects in Austria, Croatia, Czechia, Germany, Hungary, Slovakia, and Slovenia, though negative in Romania.

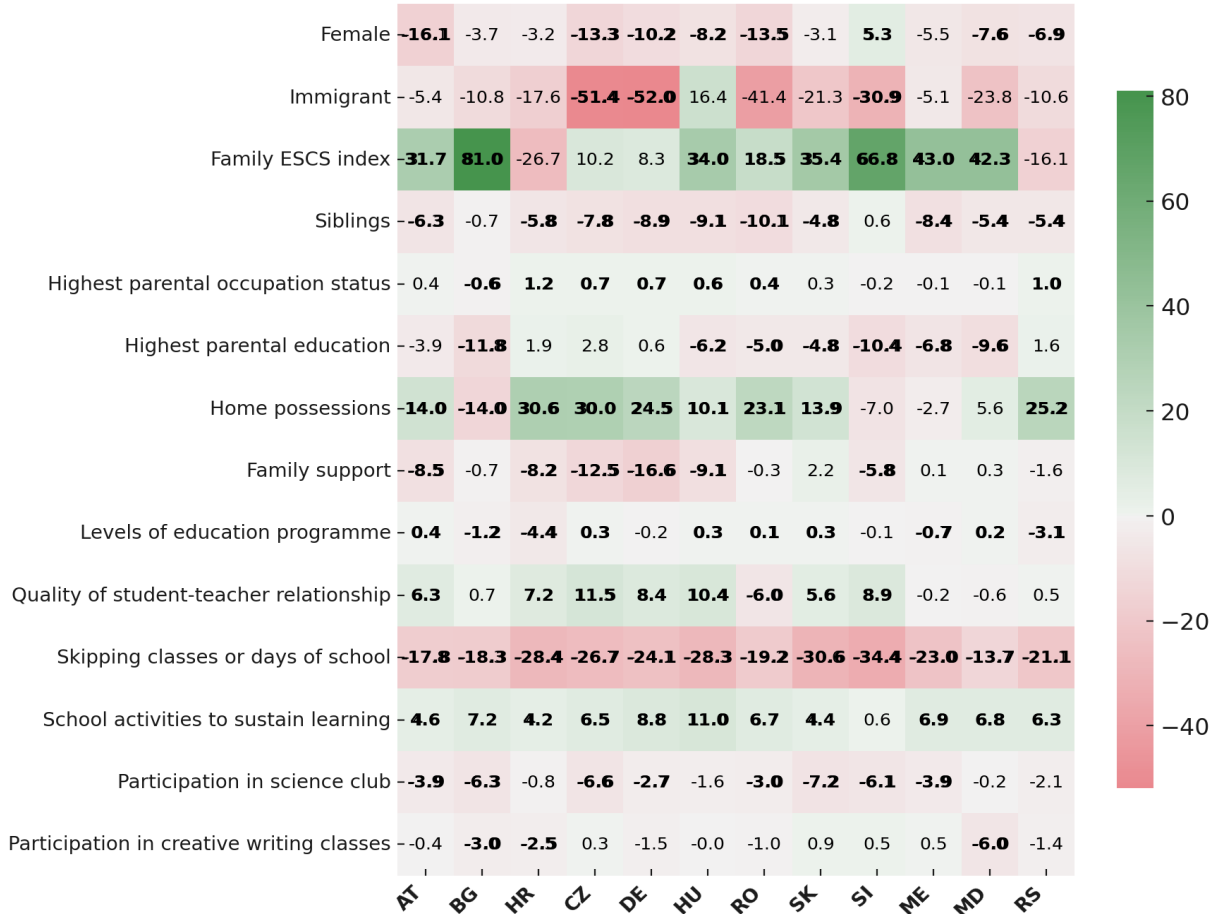
Socio-economic resources remain influential. The ESCS index is positively associated with performance in Austria, Bulgaria, Hungary, Romania, Slovakia, Slovenia, Montenegro, and the Republic of Moldova, but negative in Croatia. Home possessions contribute positively in Austria, Croatia, Czechia, Germany, Hungary, Romania, Slovakia, and Serbia, while parental occupational status is favourable in Austria, Croatia, Czechia, Germany, Hungary, Romania, and Serbia, but negative in Bulgaria. Parental education, by contrast, is negatively associated with science scores in Austria, Bulgaria, Hungary, Romania, Slovakia, Slovenia, Montenegro, and the Republic of Moldova, once other family characteristics are accounted for. Larger family size also proves disadvantageous, with significant negative associations in all countries, except Bulgaria and Slovenia.

Other factors show striking consistency. Absenteeism is negatively related to science outcomes in all twelve countries, making it one of the most stable risk factors across the region. Participation in science clubs correlates negatively with achievement in Austria, Bulgaria, Czechia, Germany, Romania, Slovakia, Slovenia, Montenegro, and Serbia, while creative writing participation is negative in Bulgaria, Croatia, and the Republic of Moldova.

Gender differences are evident, as being female is associated with lower science performance in Austria, Czechia, Germany, Hungary, Romania, Montenegro, the Republic of Moldova, and Serbia, while Slovenia shows a positive association, suggesting the gender gap is not uniform across the region. Immigrant students perform significantly worse in Czechia, Germany, Romania, and Slovenia, with no countries showing positive associations.

Country-level contrasts highlight these dynamics. In Austria, Hungary, and Czechia, socio-economic resources, supportive teacher-student relationships, and school engagement combine to drive particularly strong performance. In Bulgaria and Romania, the

Figure 10: Determinants of student outcomes in **science** in the Danube Region: country-specific regression estimates



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Test outcome in science is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in test score points). Coefficients indicate expected score point difference in performance associated with a one-unit change in the explanatory variable. Positive (green) values represent increases; negative (red) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models.

negative effects of absenteeism and parental education dominate. In the Republic of Moldova and Serbia, household resources, both positive (possessions, ESCS) and negative (siblings), are crucial. Overall, the science findings largely mirror those for mathematics but reveal even stronger links between socio-economic background, school engagement, and student achievement across the Danube Region.

ICT competence

The analysis of ICT competence, measured as students' self-assessed ability to perform digital tasks, highlights several consistent predictors across the Danube Region (Figure 11). Since, unlike Figures 8) through Figure 10), the dependent variable is an index, coefficients are measured in standardised units with an OECD mean of 0 and a standard

deviation of 1. The estimated coefficients are interpreted as the expected change in the index value (in standard deviation units) associated with a one-unit change in the explanatory variable, holding other factors constant, relative to the OECD reference distribution. Positive coefficients thus represent higher levels of the respective self-reported competence relative to the OECD average, while negative coefficients indicate below-average levels.

School engagement is the most reliable driver, with participation in school learning activities being positively associated with ICT competence in Austria, Bulgaria, Croatia, Czechia, Germany, Hungary, Romania, Slovakia, and Slovenia. Supportive teacher-student relationships show similarly positive effects in Austria, Bulgaria, Croatia, Czechia, Romania, Slovakia, and Slovenia. These results suggest that digital self-confidence is reinforced in classrooms that foster active engagement and supportive interaction.

Figure 11: Determinants of student **self-assessed competence in ICT tasks** in the Danube Region: country-specific regression estimates

Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Index of students' self-assessed competence in ICT tasks is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in standard deviation units). Coefficients are interpreted as the expected change in the index value (in standard deviation units) associated with a one-unit change in the explanatory variable, holding other factors constant. Positive (green) values represent increases; negative (red) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models.

Family resources also matter. Home possessions are positively linked to ICT competence in Austria, Bulgaria, Croatia, Czechia, Hungary, Romania, Slovakia, and Slovenia, while family support is an especially consistent predictor, showing positive associations in all nine countries. Together, these findings highlight the role of both material and emotional support at home in shaping digital self-efficacy.

Some negative associations also emerge. Female students report lower ICT competence in Austria, Czechia, Germany, Hungary, and Slovakia, pointing to a gender gap in digital self-confidence. Larger families are a disadvantage in Austria, Germany, Romania, and Slovenia, consistent with resource dilution. Higher parental occupation status and parental education are both negatively associated with ICT competence in Germany. Absenteeism shows a negative effect in Croatia and Hungary, while in Czechia it is unexpectedly positive, underlining the complex nature of school attendance patterns.

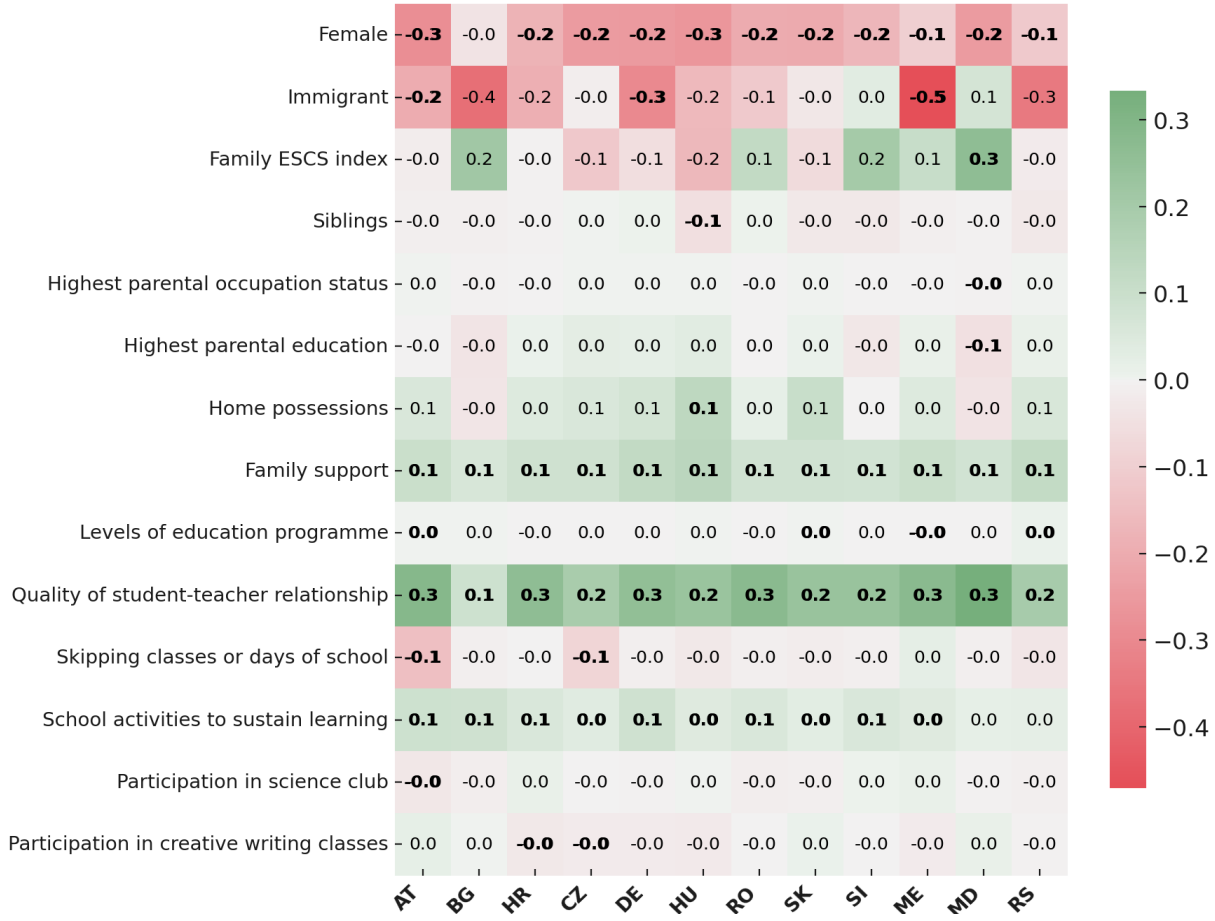
Other school-level factors show mixed effects. Participation in science clubs is positively linked to ICT competence in Croatia, but negative in Slovakia. Creative writing activities are positive in Slovakia and Slovenia, but negative in Czechia. Programme level is associated negatively in Croatia, but positively in Slovakia, reflecting track-related differences. Immigrant background shows a single positive association in Slovenia.

Similarly to the previously discussed skill domains, country variation is notable. In Austria, Croatia, Czechia, and Slovenia, the combination of strong school engagement and family support yields particularly favourable outcomes. In Germany and Slovakia, however, gender gaps and sibling effects reduce overall ICT competence. In Bulgaria, Romania, and Hungary, home resources play the strongest role, though absenteeism in Hungary and track effects in Croatia temper these gains.

Sense of belonging

The regression results for students' reported sense of belonging at school in the Danube Region point to the central importance of supportive environments, both in classrooms and at home (Figure 12). Coefficients are interpreted the same as in Figure 11. Positive student-teacher relationships are consistently and strongly associated with higher belonging in all twelve countries, making them the single most reliable driver of connectedness to school. Family support also shows significant positive associations everywhere, underscoring that encouragement from home reinforces students' feeling of inclusion. School learning activities add another positive dimension, with significant effects in Austria, Bulgaria, Croatia, Czechia, Germany, Hungary, Romania, Slovakia, Slovenia, and the Republic of Moldova. Taken together, these three factors, teacher support, family encouragement, and active classroom engagement, highlight the combined role of schools and households in shaping students' sense of belonging.

Figure 12: Determinants of student **sense of belonging** in the Danube Region: country-specific regression estimates



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Index of students' self-assessed sense of belonging is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in standard deviation units). Coefficients are interpreted as the expected change in the index value (in standard deviation units) associated with a one-unit change in the explanatory variable, holding other factors constant. Positive (green) values represent increases; negative (red) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models.

At the same time, several divides stand out. Female students report lower belonging in eleven countries (all except Bulgaria), suggesting a systematic gender gap in students' sense of connection to school environments. Immigrant background is also linked to lower belonging in Austria, Germany, and Montenegro, indicating that integration challenges extend beyond academic achievement. Absenteeism is another negative predictor. In Austria and Czechia, students who skip classes are significantly less likely to feel attached to their schools, pointing to a mutually reinforcing cycle of disengagement and detachment.

Other family- and programme-related indicators present a more mixed picture. Material resources matter in specific contexts, as in Hungary, home possessions are positively linked to belonging, while in the Republic of Moldova, higher parental education and occupation are negatively related, possibly reflecting status-related pressures. Programme

level effects vary: belonging is higher in Austria, Slovakia, and Serbia, but lower in Montenegro, reflecting institutional differences in tracking and pathways.

Overall, the sense of belonging results highlight a dual pattern. On one hand, supportive teachers, engaged families, and active learning consistently foster stronger school attachment. On the other, structural divides, notably gender, migration background, and socio-economic vulnerabilities, systematically reduce the likelihood that students feel fully included. These contrasts suggest that while positive relational and pedagogical practices can be highly effective in strengthening belonging, targeted interventions are still needed to close gaps for disadvantaged groups and ensure that the benefits of supportive environments are shared equitably across all students.

Growth mindset

Across the Danube Region, relatively few factors show consistent associations with students' beliefs in the malleability of intelligence (Figure 13). Coefficients plotted on figure Figure 13 are interpreted the same as in Figure 11. The clearest pattern is gender, as in Bulgaria, Croatia, Czechia, Hungary, Slovakia, Slovenia, the Republic of Moldova, and Serbia female students report significantly lower growth mindset, pointing to a broad but not universal gender gap.

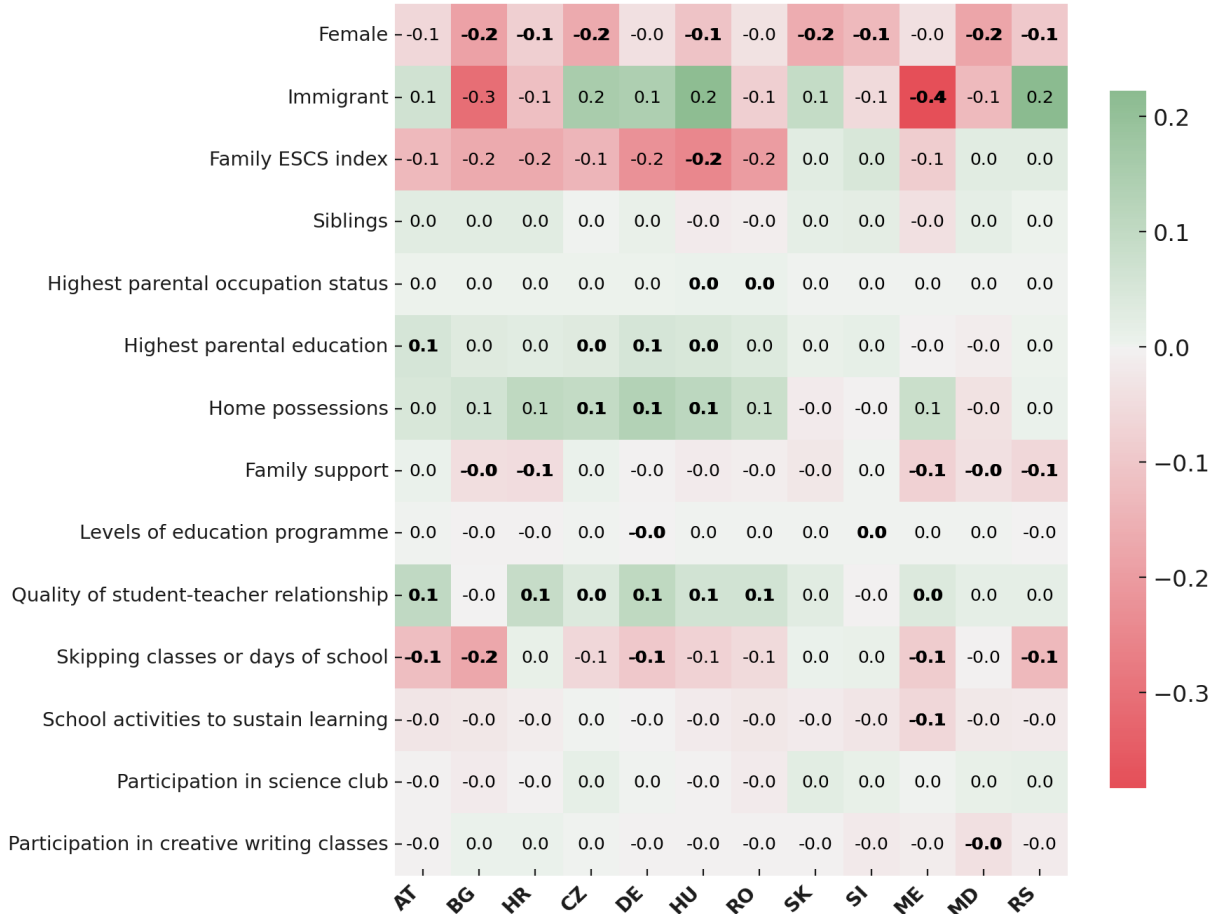
School-related influences are also visible. Supportive student-teacher relationships are positively linked to growth mindset in seven countries, spanning both EU and non-EU members, while absenteeism is negatively associated in Austria, Bulgaria, Germany, Montenegro, and Serbia. In Montenegro, reported school learning activities are also negatively associated, suggesting that how learning is structured may shape attitudes toward effort and ability.

Family background plays a more mixed role. Higher parental education is positively related to growth mindset in Austria, Czechia, Germany, Hungary, while higher parental occupational status Hungary and Romania. Home possessions are positive in three EU Member States (Czechia, Germany, Hungary). By contrast, family support is negatively linked in five countries, particularly in the Balkans and the Republic of Moldova, which may reflect compensatory family involvement when students are less confident in their abilities.

Country-level variation is pronounced. In Austria, positive teacher support and parental education appear to buffer against the negative effect of absenteeism. In Germany, strong family resources coexist with a negative programme-level effect, indicating that system-level pathways matter. In Montenegro, the combination of absenteeism, weak school learning engagement, and lack of positive family inputs coincides with lower growth mindset.

Overall, the results suggest that growth mindset in the Danube Region is less strongly

Figure 13: Determinants of student **growth mindsest** in the Danube Region: country-specific regression estimates



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Index of students' self-assessed growth mindset is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in standard deviation units). Coefficients are interpreted as the expected change in the index value (in standard deviation units) associated with a one-unit change in the explanatory variable, holding other factors constant. Positive (green) values represent increases; negative (red) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models.

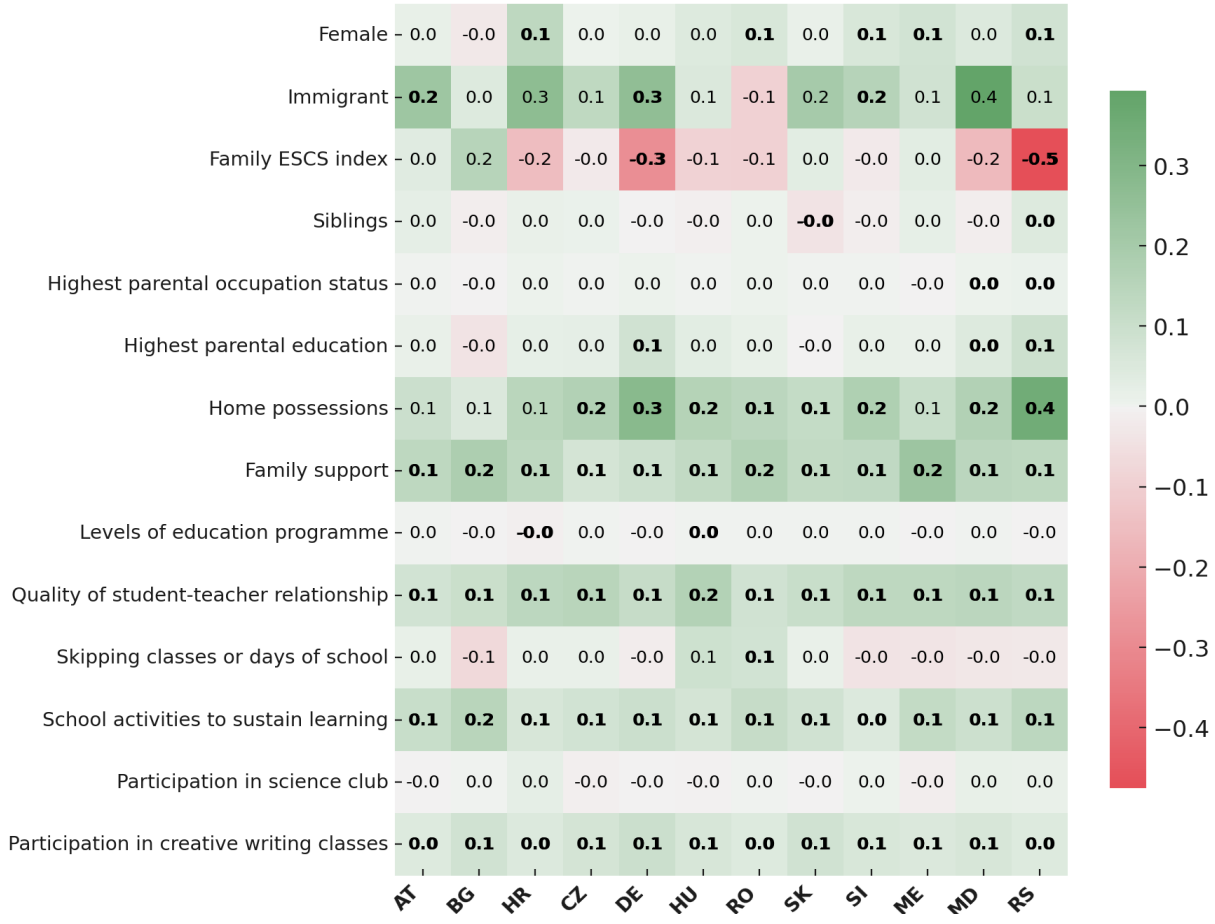
tied to socio-economic resources than cognitive outcomes, but is shaped by school climate, gender gaps, and in some cases parental education, with sharp contrasts across national contexts.

Creative thinking

Creative thinking shows some of the clearest and most consistent patterns across the Danube Region (Figure 14). Coefficients plotted on Figure 14 are interpreted the same as in Figure 11. Three predictors stand out with positive and significant effects in all twelve participating countries, namely school learning activities, teacher-student relationships, and family support. Participation in creative writing activities is also uniformly

positive across all countries. Together, these results suggest that active engagement at school, supportive learning environments, and encouragement at home are central drivers of students' creative competences.

Figure 14: Determinants of student **creative thinking competence** in the Danube Region: country-specific regression estimates



Source: PISA 2022 student-questionnaire data, the school-questionnaire data, and the teacher-questionnaire data.
Notes: Heatmaps show results from country-specific regression models using PISA 2022 data. Index of students' creative thinking competence is regressed on gender, immigrant background, socio-economic status (ESCS), parental education and occupation status, family and school supports, study programme level, and participation in science or creative activities. Coefficients indicate expected changes in the outcome index (in standard deviation units). Positive (red) values represent increases; negative (blue) values represent decreases. Bold numbers mark coefficients statistically significant at the 5% or 1% level. PISA sampling and replicate weights were used in all estimated models.

Household resources reinforce these findings. Home possessions are positively associated with creative thinking in eight countries, while parental education and occupation show positive effects in Germany, the Republic of Moldova, and Serbia . By contrast, family socio-economic status (ESCS) is negatively linked to creative thinking in Germany and Serbia, highlighting that higher status is not always aligned with stronger creative outcomes. Sibling effects are mixed, with a positive association in Serbia but a negative one in Slovakia.

Gender and background differences also emerge. Female students show significantly higher creative thinking in Croatia, Romania, Slovenia, Montenegro, and Serbia, while

immigrant students report higher scores in Austria, Germany, and Slovenia. Skipping classes is only significant in Romania, where it is surprisingly positive, though this likely reflects a localised effect rather than a general pattern.

Overall, creative thinking is the domain with the widest consensus across countries, as engagement at school, supportive teachers, family encouragement, and opportunities for creative expression are consistently linked to stronger outcomes. At the same time, national differences in how socio-economic status, gender, and immigrant background play out underline the importance of context when fostering creativity in education systems.

5 Conclusions and Recommendations

The analysis of PISA 2022 data for the Danube Region provides a comprehensive picture of student competences across four basic skills (mathematics, reading, science, ICT competence) and three citizenship skills (sense of belonging, growth mindset, creative thinking) and reveal several broad patterns.

First, a strong EU/non-EU divide persists. In mathematics, reading, and science, EU Member States of the region cluster around the EU-27 average, while candidate countries fall substantially behind. ICT competence is an exception, as even higher-performing EU countries report comparatively low levels of digital self-confidence, compared to OECD average. Citizenship skills reveal a more complex picture, while sense of belonging is relatively high in several candidate countries, creative thinking is not systematically aligned with cognitive performance, and growth mindset is uniformly weak across the region.

Second, gender differences are systematic but domain-specific. Girls consistently outperform boys in reading and creative thinking, while boys lead in mathematics and, to a lesser extent, in growth mindset and sense of belonging. Science outcomes favour girls in most systems, but the pattern is less uniform. ICT competence shows mixed gender effects, with both male and female advantages depending on national context. These divides underline that gender remains a key dimension of inequality in skills acquisition.

Third, the regression results demonstrate that school engagement and absenteeism are the most stable predictors across all skill domains. Active participation in school learning activities is positively associated with higher outcomes in mathematics, reading, science, ICT competence, and creative thinking, while absenteeism is negatively associated with all cognitive outcomes and with belonging. Teacher-student relations and family support also emerge as consistently positive correlates, especially for citizenship skills such as belonging and creative thinking. By contrast, socio-economic resources, measured by ESCS, parental occupation, and home possessions, remain central drivers of performance in the cognitive domains, confirming persistent social inequalities. Sibling numbers and

low parental education exert negative effects in many systems. Finally, participation in extracurricular science clubs often correlates negatively with performance in mathematics and science, likely reflecting selection effects.

Despite these similarities, important country differences remain within the Danube Region. Austria, Czechia, and Slovenia consistently perform closer to the EU benchmark, with strong positive effects from teacher support and socio-economic resources. In Bulgaria and Romania, weaker overall performance is compounded by steep socio-economic gradients and strong negative effects of absenteeism. Germany and Hungary exhibit sharp gender divides and socio-economic inequalities, while Western Balkan countries such as Montenegro and Serbia show comparatively positive results in belonging and creative thinking, even as their cognitive performance lags behind. These contrasts underline that while the EU/non-EU divide is the dominant pattern, each country also displays its own profile of strengths and weaknesses.

Three persistent challenges emerge from the evidence. First, socio-economic inequality remains a strong determinant of student competences, limiting upward mobility and reinforcing intergenerational disadvantage. Second, absenteeism undermines learning across all domains and is particularly damaging in the candidate countries. Third, gender divides persist in every domain, reinforcing stereotypes and constraining pathways into different fields of study and work. Alongside these challenges, there are also positive developments. Teacher-student relations and family support show consistently positive effects, pointing to the importance of human and relational resources. Several candidate countries perform comparatively well in creative thinking and sense of belonging, suggesting that supportive environments can nurture competences even where structural barriers persist.

These patterns have clear consequences for the labour market in the region. Employers across the Danube Region increasingly report shortages in ICT, engineering, health, and teaching professions, while the twin transitions of digitalisation and green transformation demand both strong foundational competences and transversal skills such as creative thinking and adaptability. Weak mathematics and science performance in several countries, combined with low ICT confidence even in high-performing systems, signals a mismatch between student competences and future labour market needs. Gender disparities in mathematics and ICT reinforce the underrepresentation of women in STEM fields, while weak growth mindset undermines the resilience and adaptability required for dynamic economies. On the other hand, stronger outcomes in creative thinking and sense of belonging in several candidate countries highlight areas of strength that can be harnessed to foster inclusive innovation and social cohesion.

On the basis of these findings, several policy priorities can be outlined that are closely aligned with the *Priority Area 9 (PA9) of the EU Strategy for the Danube Region "People*

and Skills". First, strengthening core competences in mathematics, science, and digital skills is essential, requiring targeted investments in curricula, teacher professional development, and digital infrastructure. Second, reducing socio-economic inequalities in education should remain a central priority, through expanded access to early childhood education, targeted support for disadvantaged families, and fairer school funding mechanisms. Third, tackling absenteeism and promoting school engagement are vital, with measures such as early warning systems, counselling, and active learning pedagogies. Fourth, addressing gender disparities is critical, as initiatives should encourage girls in mathematics, science, and ICT, while supporting boys in reading and creative thinking, drawing on mentoring, role models, and gender-sensitive pedagogy. Finally, fostering citizenship competences should be recognised as a core goal, as promoting growth mindset, creative thinking, and sense of belonging through innovative teaching methods and extracurricular activities is key to preparing students for democratic participation and lifelong learning.

Taken together, these recommendations highlight that closing skills gaps in the Danube Region requires a dual focus on raising performance in traditional domains where shortages are pressing, and strengthening citizenship competences that underpin resilience and adaptability. By acting on these priorities, *Priority Area 9* can contribute to reducing skills shortages, supporting inclusive growth, and equipping young people with the competences needed for the social and economic transformations ahead.