A JOURNEY IN 17 CHARTS

Mapping gender equality in STEM from school to work

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UNICEF Office of Global Insight and Policy
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INTRODUCTION

The future of work is changing. Existing jobs are being modified and new ones are emerging at the frontiers of our economies, which requires knowledge and skills in science, technology, engineering and maths (STEM). At the same time, millions of children and young people are not developing the skills they need to effectively participate in society. Girls, in particular, are missing out on the skills they will need throughout their lives and to become more effective citizens and changemakers — skills which quality STEM education can cultivate like thinking laterally, problem solving and innovating.

Against this backdrop, UNICEF in collaboration with ITU has published *Towards an equal future: Reimagining girls’ education through STEM* which presents a call to action for global, national and regional actors to the potential of STEM education to transform gender norms in the education system, to improve quality learning opportunities for girls, and to highlight key actions that can accelerate girls’ transition between education and STEM careers.

This prospectus is a supplementary resource to *Towards an equal future: Reimagining girls’ education through STEM* and provides a deeper dive into the gender disparities in STEM presented in the call to action. In particular, we trace gender disparities in STEM over the life course — from children’s participation and performance in STEM at different stages of education to their transitions to STEM employment and entrepreneurship. In doing so, we also highlight some key barriers that constrain girls from achieving in STEM at different stages of their life.
Millions of girls are deprived of opportunities to build their skills, including in STEM.

125 million girls of primary and secondary age in the developing world are out of school. Girls’ exclusion from education begins early and increases over their lifetime. While the vast majority of adolescent girls of upper secondary age begin primary education, fewer than half make it to the upper secondary level where STEM skills can be further solidified.

Source: UNICEF Education Pathways Analysis Dashboard. Note: Based on a sample of 92 LMICs across all regions.
Girls in school are equally or more likely than boys to achieve minimum proficiency levels in math and science. At the upper primary level, at least as many girls as boys achieve minimum proficiency levels (MPL) based on their respective assessment in most countries — 54 out of 86 countries in math and 58 out of 62 countries in science. This is also true at the secondary level where the share of girls achieving MPL is equal to or higher than boys in most countries — 64 and 76 out of 86 countries in math and science, respectively. In particular, the gender gap in science favours girls in 45 countries at secondary level.

Source: UNICEF calculations. Refer to endnote 3 for description of data sources and estimation approach. Note: Male advantage is defined as Adjusted GPI < 0.97. Female advantage is defined as Adjusted GPI > 1.03 while Adjusted GPI between 0.97 and 1.03 is defined as evidence of no distinct gender gap. Gender parity index (GPI) is defined as % of girls achieving MPL / % of boys achieving MPL. The GPI is further adjusted so it is symmetrical around 1. The Adjusted GPI methodology and thresholds follow the approach used in UNESCO (2017a).
However, this global snapshot masks regional differences...

### Upper-primary level

<table>
<thead>
<tr>
<th>Region</th>
<th>Math</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EAST ASIA &amp; PACIFIC</strong></td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td><strong>EAST EUROPE &amp; CENTRAL ASIA</strong></td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td><strong>LATIN AMERICA &amp; CARIBBEAN</strong></td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td><strong>MIDDLE EAST &amp; NORTH AFRICA</strong></td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td><strong>SUB-SAHARAN AFRICA</strong></td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>WEST EUROPE &amp; NORTH AMERICA</strong></td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td><strong>LOW &amp; MIDDLE-INCOME COUNTRIES</strong></td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td><strong>HIGH-INCOME COUNTRIES</strong></td>
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<td>3</td>
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</table>

### Secondary level

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<th>Science</th>
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<tbody>
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</tr>
<tr>
<td><strong>EAST EUROPE &amp; CENTRAL ASIA</strong></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>LATIN AMERICA &amp; CARIBBEAN</strong></td>
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<td><strong>MIDDLE EAST &amp; NORTH AFRICA</strong></td>
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<td><strong>SUB-SAHARAN AFRICA</strong></td>
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<tr>
<td><strong>WEST EUROPE &amp; NORTH AMERICA</strong></td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td><strong>LOW &amp; MIDDLE-INCOME COUNTRIES</strong></td>
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<td>16</td>
</tr>
<tr>
<td><strong>HIGH-INCOME COUNTRIES</strong></td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>

Data not available for secondary school in Sub-Saharan Africa

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### THE TAKEAWAY

In stark contrast to the performance of girls in many other parts of the world, fewer girls than boys are achieving MPL in math at the upper primary level in most developing countries in Sub-Saharan Africa (12 out of 23) and Latin America (10 out of 12). At the secondary level, too, the gender gap in favour of boys is visible in most developing countries in Latin America (all 11 countries in math and 9 out of 11 countries in science).
...as well as differences based on students’ socio-economic status within countries\(^6\)

<table>
<thead>
<tr>
<th>Region</th>
<th>SES</th>
<th>Upper-primary level</th>
<th>Secondary level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low SES</td>
<td>2 4 2</td>
<td>5 8</td>
</tr>
<tr>
<td>EAST ASIA &amp; PACIFIC</td>
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</tr>
<tr>
<td>High SES</td>
<td>6 2</td>
<td></td>
<td>7 7</td>
</tr>
<tr>
<td>E Arabic &amp; Medieval Asia</td>
<td>Low SES</td>
<td>4 1 3</td>
<td>5 12</td>
</tr>
<tr>
<td></td>
<td>High SES</td>
<td>2 5 1</td>
<td>5 11</td>
</tr>
<tr>
<td>Latin America &amp; Carribean</td>
<td>Low SES</td>
<td>1 1 13</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>High SES</td>
<td>1 7 7</td>
<td>19</td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>Low SES</td>
<td>4 2 2</td>
<td>3 3</td>
</tr>
<tr>
<td></td>
<td>High SES</td>
<td>3 1 4</td>
<td>6 3</td>
</tr>
<tr>
<td>West &amp; Central Africa</td>
<td>Low SES</td>
<td>2 8</td>
<td>Data not available for secondary school in West &amp; Central Africa</td>
</tr>
<tr>
<td></td>
<td>High SES</td>
<td>1 2 7</td>
<td></td>
</tr>
<tr>
<td>West Europe &amp; North America</td>
<td>Low SES</td>
<td>5 5 13</td>
<td>8 7 15</td>
</tr>
<tr>
<td></td>
<td>High SES</td>
<td>1 16 6</td>
<td>10 20</td>
</tr>
</tbody>
</table>

- Green bars: No. of countries where girls have an advantage in achieving MPL in math
- Blue bars: No. of countries with no gender difference in achieving MPL in math
- Yellow bars: No. of countries where boys have an advantage in achieving MPL in math

Source: UNICEF calculations. Refer to endnote 6 for description of data sources and estimation approach.

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**THE TAKEAWAY**

Socio-economic status (SES) is a key factor, with boys of a lower status more likely than comparable girls to achieve MPL in math in most countries at both upper primary (41 out of 72) and secondary (41 out of 78). But at higher SES, boys have an advantage in only a minority of countries at upper primary (27 out of 72) and secondary (10 out of 78). In science, too, the gender gap favouring boys is more pronounced among low SES learners at secondary (15 versus 2 countries).
Girls are less likely than boys to achieve high proficiency levels in STEM\(^7\)

<table>
<thead>
<tr>
<th>Countries where an average girl outperforms an average boy</th>
<th>UPPER PRIMARY</th>
<th>SECONDARY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Science</td>
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<table>
<thead>
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<th>Countries where an average girl outperforms an average boy</th>
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<tr>
<td></td>
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<td>6</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>1</td>
<td>31</td>
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<tr>
<td></td>
<td>18</td>
<td>38</td>
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</table>

<table>
<thead>
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<th>Countries where an average girl outperforms an average boy</th>
<th>UPPER PRIMARY</th>
<th>SECONDARY</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Science</td>
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<td>14</td>
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<td></td>
<td>32</td>
<td></td>
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<tr>
<td></td>
<td>6</td>
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</tr>
</tbody>
</table>

Source: UNICEF calculations based on PISA 2018. Refer to endnote 7 for a description of the estimation approach. Note: Male advantage in achieving high proficiency levels is defined as Adjusted GPI < 0.97, female advantage as Adjusted GPI > 1.03, and Adjusted GPI >= 0.97 and <=1.03 is evidence of no distinct gender gap. Gender parity index (GPI) is defined as % of girls achieving high proficiency levels / % of boys achieving high proficiency levels. The GPI is further adjusted so it is symmetrical around 1. To identify gender gap in performance of an ‘average’ girl vs an ‘average’ boy, the mean score of girls and boys was compared. The nature of the gender gap was determined based on the sign and statistical significance of the mean score difference.
LEARNING

Gender gaps in digital skills are wider in developing countries than in developed countries

THE TAKEAWAY

In developing countries, the gender digital divide constrains girls’ development of digital skills. For example, 23 per cent and 21 per cent fewer women than men are online or own a mobile phone.14

Gender norms pose yet another obstacle. In Sub-Saharan Africa, boys gain more in digital skills when they are in school compared to girls.15 Even among households with computers in DR Congo and Ghana, girls have lower levels of digital skills than boys.
When girls do use the computer or internet, they exhibit similar cognitive and behavioural skills as boys...

**THE TAKEAWAY**

Girls are at least as good at solving problems in technology-rich environment as boys in most countries (27 out of 31). Likewise, there appears to be small gender differences and no consistent pattern in gender gaps when it comes to critical evaluation and privacy skills.

**Source:** PIAAC2012 for performance on problem-solving in technology-rich environment, UNICEF Global Kids Online comparative report (2019) for critical evaluation and privacy skills
... but when it comes to advanced digital skills, women lag behind men everywhere

Source: ITU ICT SDG Indicators Database (Indicator 4.4.1). Most recent year value was used

THE TAKEAWAY

Just 8 out of 70 countries can boast 10 per cent or more women with programming skills. But 31 of these countries can point to at least 10 per cent of men with these skills. There is also some evidence to suggest that even when adolescent girls outperform boys in computer and information literacy, they lag behind boys in computational thinking skills and also have lower confidence in their use of specialized ICT applications.
Girls have lower self-confidence in their STEM abilities than boys in most countries. This is evident in the chart showing the percentage of secondary students with different levels of self-efficacy. In the countries where girls outperform boys in science, the self-efficacy rates are lower for girls compared to boys, especially in the high and moderate levels of self-efficacy. Conversely, in the countries where boys outperform girls, the self-efficacy rates are lower for boys in the high and moderate levels of self-efficacy. Overall, the chart underscores the need for addressing gender differences in self-efficacy to improve STEM performance globally.
ATTITUDES

Girls’ lower self-confidence is linked to gender gaps in their STEM engagement, interest and enjoyment.

An increase in gender gap in science self-efficacy is correlated with an increase in the gender gap in:

- Instrumental motivation to learn science: 0.44
- Participation in science activities: 0.46
- Valuing scientific approaches to inquiry: 0.51
- Interest in broad science topics: 0.56
- Enjoyment of science: 0.65

THE TAKEAWAY

While girls value scientific approaches to inquiry at least as much as boys, they have lower interest in science (except health) and lower participation in science activities in most countries, and also lower enjoyment of science in most countries where girls have similar or lower science scores than boys. In math, too, girls show lower interest and enjoyment in most countries (53 out of 65), even where there is no gender gap in mean scores (15 out of 22 countries).
ATTITUDES

Fewer girls than boys aspire to careers in science, technology or engineering, even among top performers

Source: OECD (2019a). Based on PISA 2018 supplementary results Table II.B1.8.22

THE TAKEAWAY

Being capable or confident in STEM does not mean that girls want to pursue STEM careers. In almost all countries, more boys than girls aspire to careers in science and engineering (72 out of 78 countries) or tech (all countries), while far more girls than boys seek a career in health (all countries). The gender gap extends to even the top-performers, with more than a fifth of top-performing boys aspiring to careers in science and engineering in most countries (41 out of 64), while the same can be said of top-performing girls in only a handful of nations (11 out of 64).
Gender gaps in STEM engagement, interest, enjoyment, and future career aspirations are shaped by gender norms, bias and stereotypes.

70% of individuals in 34 countries associated science with males more than with females.

In India, more than 50% of illustrations in math and science textbooks in primary show boys and only 6% girls.

Some 50% of parents in Chile, Hungary and Portugal expect their sons to have a STEM career but less than 20% had this expectation for their daughters.

Between 8 and 20% of grade 6 math teachers in Latin America believed that math is easier for boys to learn.

Girls have less instructional and discussion time, ask fewer questions, and receive less praise than boys.

In the US, more boys identified their male peers as knowledgeable about biology even relative to girls who perform better in the subject.

In Slovenia, the lowest achieving girls were those with the least opportunity to conduct experiments during chemistry lessons.

In Nepal, only 20% of science and 10% of math teachers are women.

In the UK, over a quarter of girls say they have been put off a career in tech as it is too male-dominated and only 22% can name a famous female working in tech.

In Uganda, information gaps about the relative profitability of male-dominated businesses play a key role, as do the types of role models, in influencing young women’s career paths.

Gender gaps in aspirations and attitudes at secondary level affects choices at the tertiary level

THE TAKEAWAY

Globally, 18 per cent of girls in tertiary education are pursuing STEM studies — compared to 35 per cent of boys. Even within the STEM fields, there lies a gender divide, with similar numbers of boys and girls pursuing natural sciences while far more boys looked to engineering, manufacturing and construction (7 per cent of girls versus 21 per cent of boys) and ICT (3 per cent of girls versus 6 per cent of boys).32

Source: UNICEF calculations based on data on 122 countries from UNESCO UIS database. Estimates are weighted. Most recent values between 2015-2018 are used.
Women find themselves underrepresented in STEM jobs

**THE TAKEAWAY**

Women comprise about 40 per cent of the STEM workforce across 68 countries.33 Women are well represented in health but are acutely under-represented in engineering and technology jobs and in STEM jobs of the future.34 For example, women comprise just 28 per cent of professionals in the tech industry. Women are also under-represented in STEM-related jobs that do not require a professional degree, for instance, making up just a third of that workforce in the US.35

Source: ILOSTAT data series on employment in STEM occupations, WEF (2019), WEF (2020), Gracey and Davidson (2012) Note: * refers to jobs with substantive STEM content. ^US data only. For all others, the WEF estimates are based on 20 advanced and emerging economies
Women’s underrepresentation in STEM careers is shaped by gender stereotypes, bias and norms

Gender stereotypes and lack of role models affect girls’ interest in STEM from an early age. Yet, even when women get STEM degrees, many do not pursue STEM jobs — in the US, just 38 per cent of women versus 53 per cent of men with computer degrees are in a computer occupation.36 Gender discrimination and bias at work also discourage women from entering or remaining in STEM jobs — for example, 50 per cent of women in tech jobs drop them by age 35 versus 20 per cent in other jobs.37

The number of women entrepreneurs in STEM is also low but growing...

**THE TAKEAWAY**

Women are also under-represented in entrepreneurship in STEM. In the US, 26 per cent of tech start-ups have at least one female founder, and in Europe, only 21 per cent of tech founders are female. In Latin America, too, fewer than 15 per cent of companies analysed by investment firms are founded by women STEMpreneurs. However, numbers are increasing — potentially creating more role models for girls and women.

**WORKPLACE**

**SHARE OF US STARTUPS WITH AT LEAST ONE FEMALE FOUNDER**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>2020, Tech-related</th>
<th>2020, Health-related</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>22%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>2018</td>
<td>24%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>2019</td>
<td>26%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>2020</td>
<td>26%</td>
<td>38%</td>
<td>26%</td>
</tr>
</tbody>
</table>

**SHARE OF WOMEN STEMpreneurs IN LATIN AMERICA**

- Before 2010: 7%
- 2010-2014: 12%
- 2015-2020: 81%

...however, women STEMpreneurs face many challenges

What women STEMpreneurs in Latin America say are their biggest challenges

- Lack of financing and access to capital: 59%
- Lack of managerial or technical knowledge: 39%
- Work life balance and women’s social roles: 36%
- Lack of access to networks and mentors: 31%
- Adverse macro-economic conditions: 26%
- Lack of high quality human capital: 25%

What investors in Latin America say are women STEMpreneurs’ biggest challenges

- Lack of self-confidence: “Women are more conservative and don’t overstate projections. They involve more emotion in their pitches and generally take feedback very personal”
- Work-life balance: “They see the entrepreneurial process as a trade-off: ‘In order to be here, I am sacrificing other aspects of my life’”
- Lack of strong personal networks: “Access to capital is strongly linked to whom you know, and women entrepreneurs are not being very pro-active at building their own networks”
- Lack of professional networks: “The more female-led funds, female mentors and role models we have, the better ecosystem we would build”

Source: IADB (2020)

THE TAKEAWAY

Lack of self-confidence, networks, market access and finance are common pain points, as is lower female mentorship (14 per cent in STEM vs 38 per cent in non-STEM). Gender biases in tech incubators and accelerators pose a further barrier. Investor perceptions also reflect gender biases – investors (typically male) tend to ask promotion-focused questions to male entrepreneurs and prevention-focused ones to female ones, which perpetuates gender gaps in funding.
For upper primary, UNICEF analysis is based on TIMSS for East Asia & Pacific, West Europe & North America, Middle East & North Africa, East Europe & Central Asia, and PASEC for West & Central Africa. For secondary, the analysis is based on PISA 2018 or PISA-D results for all countries. The share of boys and girls by proficiency level was extracted from EdStats (SACMEQ) and supplementary Tables II.B1.7.4 and 7.6 in OECD (2019a) (PISA), and calculated by UNICEF based on PASEC, PISA-D, TIMSS and TERCE assessment datasets. MPL in math and science is defined based on minimum proficiency thresholds in the different assessments outlined in UNESCO (2019). Since research on alignment of MPL descriptors across assessments is only available for math not science, the analysis is based on MPL used in the different assessments for consistency. Gender parity index (GPI) is defined as % of boys achieving MPL% of boys achieving MPL, and further adjusted to be symmetrical around 1. Male advantage is defined as Adjusted GPI < 0.97. Female advantage is defined as Adjusted GPI > 1.03 while Adjusted GPI >= 0.97 and <=1.03 is defined as evidence of no distinct gender gap. The Adjusted GPI methodology and thresholds follows the approach used in UNESCO (2017a).

4 The global trend is similar if MPL in math are aligned across assessments with girls doing at least as well as boys in achieving MPL at upper primary in 46 out of 86 countries. MPL in math are aligned across various assessments (based on thresholds identified in UNESCO (2019). The trend is similar if MPL in math are aligned across assessments with fewer girls than boys achieving MPL at upper primary in 17 out of 23 low- and middle-income countries in Sub-Saharan Africa and all 12 low- and middle-income countries in Latin America. MPL in math are aligned across various assessments (based on thresholds identified in UNESCO (2019).

5 For upper primary, UNICEF analysis is based on TIMSS for East Asia & Pacific, West Europe & North America, Middle East & North Africa, East Europe & Central Asia, TERCE for Latin America & Caribbean, and PASEC for West & Central Africa. For secondary, the analysis is based on PISA 2018 results in supplementary tables II.B1.7.47 and 7.48 (OECD, 2019a). We use the SES measure as pre-defined in each assessment dataset and standardization is not always possible. In PASEC and TERCE, low SES refers to the bottom quartile of their respective SES index and high SES to the top quartile of their respective SES index. TIMSS does not have a traditional SES index and students’ SES is inferred by whether they went to a school composed of more disadvantaged than affluent students (low SES) or more affluent students than disadvantaged students (high SES). In PISA, low SES refers to the bottom quarter of the index of economic, cultural and social status (ESCS) and high SES refers to the top quarter of ESCS. MPL in math is defined based on minimum proficiency thresholds in the different assessments outlined in UNESCO (2019). Gender parity index (GPI) is defined as % of girls achieving MPL at the given SES level% of boys achieving MPL at the given SES level, and further adjusted to be symmetrical around 1. Male advantage is defined as Adjusted GPI < 0.97. Female advantage is defined as Adjusted GPI > 1.03 while Adjusted GPI >= 0.97 and <=1.03 is defined as evidence of no distinct gender gap. The Adjusted GPI methodology and thresholds follows the approach used in UNESCO (2017a).

7 For upper primary, UNICEF analysis is based on TIMSS for East Asia & Pacific, West Europe & North America, Middle East & North Africa, East Europe & Central Asia, TERCE for Latin America & Caribbean, PASEC for West & Central Africa and SCAMEQ for East & South Africa. For secondary, the analysis is based PISA 2018. Gender gap in average performers is based on comparison of mean scores in math and science and the nature of the gap is determined by the direction and statistical significance of the difference in scores. The data on means comparison is extracted from UNESCO (2017b), Mullis et al. (2016a), Mullis et al. (2016b), and supplementary tables II.B1.7.3 and 7.5 (OECD, 2019b). Gender gap in high performers is based on the Adjusted Gender parity index (GPI) methodology. GPI is defined as % of girls achieving high proficiency levels% of boys achieving high proficiency levels, and further adjusted to be symmetrical around 1. Male advantage is defined as Adjusted GPI < 0.97. Female advantage is defined as Adjusted GPI > 1.03 while Adjusted GPI >= 0.97 and <=1.03 is defined as evidence of no distinct gender gap. The Adjusted Gender GPI methodology and thresholds follows the approach used in UNESCO (2017a). High proficiency levels are defined as Level 6 or above in SACMEQ, Level 4 in TERCE, Level 3 in PASEC, score of 500 and above in TIMSS, and Level 5 or above in PISA. See endnote 3 for how data by gender and proficiency levels was sourced and/or calculated.

8 OECD (2019b), OECD(2019c). The OECD case also illustrates this point. 78 per cent of 15-year-olds in OECD countries can read and understand simple text on familiar topic but only 7 per cent can differentiate fact from opinion when reading about an unfamiliar topic. Likewise, 77 per cent can understand and interpret simple and familiar scientific information and situations but only 9 per cent can creatively and autonomously apply their knowledge to critically understand, evaluate and interpret unfamiliar scientific information and situations. Similarly, 85 per cent can apply their knowledge to money matters that are immediately relevant to them but only 10 per cent apply their knowledge to money matters that will be relevant to their adult lives later on.

9 The overall finding does not change if we expand the definition of high proficiency. In secondary, if we were to define high proficiency as levels 4-6 (instead of levels 5-6), girls are still underrepresented in top-performers in the majority of countries in math (65 out of 78 countries) and science (51 out of 78 countries), using the adjusted GPI approach.

10 The finding does not change if we expand the definition of high proficiency. In secondary, if we define high proficiency as levels 4-6 (instead of levels 5-6), girls are still underrepresented in top-performers in the majority of countries where there is no gender gap in math and science scores - 27 out of 34 countries in math and 31 out of 38 countries in science.

11 UNICEF (2018). In the US also, only 19 per cent of high school students taking the Advanced Placement test in computer science were girls (Chang, 2013).

12 In MICs 6, individuals are considered to have digital skills if they engaged in at least one of the following 9 activities in the last three months: copied or moved a file or folder; used copy or paste tools to duplicate or move information within a document; sent an email with an attached file; used basic math formulae in a spreadsheet; connected and installed new devices; built, downloaded, installed and configured software; created electronic presentations with presentation software; transferred a file between a computer and other devices, or wrote a computer programme using specialized programme language. Individuals who have not used any of these skills in the last three months are considered to not have digital skills.

13 https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

14 Chang (2013).

15 UNICEF (2020).

16 Based on analysis of PIAAC 2012 data using https://piaacdataexplorer.oecd.org/ide/idepiaac/

17 UNICEF (2019). Critical evaluation skills vary by gender only to a small extent, and the direction of the difference varies by country. There are some gender differences in children’s self-reported privacy skills in the 10 countries analysed, but there is no consistent pattern to these.

18 UNICEF analysis of data on indicator 4.4.1 in ITU ICT SDG Indicators Database. For each country, most recent value was used. World Bank country classification was applied.

19 Computational thinking skills enables individuals to recognize, analyze, and describe real-world problems and propose solutions using a computer
Science self-efficacy is coded high if students could perform at least 5 of the 8 science tasks easily and the remaining with some effort. Science self-efficacy is coded low if students struggle to or could not complete on their own at least 5 of the 8 science tasks. Science self-efficacy is coded moderate if students could perform at least 5 of the 8 science tasks easily or with some effort but struggle to or could not complete on their own the remaining tasks. The analysis is based on sample of PISA 2015 test-takers with non-missing responses for all 8 science tasks. The results are very similar if the sample is expanded to included test-takers with some non-missing responses. Countries where girls outperform boys refers to countries where average science scores for girls are higher than boys and the difference is statistically significant, countries where boys outperform girls refers to countries where average science scores for boys are higher than girls and the difference is statistically significant, while countries where girls perform similar to boys refer to those countries where the difference in average science scores for boys versus girls is not statistically significant.

STEM self-efficacy is especially vital to perform at a high level - in the 35 countries where the gender gap in science among high achieving boys, boys had higher self-efficacy in 27 countries. High achievers are those in the 90th percentile of the PISA 2015 score. The determination of countries with gender gap in high-achievers is based on comparison of mean scores between girls and boys in the 90th percentile in supplementary table in Table I.2.8a (OECD, 2016a). The nature of the gap is determined by the direction and statistical significance of the difference in scores.

UNICEF analysis on science self-efficacy (vis-à-vis science achievement) is based on PISA 2015 supplementary tables I.2.8a and I.2.8a (OECD, 2016a), and for math self-concept (vis-à-vis math achievement) is based on PISA 2012 supplementary tables 4.2 (OECD, 2016b) and I.2.3a (OECD, 2014).

UNICEF analysis is based on those countries where for which data on both math (science) achievement and math self-concept (science self-efficacy) was available. In most countries, where girls had a significantly lower achievement than boys in math and science, girls also had lower self-concept and self-efficacy related to the STEM subjects. For instance, in 25 countries where science achievement of girls was lower than boys in PISA 2015, science self-efficacy was lower among girls than boys in 17 countries.

While 15-year-old girls value scientific approaches to enquiry at least as much as boys in most countries (68 out of 72), they show lower interest in science topics (53 out of 57) – except health, lower participation in science activities (all 57 countries).

UNICEF analysis based on PISA 2015 supplementary tables 1.2.8a and 2.12c, 1.3.1c, 3.2c and 3.5c (OECD, 2016a).
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