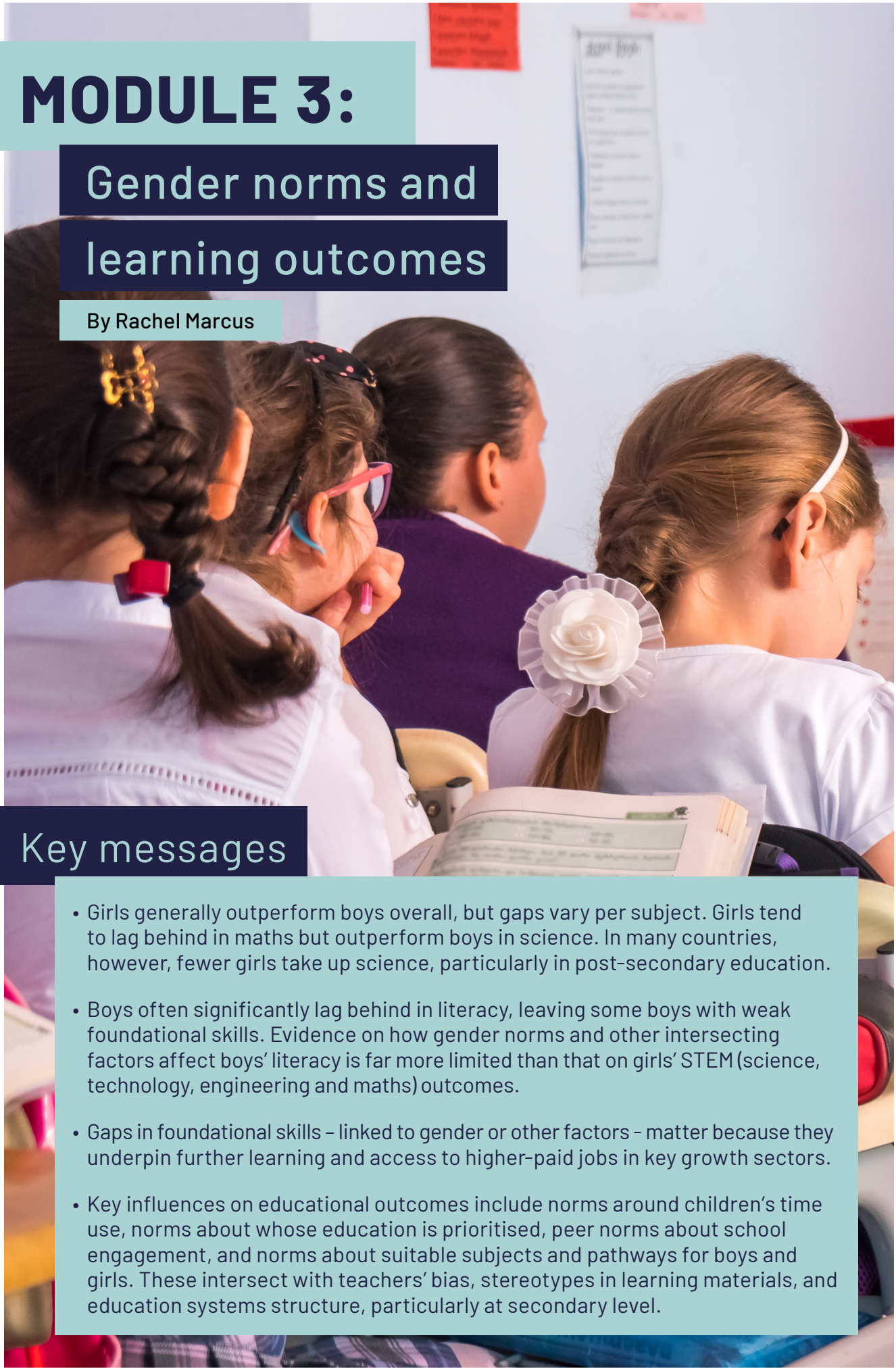
MODULE 3:

Gender norms and learning outcomes

By Rachel Marcus



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Key messages

- Girls generally outperform boys overall, but gaps vary per subject. Girls tend to lag behind in maths but outperform boys in science. In many countries, however, fewer girls take up science, particularly in post-secondary education.
- Boys often significantly lag behind in literacy, leaving some boys with weak foundational skills. Evidence on how gender norms and other intersecting factors affect boys' literacy is far more limited than that on girls' STEM (science, technology, engineering and maths) outcomes.
- Gaps in foundational skills – linked to gender or other factors - matter because they underpin further learning and access to higher-paid jobs in key growth sectors.
- Key influences on educational outcomes include norms around children's time use, norms about whose education is prioritised, peer norms about school engagement, and norms about suitable subjects and pathways for boys and girls. These intersect with teachers' bias, stereotypes in learning materials, and education systems structure, particularly at secondary level.

About this module

This module discusses how gender norms affect children's learning outcomes and their uptake of different subjects and study pathways. It begins by outlining data on gender differences in learning outcomes and patterns of subject choice. It then discusses how gender norms contribute to different learning outcomes and educational trajectories, with a focus on STEM, for which the body of evidence is greatest. It also presents highlights from the much smaller body of evidence on masculinity and on outcomes for boys. It is important to note that gender norms are not discussed directly in much of the literature on learning outcomes. The module therefore combines direct evidence on norms with indirect evidence on mechanisms such as time use, the operation of stereotypes and teacher bias.

> **Between 2003 and 2023 the percentage of education systems with gender gaps favouring boys at grade 4 science rose from 26% to 81% (Eck et al., 2026).**

Gender differences in learning outcomes

At first sight, gender norms do not appear to play a major role in learning outcomes. Most aggregate data shows that differences in learning outcomes for girls and boys are small compared to inequalities based on country income, household socioeconomic status, and closely related factors such as geographical location (UNESCO, 2024). Many international comparative studies find lower learning outcomes among boys than girls (see Table 3.1 below and Module 6). However, studies such as the OECD's Programme for International Student Assessment (PISA) tests and the IEA's Trends in International Mathematics and Science Study (TIMSS) show a more nuanced range of gendered patterns, particularly when disaggregated by specific subjects:

- Girls typically outperform boys in reading to a greater extent than boys outperform girls in maths (Encinas-Martín and Cherian, 2023).
- Gender disparities are often reversed at more advanced levels: while gender disparities in maths outcomes have decreased over time, boys are still more likely to be over-represented among the highest performers in mathematics (UNESCO, 2023; OECD, 2025; Eck et al., 2026).

Box 3.1: How does gender intersect with other inequalities to affect learning outcomes?

Systematic evidence comparing gendered learning outcomes among different groups of children is limited (Longlands, et al., 2024), but the available data suggests that inequalities are often compounded. UNICEF, for example, found that 7% of boys and 7% of girls aged 7-14 with at least one disability demonstrated foundational reading and numeracy skills, compared with 12% and 13% of their non-disabled peers (UNICEF, 2021).

- Recent TIMMS survey data shows changes in both average achievement and the distribution of achievement. Specifically, it shows an increase in the proportion of education systems where girls are not meeting the lowest international benchmarks for maths achievement, particularly at grade 4 level, while the proportion where boys are not meeting these benchmarks is declining (Eck et al., 2026).

Box 3.2: A note of caution

Most publicly available data on learning outcomes covers upper-middle-income and high-income countries, and does not necessarily reflect dynamics in low-income contexts. In any context, aggregate learning outcomes data often hides substantial inequalities that start to become apparent when disaggregated at the sub-national level. Most disaggregation presents learning outcomes by one variable at a time, such as gender or location. As a result, it masks the effect of intersecting inequalities, such as gender, location, class, ethnicity or disability. This matters because evidence that is more granular can identify the areas where focused action is needed to address learning inequalities.

Table 3.1: Aggregated international data on gender differences in learning outcomes

Programme for International Student Assessment (2022)
Data summarised in UNESCO, 2024

Reading	Mathematics
In middle-income countries 72 boys per 100 girls achieve minimum reading proficiency. **In high-income countries** 88 boys per 100 girls achieve minimum reading proficiency.	**In middle-income countries** patterns vary, with boys outperforming girls in several Latin American countries (such as Costa Rica, Guatemala and Paraguay) and girls outperforming boys in Albania, Jamaica, the State of Palestine (pre-2023) and the Philippines. **In high-income countries** gender parity in outcomes is the most common pattern.

Trends in International Mathematics and Science Study (TIMSS 2023)
Based on internationally comparable data for grade 8 students (42 countries), and grade 4 students (58 countries) (von Davier et al., 2024)

Mathematics	Science
Grade 8 (von Davier et al., 2023) • Boys' average scores higher than girls in 21 countries • Girls' average scores higher than boys in 4 countries • No difference in 17 countries. **Grade 4** (von Davier et al., 2023) • Boys' average scores higher than girls in 40 countries • Girls' average scores higher than boys in 1 country • No difference in 17 countries. Between 2003 and 2023 the percentage of education systems with gender gaps favouring boys at grade 4 science rose from 26% to 81% (Eck et al., 2026).	**Grade 8** (von Davier et al., 2023) • Boys' average scores higher than girls in 12 countries • Girls' average scores higher than boys in 11 countries • No difference in 19 countries. **Grade 4** (von Davier et al., 2023) • Boys' average scores higher than girls in 20 countries • Girls' average scores higher than boys in 12 countries • No difference in 26 countries.

Learning poverty data (World Bank, 2024)
Percentage of children who do not reach minimum reading proficiency levels by the end of primary school

- Low-income countries: 92% of children (minimal gender differences)
- Lower-middle-income countries: 57.9% of girls and 61.3% of boys
- Upper-middle-income countries: 14.2% of girls and 17.2% of boys

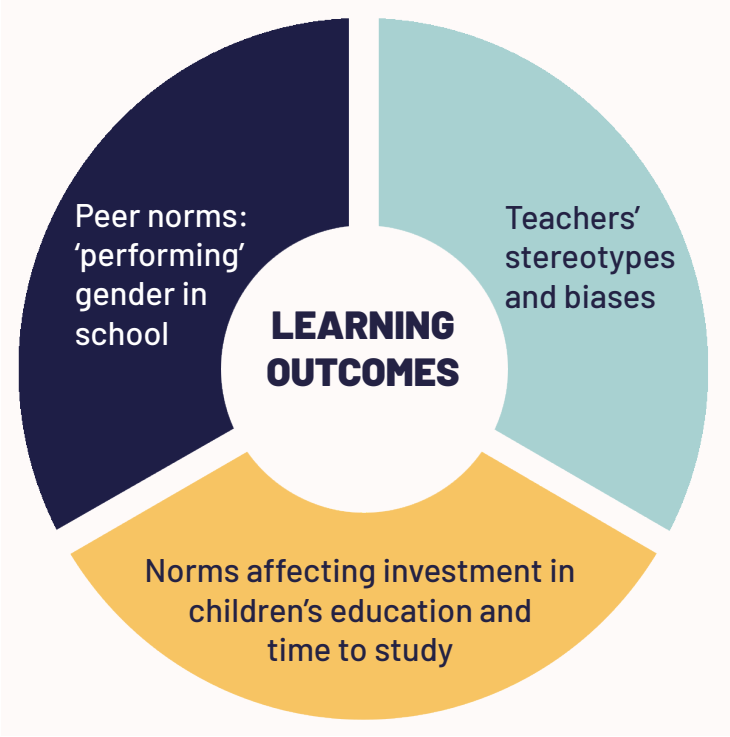
Sources: Eck et al. (2026); UNESCO (2024); von Davier et al. (2024); World Bank (2024).

How do gender norms affect learning outcomes?

> 'No single explanation can capture the many nuances relating gender and academic achievement across all subjects, topics, ability levels or population groups ... but the gendered socialisation process is likely to play a key role.' (OECD, 2025: 78)

This section discusses two key sets of norms that intersect with one another: norms related to children's time use and investment in their studies, which may have a major influence on students' home lives; and norms that have a particular influence in school environments: peer norms around engagement with schooling and teachers' micro pedagogical practices. The ways in which these norms affect learning outcomes go beyond gender to reflect other aspects of children's background and identity.

Figure 3.1: Intersecting norms that affect learning outcomes



Source: Author

Norms related to children's time use and investment in studies

Gendered norms about children's engagement in paid and unpaid work are among the most important norms that affect gender differences in learning outcomes. As discussed in Module 1, these intersect with norms and expectations about how best to secure children's futures, and – in low-income contexts – how to meet everyday expenses. These intersecting pressures can lead to gendered family expectations that girls and boys will undertake particular chores, that the education of certain children will be prioritised, and to different norms around how boys and girls of different ages can spend their leisure time.

Unpaid care and domestic work is more likely to affect girls' study time in much of the world, while boys are more likely to engage in household enterprises and/or to undertake paid work, particularly in adolescence. In both cases, these trade-offs are more pronounced in low-income contexts where there are no resources to outsource this work, and can affect learning outcomes as well as school participation rates, as discussed in Module 1.

Policy discussions often highlight the effects of unpaid care and domestic work on girls' learning outcomes, paying less attention to demands on boys' time. However, research shows that both paid and unpaid work have detrimental effects on educational outcomes for both boys and girls, particularly in low-income households. For example:

- In India Sharma and Shah (2025) found that one hour of additional time spent by respondents on unpaid domestic work was associated with a reduction in the likelihood of being proficient in reading and arithmetic problem-solving of about 4%–5% for both girls and boys.
- Cuesta's (2018) study in Ethiopia found that domestic work undertaken by girls and market work undertaken by boys affected their vocabulary development.
- Comparing across Ethiopia, India, Peru and Viet Nam, Keane et al. (2022) also found negative impacts on maths scores when work (paid or unpaid) crowded out study time, particularly for young adolescents and pre-teens, concluding that the amount of time spent working was a key factor.

Case study: Disaggregated data from India shows intersecting inequalities in household spending on children's education

A study on per capita household educational spending data across India in 2017 and 2018 found that, while patterns varied across the country:

- spending on girls was substantially lower than for boys in all age groups
- the gender gap widened among those aged 16–17 years across both rural and urban areas
- the gender gap was highest among disadvantaged castes; girls from large households were also particularly disadvantaged.

Source: Rashmi et al. (2022).

As these studies show, a combination of norms and economic pressures affects learning outcomes for both girls and boys and can help explain the patterns observed in specific contexts. In addition, they often vary by season, peaking at harvest time in rural areas, for example. How far this may affect measured learning outcomes also depends on the duration of peak work periods, and their timing in relation to key assessments.

Studies from marginalised communities document boys spending less time than girls on homework and study, and more on gaming, sports or playing outside.

The norms that affect children's use of leisure time also influence learning outcomes. Some studies, for example, report that reading is sometimes seen as a feminine activity, which may deter boys from engaging in a leisure activity that reinforces the development of vocabulary and comprehension skills (Eck et al., 2024). Consistent with this, the 2018 PISA study (undertaken largely in high- and upper-middle-income countries) found that 44% of 15-year-old girls, but only 24% of boys the same age, agreed that 'reading is one of my favourite

hobbies' (Encinas-Martín and Cherian, 2023). Studies from marginalised communities in Fiji, Indonesia and Cambodia all document boys spending less time than girls on homework and study, and more on activities such as gaming, sports or playing outside (CDRI, 2024; Escobar-Carías et al., 2025). These patterns may reflect norms that give boys greater freedom to play outside or online, and/or associate effort in school with femininity.

Norms around investment in different children's education often vary by gender and age as well as social class. Some evidence from OECD countries suggests that parents spend less time in early learning activities with boys, with the exception of play that helps to build their spatial skills, such as construction games. This type of play may contribute to boys' generally stronger maths outcomes (Hencke et al., 2023).

As discussed in Module 1, as children get older, norms valuing boys' educational outcomes over those of girls may lead families to invest more in their sons' education, particularly where resources are scarce. Specifically, these norms lead families to invest more in private schooling and tutoring for boys than girls, and/or free up boys' time to study for exams, as shown in studies from India (Choudhury et al., 2025; Sharma and Shah, 2025). Disparities can also extend to boys' being given greater access to quiet space or electricity so that they can study.

As children get older, norms valuing boys' educational outcomes over those of girls may lead families to invest more in their sons' education, particularly where resources are scarce.

Gendered norms affecting children's digital access can also affect their ability to study. In highly patriarchal contexts, concerns about individual and family honour and reputation can lead to girls facing greater restrictions on use of digital devices – spending less time online and being more likely to need to borrow or share a device than their male counterparts, particularly in poorer households (Wang et al., 2023; Khadka et al., 2025). This can limit access to resources that boost learning (although it can also help to reduce digital distractions). Similarly, norms restricting girls' mobility can limit their access to data; as Huq et al. (2021) explain in Bangladesh, girls in low-income settlements cannot go to public spaces like markets to access Wi-Fi and are therefore dependent on purchased data packages.

Gendered norms about student competence and engagement in school

This section discusses how norms and stereotypes among two key groups of stakeholders – students and teachers – can influence learning outcomes.

Peer norms – performing gender in school

As explained in Module 2, schools are key contexts where children learn to 'perform' gender: to act in ways seen as appropriate for a boy or girl from a specific background. These norms can affect overall levels of diligence and effort, how far students from different backgrounds seek help from teachers, and levels of effort and engagement with specific subjects.

In combination with the other factors outlined in this section, gender norms among peers affect learning outcomes. Studies from various contexts show that engaging at school,

doing homework conscientiously and behaving politely are often associated with femininity. In some contexts, these norms are reinforced by the ways that girls and boys are depicted in learning materials. In contrast to the conscientious and demure behaviour associated with femininity, asserting one's masculinity can mean disengaging from lessons or homework, disrupting classes or questioning the authority of teachers, particularly teachers who are female (CDRI, 2024; OECD, 2025).

This is particularly likely for boys from poorer backgrounds where earning an income is seen as a core element of successful masculinity, and where labour markets offer adolescent boys and young men ways to demonstrate their transition to manhood in a way that schools are not perceived to do (van Hek et al., 2019; UNESCO et al., 2026). As noted earlier in this module and in Module 6, gendered divisions of labour can also lead to adolescent boys – particularly those from rural and farming backgrounds – spending considerable amounts of time on heavy manual work, leaving them too tired or too demotivated to study, as documented in Cambodia (CDRI, 2024).

Peer norms around gender-appropriate behaviour can also affect students' identification with, and levels of effort in, particular subjects, which can affect subject choices. One pervasive example common across many contexts is an association of STEM skills and subjects with masculinity, and of language-based subjects with femininity. In Sweden, for example, Raabe et al. (2019) found that friends' subject preferences affected both boys' and girls' enjoyment of STEM subjects and contributed to gender gaps in STEM participation.

Teachers' stereotypes and biases

A growing number of studies in recent years have examined the impacts of teachers' gender biases on learning outcomes. Table 3.2 summarises some key findings.

Table 3.2: How teacher bias affects student learning outcomes

Country (and study)	Finding
India (Andhra Pradesh) (Rakshit and Sahoo, 2021)	The gender gap among grade 9 students in maths performance – favouring boys – widens when students are taught by a gender-biased male (but not female) teacher. No impacts on children's outcomes in English were found.
Türkiye (Alan et al., 2018)	Girls in grades 3 and 4 who are taught for over a year by teachers with traditional gender views have lower performance in maths and verbal tests; longer exposure to the same teacher amplifies this effect. Boys' outcomes are unaffected. These effects arise partly through teachers transmitting traditional beliefs to girls.
Chile (Bassi et al., 2018)	In general, teachers give boys in grade 4 more attention than girls – an attention gap correlated with girls' lower scores on Chile's national standardised test (SIMCE).
Peru (Martínez, 2025)	Teachers' gender stereotypes affect their evaluations of students' performance. Mathematics teachers strongly associate skills in maths and science with boys, and skills in the humanities with girls. This contributes to lasting advantages in labour markets for boys, and smaller, shorter-term detrimental effects for girls.
Italy (Carlana, 2018)	Teachers' stereotypes affect the gender gap in mathematics, choice of educational track, and the self-confidence of middle-school girls in their mathematical abilities.
Greece (Lavy and Megalokonomou, 2024)	A one standard deviation increase in teacher bias in a given subject towards boys reduces the probability that a girl will study that subject at university by 4 percentage points.

Source: author compiled

Few studies are explicit about how these biases might operate. However, one key mechanism is through differences in the amount and quality of attention teachers give to girls and boys.

Some key differences in the quality of attention include calling on boys (or girls) more often to answer more complex questions. Such questions involve analysis and synthesis of information, which develop students' ability to think independently, construct arguments and apply logic. In India, Jatoliya (2025) found that boys who give incorrect or partial answers were more likely to be guided to rethink their responses, with questions or offered hints, enabling them to develop their reasoning. By contrast, girls were often corrected quickly or had the question answered on their behalf, and were not given the space to develop thinking skills.

This echoes findings from Chile (Bassi et al., 2018), and research in the US in the 1980s and 1990s (Sadker and Sadker, 1995). Reviewing research in Sweden, Stenberg (2025) found that teachers' responses to children's gender and class background intersected, and that a few high-achieving middle-class boys commanded their attention, while many others received little support. The case study opposite illustrates how caste and gender biases in India influence teachers' pedagogical practices.

Case study: How pedagogical practices reinforce caste and gender biases in India

A study of government schools in Rajasthan (India) found that boys received nearly 60% of all higher-order questions – those that required analysis, synthesis or evaluation of information. Girls were mainly asked lower-order questions, often requiring recall of facts or rote responses.

Girls were typically praised for neatness, and being well-behaved, quiet and attentive. Boys were more likely to be praised for confidence, originality and initiative, creating an implicit link between masculinity and cognitive competence and leadership.

Evidence from other studies in India shows that Dalit and Adivasi girls (respectively, marginalised castes and ethnic groups) are even less likely to be asked higher-order questions, as teachers' intersecting caste and gender stereotypes lead them to assume that girls from these backgrounds lack intellectual capacity.

Source: Jatoliya (2025).

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Such differences in how teachers respond to students subtly communicate messages about whose intellectual development is worth investing in, and whose is not. This can lead children whose development is sidelined to avoid volunteering answers or engaging with challenging material, or to avoid making mistakes and taking risks. Over time, this can limit intellectual development as academic growth builds on trial, error and experimentation (Jatoliya, 2025). Where students are only praised for right answers, rather than supported to develop the skills to arrive at them, this can feed a fear of failure and anxiety about assessments. The next section discusses this further in relation to STEM studies.

STEM studies: what role do norms play in gender disparities?

Across different curriculum areas, STEM is one of the most extensively researched examples of how gender norms and stereotypes shape learning experiences, subject choices and educational pathways. This section therefore focuses specifically on how gender norms and stereotypes in school STEM education contribute to ongoing gender disparities. This matters because STEM jobs are often relatively well-paid, 'decent' jobs, and are growth areas in low-carbon economies. Tackling inequalities in STEM education matters, therefore, for economic justice.

Despite many years of efforts to reduce gender inequalities in the uptake of STEM subjects in upper- and post-secondary education, significant gaps persist in much of the world (UNESCO, 2017; UNESCO, 2024). This contributes to continuing gaps in higher education in post-secondary technical and vocational education and training (TVET) and in access to and retention in the STEM workforce (Box 3.3).

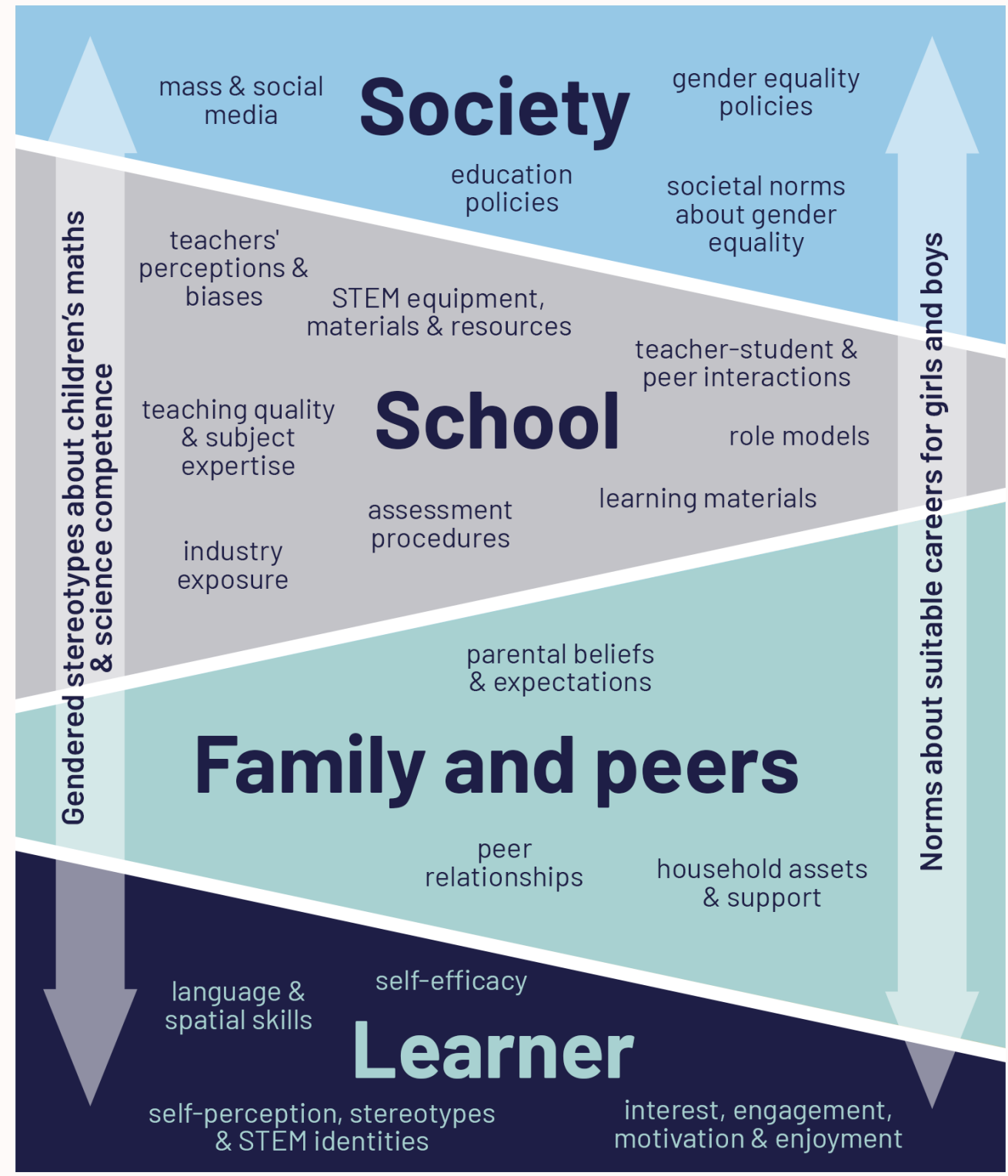
Box 3.3: Girls' and young women's participation in STEM studies

Key findings on participation of girls and young women in STEM studies:

- In India, girls at upper-secondary level are 20 percentage points less likely than boys to study science or commerce than arts or humanities (Sahoo and Klasen, 2018).
- In most countries, less than 25% of participants on STEM-related TVET courses are female, although definitions of STEM vary significantly between countries (UNESCO-UNEVOC, 2020).
- Between 2018 and 2023, women comprised the majority of STEM graduates in only 9 of 122 countries, with particularly high rates in Arab states (UNESCO, 2024).
- The gender composition of the STEM workforce has changed little in G20 countries in the past two decades, with women forming less than one-third in most of the countries studied (UNESCO, 2024).
- Women are particularly under-represented in computing and engineering (UNESCO, 2024). Globally, women account for approximately 26% to 28% of the overall technology workforce, but are particularly under-represented in advanced computing roles. For example, women form only 6% of the workforce in data and artificial intelligence (AI), and 12% in cloud computing (UN, 2026).

As Figure 3.2 shows, these patterns reflect the interaction of gender norms and stereotypes with a range of other influences at different levels. The next section focuses on two key norms in interaction with other influences: norms held by students, teachers and families about STEM skills and competence; and gendered norms and stereotypes about suitable careers.

Figure 3.2: How gender norms and stereotypes affect STEM studies at school level



Source: Author, inspired by UNESCO (2024: 13).

Gendered norms and stereotypes about STEM skills and competence

Stereotypes about boys being better at maths than girls, whether based on students' empirical reality or not, are often internalised by students, affecting their sense of identity and belonging as STEM students. As Figure 3.2 shows, these stereotypes often permeate society, from representations in the media and textbooks, to teacher biases, to family and community influences. Where boys dominate the top levels of maths performance, this can strengthen the stereotyped perception that this reflects their innate abilities and reduce girls' sense of competence and self-efficacy to succeed.

The micro-pedagogical practices discussed earlier, which reward girls' right answers rather than building their learning, may contribute to their greater levels of anxiety about maths in much of the world (Encinas-Martín and Cherian, 2023; UNESCO, 2024). This can, in turn, lead even high-performing students to opt disproportionately for non-STEM studies (UNESCO, 2024).

Girls' lower sense of self-efficacy or identity as STEM students can also be reinforced by comments or practices (such as giving boys more opportunities to use limited science equipment) that signal this is a boys' domain, and/or a domain of students from more socially advantaged backgrounds (Seo and Lee, 2021). This said, it is important to recognise many teachers are highly committed to the success of all their students regardless of gender, even without gender-responsive pedagogical training (Carter et al., 2025; Nishat et al., 2026).

Gendered norms and stereotypes about careers

Gendered norms and stereotypes about suitable careers can have a direct influence on students' interest in and pursuit of STEM studies. A study in the Netherlands, for example, found that adolescents – particularly boys – with more traditional gender attitudes were more likely to make gender-stereotypical subject choices. Among the students interviewed, maths – formerly male-coded – was seen as gender-neutral, as was economics (van der Vleuten et al., 2016).

Stereotypes about the attributes needed for certain types of work often flourish where students or their families lack information about those fields and roles. This can lead to students making decisions about future careers and subject choices on the basis of outdated information, and, for example, not being able to imagine themselves in a field where they believe they will not fit in.

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Families' norm-based perceptions of suitable careers can intertwine with perceptions of the potential returns from particular fields of study (OECD, 2025). For example, young women electrical engineering TVET students in Zimbabwe reported that their families often questioned the suitability of engineering careers (Malomalo et al., 2025). Family influences can also reflect concerns about young women's employability and safety in a male-dominated field (ADB, 2026). However, even where this challenges prevailing norms, families often support their daughters' interests or encourage them into subjects and professions they see as having strong potential in the future (Moshfeghyeganeh and Hazari, 2021; Adely et al., 2025).

Education system design

The previous sections have outlined some of the ways in which gender norms may affect STEM uptake and outcomes. One other factor that can amplify or reduce the effects of these norms is the specific design of education systems. While a full discussion of these issues is beyond the scope of this module, the key elements include the following:

Curriculum and learning materials. As outlined in Module 2, these can often reproduce gender biases, sometimes reinforcing outdated gender divisions of labour or beliefs.

The under-representation of female scientists and engineers can subtly communicate that these are unusual roles for women (Crawfurd et al., 2024).

Assessment systems. Teacher-led assessments may replicate biases based on the perceived competence of students of different genders and backgrounds (Lehti and Laaninen, 2024). Assessments with gender-typed content (e.g. literacy tasks based on texts about certain types of sports or household activities) can favour children of a particular gender disproportionately (Spagnolo and Nicchiotti, 2023). High-stakes timed testing, in particular, can increase anxiety levels among female students, leading to lower performance.

Subject tracks. In education systems with subject tracks, a combination of gender-biased career counselling and gendered identification with particular subjects can lead to girls' under-representation in STEM tracks (Sevilla et al., 2023). Broader subject tracks with flexibility to shift between them can help to prevent early stereotyping shutting off later opportunities.

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Resourcing. Space for learner-centred project-based methods is limited in overcrowded schools. Under-resourced schools in low-income contexts may not have the equipment for practical science or computing activities, making it harder to engage students, and/or may limit access to students perceived as high-performers (often boys) (Durrani and Kataeva, 2025). Concerns about safety or potential resistance from parents may also disproportionately limit girls' access to computing in schools.

What helps shift norms and stereotypes affecting gendered learning outcomes?

Shifting the norms that underpin gender differences in learning outcomes and subject outcomes requires action at all levels of society, and particularly families, education systems, and wider society. This section summarises some key actions, noting that their relevance will vary by context.

Families, communities and wider society

Community mobilisation and discussion and parenting initiatives show promise in helping to overcome gender stereotypes and help parents encourage the education of all their children, regardless of gender.

Some community mobilisation programmes engage parents (often mothers, sometimes targeting fathers directly) in discussions about gender equality issues, focusing on how greater gender equality can benefit children's educational outcomes and future opportunities.

Such conversations often include discussions on fairer gender divisions of household work, as seen in the Voices-Choices-Promises initiative in Nepal (Lundgren et al., 2018).

Providing accurate information about the returns to particular careers can help extend parents' and adolescents' horizons to include non-stereotypical futures.

Initiatives with parents and at community level are likely to be more effective if reinforced through media campaigns, messaging through public services (e.g. schools, health centres) and local institutions, such as religious institutions (Agha et al., 2026). These can help change expectations and aspirations to challenge norms and stereotypes - for example, that women cannot be engineers or that reading is not manly. Providing accurate information about the returns to particular careers - for example, through school-community outreach, can help extend parents' and adolescents' horizons to include non-stereotypical futures (Evans and Acosta, 2026).

Parenting/early education support activities in different contexts include: initiatives encouraging parents (including fathers) to read with their boys (Eck et al., 2024), and to engage both sons and daughters in spatial-visual play and construction activities that help to build mathematical skills and confidence (Hencke et al., 2023). In different contexts, advice and support on early childhood education may be provided by health services, school/nursery outreach, or civil society initiatives (see Module 7). As children move into adolescence, parents can also play an important role in supporting students when they choose non-traditional careers. Studies of women's trajectories in STEM fields often highlight the role of supportive parents (e.g. Adely et al., 2025).

Studies of women's trajectories in STEM fields often highlight the role of supportive parents.

Preventing children's workloads affecting their educational outcomes may, however, require more than a discussion about gender norms. Given that the poorest children are most likely to undertake unpaid work that affects their learning, other important areas of action include, in different contexts: investing in water and energy infrastructure to reduce domestic workloads (Loureiro and Ajayi, 2025); the provision of childcare to reduce the need for schoolchildren to look after younger siblings; and anti-poverty policies, including social protection and value chain development activities.

Education systems

Key approaches include the following:

Strengthening the overall quality of education. A large body of research shows that the quality of teaching is one of the most important elements for improving learning outcomes and for reducing gender and other gaps (Béteille and Evans, 2021). This applies across subjects, and requires teacher training in both effective general pedagogies and subject-specific knowledge and approaches.

Active learning focused on real-world problem-solving. This can help to build engagement in both STEM and other curriculum areas. Much evidence highlights the importance of an integrated, inquiry-based approach to STEM learning (UNESCO, 2024). This approach is equally applicable to strengthen learning in other areas of the curriculum, particularly in subjects and topics that are seen as abstract or unrelated to students' experiences. For example, demonstrating relevance to contemporary social issues is seen as one way to reduce gender disparities in the uptake of economics (Georgouli Loupi et al., 2025; Martinez-Matute, 2025).

Learner-centred, inquiry-based and participatory methods strengthen the engagement of all students and boost their achievement, with the potential to help reduce gender gaps. This depends on their being used in a gender-responsive way that does not reinforce stereotypes, and on creating opportunities and a supportive environment for less confident children (often girls) to participate in practical activities and lead group work.

Case study: Reduced gender gaps through active STEM learning

A maths initiative with 8-year-olds in Italy that focused on peer interaction, sharing of ideas, learning from mistakes, and problem-solving enhanced girls' maths scores, did not affect those of boys, and reduced the gender maths outcome gap by 40%.

A study in Hong Kong found that a model of ICT learning that focused on students' problem-solving skills and analytical ability enhanced their self-efficacy in ICT and reduced their perceived difficulties in using it, leading to reduced gender stereotyping around the subject.

Source: Di Tommaso et al. (2021); Tam et al. (2024).

Strengthening gender-responsive teaching. Another key element of quality education is responsiveness to gender and other social inequalities. Important elements include making sure that all students have equal opportunities to participate in class activities, to speak and to practise leadership skills. Gender-responsive teaching also involves actively redressing the biases outlined earlier in this module: providing effective feedback and encouragement to develop thinking skills, and paying attention to gender and other inequalities when monitoring student progress. See Module 5 for more details and resource materials.

Role models and mentoring initiatives. These show promise in promoting girls' STEM engagement (De Gioannis, 2024). This is particularly the case where mentors seem relatable, and where initiatives involve structured reflection and link to concrete subject or career decisions, rather than one-off talks.

Some studies suggest that role model exposure helps to nudge girls with more advanced maths skills towards STEM choices (Agurto et al., 2021; J-PAL Policy Insight, 2023). A study in Spain found that emphasising the importance of soft skills (such as communication and collaboration) through a role model programme increased girls' interest in pursuing STEM careers. This may be because it helped them imagine themselves as having the skills they needed to succeed in these fields (González-Pérez et al., 2020).

Role model initiatives have also been developed to boost boys' engagement with reading (Eck et al., 2024). While there is continued debate on how important it is to match the genders

and backgrounds of students and mentors, some studies find role model initiatives particularly important for more disadvantaged children (e.g. Kearney and Levine (2020) in the USA).

Subject tracks. Education systems that delay specialisation in certain subjects, keeping STEM subjects compulsory for longer, can help to prevent girls from being steered away from STEM before they have had the opportunity to build their interest and confidence (Lorenz and Schneebaum, 2024). Tracking systems that steer students with strong quantitative skills into STEM subjects also help to promote gender parity (Adely et al., 2025). Designing upper-secondary education choices or 'tracks' so that students continue with some STEM studies, and/or may swap between tracks, can help to prevent the long-lasting effects of early stereotyping.

Extracurricular approaches/bootcamps. STEM and ICT (information and communication technology) bootcamps/taster initiatives are a common way to build children's interest and self-efficacy in STEM subjects and careers. Many target girls, given the clear gender gaps in STEM participation. Such initiatives are most likely to be effective when they are linked to students' ongoing education, and include further opportunities for engagement (Archer et al., 2021). The design must be context-sensitive: where schools are underfunded and most boys also lack STEM opportunities, offering similar initiatives to boys (in single-sex groups, where relevant) could help to prevent resentment and backlash. Investing in strengthening overall STEM education is more likely to have a lasting impact than one-off bootcamps, which should therefore be developed to complement, rather than replace, school-based improvements.

Investing in strengthening overall STEM education is more likely to have a lasting impact than one-off bootcamps.

Useful resources

Data on learning outcomes

British Council (n.d.) - *ASEAN-UK's Supporting the Advancement of Girls' Education (SAGE) Programme* includes data on trends in learning outcomes (and other educational metrics) by gender, location and socioeconomic status.

PISA, TIMMS, PIRLS and the many other learning outcomes surveyed by the International Association for the Evaluation of Educational Achievement (IEA) provide datasets. Briefs and studies, available from IEA, include UNESCO and IEA Compass briefs aimed at education decision-makers and policy-makers.

UNESCO (n.d.) - *World Inequality Database on Education* provides visual data on education inequalities for 26 indicators, covering gender, geographical location, wealth, and in some countries, disability, being a native speaker of language of instruction, and other indicators.

World Bank (n.d.) - *Learning poverty country briefs* include sex-disaggregated data on learning deprivation where available.

World Bank and UIS (2024) - *The World Bank's Gender Data Portal* presents data on learning poverty by gender, based on World Bank gender portal and UIS data.

Gendered learning disparities and ways to tackle them

Brussino and McBrien (2022) - *Gender stereotypes in education: Policies and practices to address gender stereotyping across OECD education systems* explains the impacts of gender stereotypes and presents examples of approaches within and beyond education systems.

Eck et al. (2026) - *Girls losing ground: the widening gender gap in mathematics* explains recent trends and promising approaches to reduce gender gaps.

GPE-KIX (n.d.) - *Lifting barriers: Educating boys for gender equality* is a project hub with studies and resource materials, with a focus on Cambodia, Lesotho and Malawi.

See also Module 5 (Gender-transformative education) and Module 6 (Boys and masculinities).

Gender norms and STEM

Sosale et al. (2023) - *Engendering access to STEM education and careers in South Asia* provides evidence on trends, underlying factors and potential interventions across the region.

UNESCO (2024) - *Changing the equation: Securing STEM futures for women* provides an overview of factors underpinning gender gaps in STEM and ways to tackle them.

UNESCO-UNEVOC (2020) - *Boosting gender equality in science and technology: A challenge for TVET programmes and careers* focuses on specific challenges of addressing gender gaps in STEM-related TVET, and promising practices.

UNESCO (2017) - *A resource pack for gender-responsive STEM education* is a set of training modules covering policy, curriculum, pedagogy, teacher education, developing materials and community engagement.

UNESCO IITE (2025) - *Guide for educators to support gender transformative integration of information and communication technologies and artificial intelligence into secondary and TVET classrooms in the Global South* provides background on why a gender-transformative approach to ICT and AI is important, checklists to guide implementation, and case studies of innovative practices.