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The Maths Gender Gap in Primary Schools – A Key Issue for Educators

The Gender Gap in Maths Performance in Primary Schools – A Study of National Assessment Results at School Level

The gender gap in maths performance in France was evidenced with the 2018 introduction of national assessments for Grade 1 (*cours préparatoire*) and Grade 2 (*cours élémentaire 1*).

According to national and international studies the gap in favour of boys at the end of primary school has been widening since 2015 and is greater in France than in any other EU and OECD country.

The French Council for School Evaluation (CSE) convened a cross-category working group to identify the cause. The aim was to combine quantitative and qualitative approaches, and to draw on research findings. What emerges is that school-level reflection is necessary to tackle gender-related performance inequality.

Summary

Research has shown that the differentiated play of young children in families, stereotypes and the anxiety more often expressed by girls about maths are factors likely to explain the lower performance of girls in maths at national level. What about factors at a local level? The working group set up by the CSE studied Grade 2 national assessment 'problem solving' results at school level. The aim was to illustrate the variety of situations for educators and investigate the possible impact of school profile on the gender gap.

The study shows that the Grade 2 problem-solving performance gap is in favour of boys in 53% of schools, girls in 30.5%, and at zero or virtually zero in 16.5% for a given year. However, from one year to the next, the gender gap fluctuates for most schools: in 2021, 2022 and 2023 (the three years covered by the study), in more than 8 out of 10 schools, sometimes boys will do better, sometimes girls, and sometimes neither.

In 19% of schools the gap is the same every year, most often in favour of boys. In those schools the gap's width is much greater than average. This note examines the correlation between the gaps and some of the schools' features. The most disadvantaged schools and those located in overseas territories stand out, with stable gaps that are less frequently in favour of boys. Further studies are needed to deepen the analysis.

Situations changing over time make it potentially tougher for most teachers to tackle the issue. Even though the gender-based results also depend on what happens outside school, the latter clearly has a role to play in promoting equality. The analysis carried out by the working group in three districts of the Versailles education authority showed that, when educators were made aware of their pupils' results and had comparative data at their disposal, they took up the issue. Some began to take action, initially by observing the results, while the relevance of others' actions was confirmed by gap-closing results. Teacher training as well as the CSE's 2020-launched school evaluation could provide an opportunity to examine the effectiveness of measures aimed at improving pupils' overall maths performance.

For maths as well as for French, where boys' national assessment results are well below girls' throughout their school career, easy annual access to school-level national assessment gender gap results should enable educators to take up the issue by studying their pupils' situation, especially when the school is evaluated, or monitoring the impact of actions taken. To help them identify what happens in classrooms, the working group has developed observation grids for pupil activity and maths and French teaching. Educators can then target equality by drawing on research results in order to identify relevant levers.

The development of Grade 1 and Grade 2 national assessments since 2018 has made it possible to highlight the widening of the gender gap in maths performance during the first years in primary school. While on average the national-level gap is slightly in favour of girls at the start of Grade 1, it gradually shifts in favour of boys from mid-year on to Grade 2. In 2024 45.8 % of girls and 51.3 % of boys had a satisfactory command of problem solving at the start of Grade 2, a 5.5-point gap in favour of boys, as opposed to a 1.4-point gap in favour of girls at the start of Grade 1 in 2024 and 1.6 in 2023.

The Need for Action

Grade 4 national assessment results show a recent question-raising trend, with a widening maths gender gap since 2017. Boys' results improve while girls' remain stable, which suggests the situation will worsen during lower secondary, upper secondary, and even higher education. The gender gap is also wider, though stable, in French, in favour of girls.

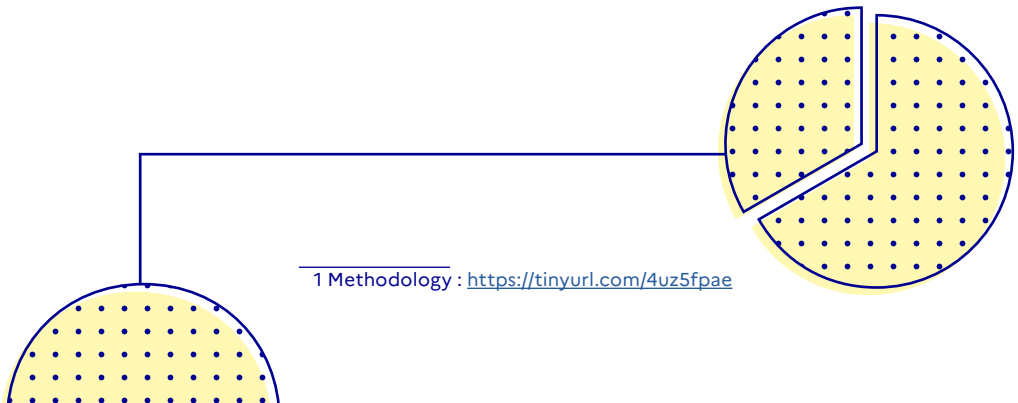
Timss 2023 survey results for Grade 4 confirm the trend in maths and show the gap widening in France since 2015. France has become the participating EU and OECD country with the widest gender gap at primary school level. While boys' results have improved since 2015, girls' have fallen, leading to a slight drop in national results and helping to reinforce France's persistent low ranking. However, this finding needs to be qualified insofar as the factors explaining poor maths performance in France are diverse and relate in particular to the social gap between pupils from advantaged and disadvantaged backgrounds, which are significant in France.

National-level findings mask major school-level differences

A quantitative analysis of Grade 2 national assessment results was carried out, based on problem-solving performance rates in 2021, 2022 and 2023. Problem solving was chosen because it involves all mathematical skills. Gender-based performance rates were compared across France, using descriptive statistics, as well as regression models to confirm the impact of the variables studied[1].

Each year the gap is in favour of boys in 53% of schools, girls in 30.5% and negligible in 16.5%

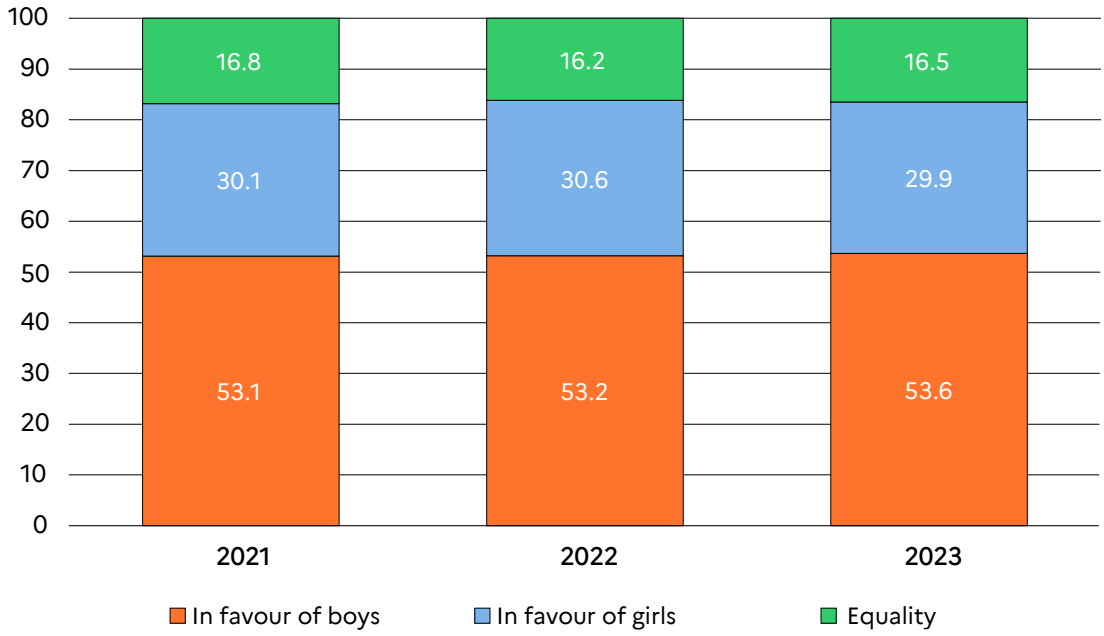
Although national results favour boys, there are considerable differences in space and time. What national results say is not necessarily to be found in every school, and even less so in every classroom. When one is in front of pupils, one needs to be careful not to assume that boys will systematically do better in maths. Reducing the ambition and expectations of teachers or parents for girls may prove counterproductive, particularly for the highest achievers, whose results fall the most between Grade 1 and Grade 2.



1 Methodology : https://tinyurl.com/4uz5fpae

Whether in 2021, 2022 or 2023 school-level performance gaps across the country paint the same picture: they are in favour of boys in almost half the schools, girls in almost a third of the schools and amount to zero or virtually zero in almost 17% of them. These results differ from those observed for Grade 1, for which, in 2023, the gap is in favour of girls in 43% of schools, and boys in 37%.

Figure 1. Nature of the gender gap in problem-solving performance at the beginning of Grade 2, by school (%)



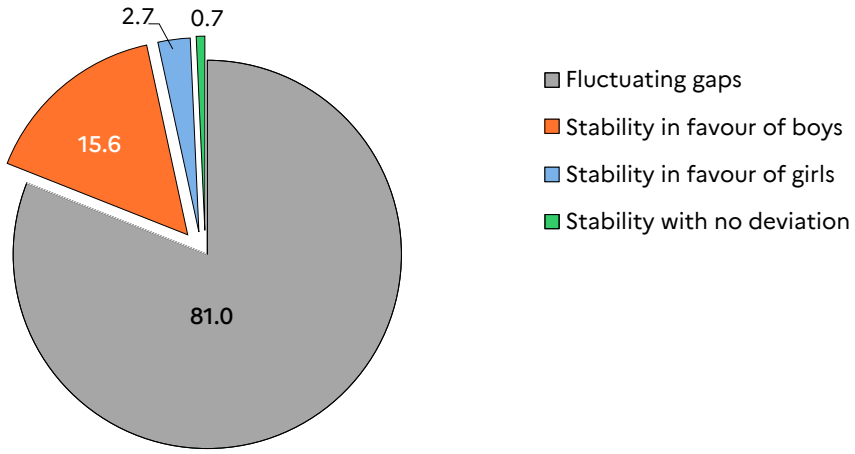
Field: Mainland France and overseas departements and regions, state schools and state-funded private schools.
Source: DEPP, CEE calculations.

In 2021, 2022 and 2023 differences fluctuate in most schools

The study of Grade 2 results over three years in the 17,500 schools in which data is available shows fluctuating differences in 81% of schools, sometimes in favour of boys, sometimes in favour of girls, sometimes insignificant.

The expression 'stable school' used below refers to schools in which the gap is of the same nature over the three reference years, *i.e.* systematically in favour of boys, girls, or amounting to zero or almost zero. The term 'fluctuating school' refers to all other situations.

Figure 2. Distribution of schools according to changes in the nature of the gender gap in problem-solving performance rates at the start of Grade 2 from 2021 to 2023 (%)



Field: Mainland France and overseas departements and regions, state schools and state-funded private schools.
Source: DEPP, CEE calculations.

Most fluctuating schools have a gender gap three times smaller than stable schools

Nearly 14,000 schools have a gender gap that is both fluctuating and small on average, amounting to almost 3.6 points each year in favour of boys: in 2023, 49.6% of the boys showed satisfactory problem-solving performance, compared with 46% of the girls. However, these average values mask major differences from one year to the next and from one school to the next, and where differences do exist, they are significant on average, whether in favour of boys or girls.

Specifically, when differences are in favour of boys, they are on average, for a given school and year, of almost 20 points in absolute value, and 17 points when in favour of girls. For example, in a class of 24 pupils with as many boys as girls, a gap of 17 points in favour of girls means there are two boys fewer displaying satisfactory problem-solving performance than girls.

A majority of fluctuating schools can therefore alternately show a strong advantage in favour of girls or boys. It shows how difficult it can be for educators to get to grips with the maths gender gap as the diagnosis has to be redefined every year.

While most schools are unstable, almost 2 out of 10 show similar differences each year, most often in favour of boys. Of those 19% stable schools (around 3,300 of them), many (16%) favour boys, 3% girls and less than 1% neither. The gap in favour of boys in all stable schools is around 19 points on average each year *vs* 16.5 points for girls. The gap is understood as the number of boys or girls (2, even 3) whose satisfactory problem-solving performance would make it possible to achieve class-level equality, assuming other pupils' performance is unchanged.

As the average gap for schools is around 5.5 points in favour of boys, stable schools have a significant impact on national figures as they contribute almost 2 points (*i.e.* 35% of the national gap) when their 'weight' is only 19%. Restricting the scope to stable schools favouring boys, the situation is even more salient as they represent only 16% of all French schools, but more than half the problem-solving gender gap at national level, which calls for priority analysis.

Schools with a persistent maths gender gap have a slightly different profile to the others

The analysis shows that the features of the schools (size, social and academic profile) play only a marginal role in the nature of the gap. Fluctuating schools are generally typical of all primary schools (grade level, pupil numbers, public or private status, social background) but this needs to be qualified, as some features are more often associated with a persistent gender gap, or with no gap at all. Situations favouring girls or equality are more frequent in socially disadvantaged stable schools or schools in the French overseas territories.

Stable boys-favouring schools are less likely schools where pupils are socially disadvantaged, especially in priority education. They tend to be more often private schools. Still, this finding should be put into perspective as the 80% of schools with a fluctuating gap are equally state and private schools, as well as in priority education.

A complementary qualitative study should make it possible to uncover why there are persistent gender gaps, such as the impact of the families' socio-cultural background. Conversely, geographical location does not seem to be correlated with the gaps, the only exception being overseas territories, where stable girl-favouring gaps or equality are more frequent.

Additional features analysed

In addition to the above features, other variables were studied, such as school size, average academic proficiency, and location (rural or urban), but no correlation was found explaining the nature of the gaps. Other factors, such as class-level gender ratio, teacher gender, or staff gender ratio were not specifically studied.

This initial analysis of school-level results highlights the diversity of local situations, with stable or fluctuating gaps, in favour of boys, girls or neither. Situation awareness is a major step for schools to understand the issues in order to reduce the maths gender gap and improve performance.

The study calls for further investigation to gain a better understanding of the various situations in each school. The features studied here only marginally account for some schools standing out over the long term. In the short term, only a local analysis enables actors to have a better understanding and develop appropriate answers.

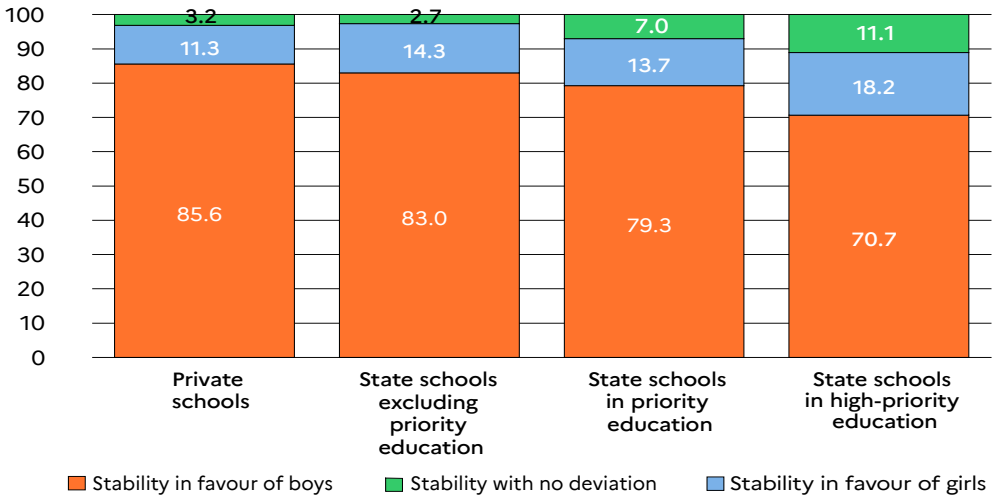
A study of gender-based school-level national assessment results with comparative data enables educators to ask themselves new questions

Though the gender gap and its stability vary greatly from one school to another, educators do little to address the issue. It is indeed rarely the case in self-evaluation and external school evaluation reports.

School teams do have the results per pupil, but the data may not yet include gender, cross-school or national level comparisons. Teachers have therefore to calculate data on their own, and can then use national, regional, county-level (*département*) or sometimes district-level references to carry out an in-depth analysis. At district level, the problem-solving gap is almost always in favour of boys (80% of districts in 2023).

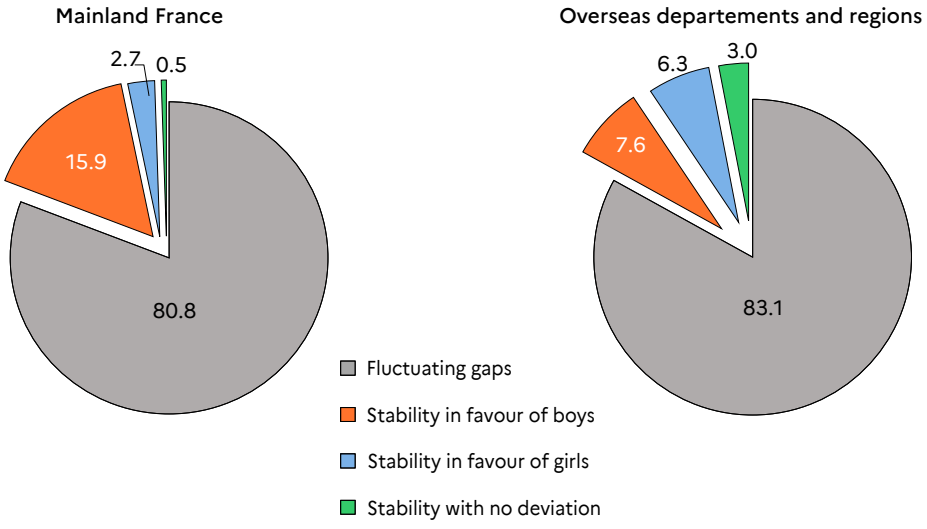
Due to the lack of such an analysis, some of the measures implemented by schools to reduce the gender gap may be ineffective or even counterproductive, for example when girl results are satisfactory and boys' results are the ones that need to be improved.

Figure 3. Nature of differences in problem-solving performance rates at the start of Grade 2, by sector and priority education status, among schools where the gender gap is stable from 2021 to 2023 (%)



Field: Mainland France and overseas departements and regions, state schools and state-finded private schools.
Source: DEPP, CEE calculations.
Note for the reader: Among private schools where the differences are stable over the three years, the differences are in favor of boys in 85.6% of cases.

Figure 4. Nature of the gender gap in problem-solving performance rates at the beginning of Grade 2 by school between 2021 and 2023, by type of territory (%)



Field: Mainland France and overseas departements and regions, state schools and state-funded private schools.
Source: DEPP, CEE calculations.
Note for the reader: In the overseas departements and regions, the gap in problem-solving performance rates between girls and boys at the start of Grade 2 persists in favor of girls between 2021 and 2023 in 6.3% of schools.

Lessons learned from an experiment carried out in three districts of the Versailles regional education authority

The example of three districts in the Versailles education authority whose local inspectors take part in the working group is enlightening. Teachers and support staff were informed of gender-based school-level Grade 1 and Grade 2 results for cohorts from 2020 to 2023, as well as the variability of the gap observed.

The presentation elicited questioning among staff. The various analyses and levers put forward by teachers and heads of primary and nursery schools, district educational advisers, external evaluators, trainers, teachers of pupils with learning difficulties, and foreign language teachers showed how important it is to have shared, objective awareness of local results. The study of gender gap reduction has shown the relevance of the actions taken by school teams who had already developed equality-promoting projects.

Some teachers were surprised when they saw the figures and comparisons. The difficulty sometimes lies in spontaneously assessing the problems encountered by girls or boys depending on the location, or in identifying the presence of gender-based behavioural stereotypes.

The experiment conducted in Versailles also highlighted the desire to find out more about the subject in order to reduce the gender gap. The focus was primarily set on the observation of pupils, teaching, premises and break times in an attempt to understand what might contribute to the gender gap at school level.

Nonetheless, it is a complex and delicate task to help each pupil to progress without fostering gender-based opposition. Boys' lower achievement in French national assessments shows that action is needed for all genders.

Research is needed in order to make progress while avoiding bias. It stresses the importance of developing gender-blind levers. This is one of the conclusions reached by the local inspectors, who will be relying on the training provided in their districts and on school evaluations, in particular thanks to the input of external evaluators.

To support the evaluation process in schools and training courses, the CSE-led working group has published observation grids for pupil activity and Maths and French teaching, collectively designed and taking research results and field feedback into account. The grids are available on the CSE website and can be used for school evaluation and class cross-observation as part of teacher training in connection with the ministry's French and maths development plans. Both school evaluation and teacher training, which include cross-observation, are good opportunities to tackle the issue.

Findings in the field have shown the usefulness of an evaluative approach to raise awareness of the gender gap in maths and in French, so as to help and mobilise educators.

For the moment such an analysis is seldom carried out in schools. School-level national assessment gender gap figures and comparative data would be very useful.

School team support in the context of training and school evaluation is also crucial. It could be based on research findings and the observation grids produced by the working group.

More generally, early awareness of the gender gap is an essential lever in the fight against longer-term inequalities, which extend into higher education and the professional world.

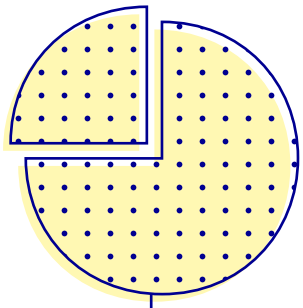
Some research findings on the maths gender gap

A 2024 study by the French Institute for Public Policies (IPP), based on individual pupil data from 2018 to 2022, shows that no single factor has yet been identified to explain the widening maths gender gap affecting girls between Grade 1 and Grade 2. It is observed in all backgrounds and in all types of school. However, '[it] occurs mainly among the best-performing girls at the start of Grade 1. Girls' performance drop is smaller when most pupils are girls, when the teacher is a woman, and when the school belongs to a Priority Education Network. However, these environmental factors can only explain a small part of the overall drop, which suggests the evolution exists at society level.'

The Ministry's Scientific Council, which took part in the CSE working group, is currently carrying out a study, the results of which should be published at the end of 2025. The aim of this interventional study is to test whether it is possible to reduce the maths gender gap by modifying Grade 1 teacher training, distinguishing between the effect of gender stereotype training and that of maths teaching training.

Several studies have shown that the maths gender gap stems from out-of-school factors, *i.e.* stereotypes in society and families. A 2023 study by the International Association for the Evaluation of Educational Achievement (IEA), in partnership with UNESCO and based on Timss 2019 data, concluded that early learning activities have an impact on results in maths and science. It shows that 'overall, parents tend to carry out early learning activities at home more often with girls than boys, except for playing with blocks or construction toys. Girls tend to engage in various activities, while boys are more involved in activities developing numeracy skills.'

A 2023 General Inspectorate report listed research and study findings explaining the maths gender gap in France, citing girls' lower sense of self-efficiency and lesser desire for STEM studies, when their better, more balanced academic results should allow them to consider a wider range of career options. The report notes that girls are more likely to be anxious and to lack self-confidence when it comes to maths, and that this anxiety is generally higher in France than in other OECD countries. It also explains the concept of perceived efficiency, which has been shown to influence student results, and notes that in the 2012 PISA study France was the country where the gender gap in perceived effectiveness in maths had widened the most between 2003 and 2012. The report also refers to the weight of stereotypes and their negative effects on girls' maths performance. Several gender-blind levers for teachers illustrate what can be done to mitigate the weight of stereotypes and reduce anxiety and lack of confidence.



The levers put forward are first the understanding by teachers of factors influencing gender-based success, which are partly the same for pupils with learning difficulties. Then comes advice on teaching methods and processes. Topics include:

- Fostering a reassuring and engaging environment where every pupil understands the learning objectives and knows they can be achieved thanks to commitment. Considering mistakes as part of the learning process is a way of promoting what has been learnt and identifying progress areas, developing oral communication to check that all pupils understand, questioning approaches and developing strategies,
- Classroom interaction,
- Answer format and teacher instructions allowing all pupils to express themselves thanks to equal speaking-time distribution and various contribution formats (closed answer, lesson reminder, reasoning, conjecture, etc.),
- Random distribution of tasks and speaking time to avoid gender-biased solicitation,
- Assessment instructions in order to reduce pupil stress,
- Gender-blind school report or paper ratings,
- Inclusive and collaborative practice development,
- Mastery goals rather than performance goals setting in order to reduce student stress,
- Attention to adult- and pupil-conveyed stereotypes in the wording of exercises and textbooks,
- Gender-balanced groups.

This last point, mentioned in the General Inspectorate report, with reference to reduced-size groups, and in the IPP study, can be particularly relevant to primary schools when it comes to setting up classes, especially multi-grade classes, where possible.

While research shows that social interactions and stereotypes in society, in families, among pupils and among teachers, can have an impact on pupils' self-confidence and ultimately on the maths gender gap, it also points the way for teachers to fight against those factors.

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