



Have we reached gender equity in mathematics education?

Evidence from TIMSS South Africa 2011

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- Results from TIMSS 2011 point to the presence of new complexities in the schooling experience of South African boys and girls.
- On average, across South Africa, gender differences in mathematics test results were small or non-existent. Achievement levels for both boys and girls remained low based on international standards.
- When fee-paying, no fee and independent schools were compared, boys and girls *within* each school grouping achieved similar results.
- By contrast, girls from independent and fee paying schools were more academically advantaged than girls from no fee schools. The same pattern applied to boys.
- The achievement gap favoured boys in no-fee schools when older learners were compared.
- The relationship between attitudes and achievement differed for boys and girls. It was also dependent on the type of school that learners attended.
- Gender differences in educational expectations favoured girls in South African schools.
- Girls also reported a higher level of parental engagement than boys.
- Boys were overrepresented among learners who were victims of bullying. Boys in independent schools experienced bullying with equal frequency as boys in less affluent schooling environments.

Eight education departments exist, which follow different curricula and offer varying standards of learning quality. The South African Schools Act, 1996 seeks to rectify this by providing a uniform system which promotes gender equality.



Parents whose combined annual income is less than ten times annual school fees are exempt from paying school fees.



Matric pass rate is 78.2% – the highest in the history of post-1994 education in South Africa. A higher % of males (80%) compared to females (77%) passed. However, 55% of candidates are female.

1994



1997

Government launches its new education system – Curriculum 2005 – based on outcomes-based education (OBE).

1998



1999

Curriculum Assessment Policy Statements (CAPS) are developed to form the basis of a new schools' curriculum.

2013

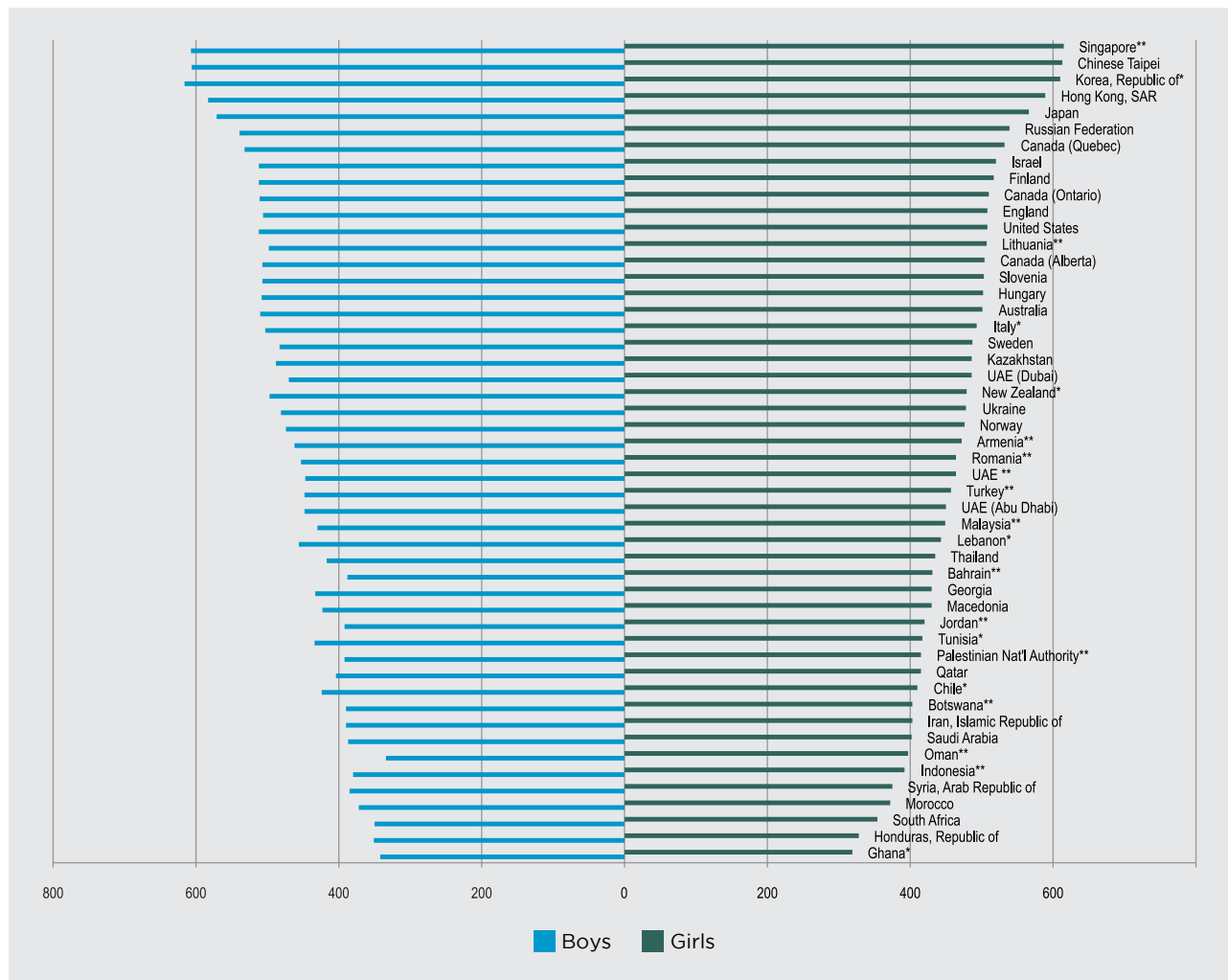


South African girls are performing as well as boys in mathematics although the overall level of performance remains low.

Questions about gender equity in education continue to receive global attention but for very different reasons to those that have prevailed in the past. There have been major shifts in achievement patterns among girls and boys in countries with varying cultural and national identities, raising questions about whether a gender convergence has been achieved or whether new complexities about gender inequalities are emerging.

In 22 out of the 42 TIMSS countries, including South Africa, there was no statistical difference in average national test scores between boys and girls. There was a significant difference favouring boys in only seven countries and favouring girls in a further 13.

FIGURE 1: AVERAGE MATHEMATICS ACHIEVEMENT FOR GRADE 8¹ BOYS AND GIRLS



* Countries where the gender gap favouring boys was statistically significant.

** Countries where the gender gap favouring girls was statistically significant.

South African government schools are grouped into one of five bands known as quintiles. Quintiles are based on the poverty level of the community where the schools are situated. The quintile ranking determines how funds are allocated to schools by the Department of Basic Education. The most economically disadvantaged and resource-poor schools are grouped into Quintile 1 and the most affluent schools are assigned a Quintile 5 ranking. All schools in Quintiles 1 to 3 are also referred to as 'no fee' schools and the top two quintiles of government schools are categorised as 'fee paying' schools.

Beyond the state-controlled government schools are a growing group of independently governed schools. Independent schools are diverse and some even receive state subsidies but they generally have access to a

¹ South Africa, Botswana and Honduras participated in the study at the Grade 9 level.

substantially greater level of private resources because of the tuition fees that are paid by parents. Although mathematics achievement levels were significantly higher among learners in independent and fee paying schools, gender patterns in achievement were strikingly similar within each of the three school categories (no fee, fee paying and independent). The average performance of boys and girls in independent schools was the same (474 for boys and 473 for girls). Boys and girls attending fee-paying schools also had comparable average achievement results (396 for boys and 398 for girls) as did boys and girls within no fee schools (322 for boys and 326 for girls).

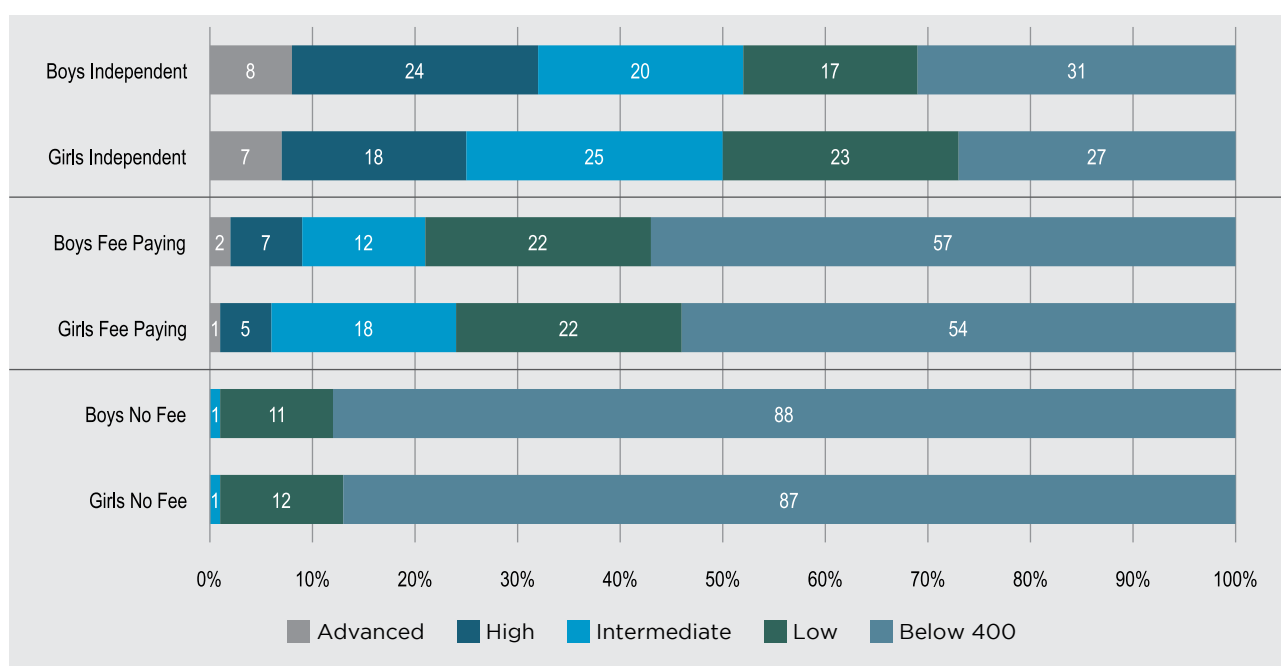
Achievement gaps in mathematics had less to do with gender and more to do with the educational environment. Girls from independent and fee paying schools were more academically advantaged than girls from no fee schools. Eighty seven per cent of girls in no fee schools, but only 27 per cent of girls in independent schools were below the minimum TIMSS benchmark of 400 that represents a basic knowledge of whole numbers and decimals, operations and graphs. The same pattern was found for boys.

TABLE 1: PERCENTAGE OF LEARNERS BELOW THE TIMSS 400 MINIMUM BENCHMARK

School Type	Gender	
	Boys	Girls
Independent (n=920)	31.35%	27.07%
Fee Paying (n=4 233)	57.37%	53.76%
No Fee (n=6 816)	87.84%	87.09%

Wider gaps favouring boys typically appear among high achievers. Although South African boys outnumbered girls among the highest achieving learners based on TIMSS international benchmarks, there was only a fraction of all learners among the top achievers and the gender differences were not statistically significant.

FIGURE 2: PERFORMANCE AT INTERNATIONAL BENCHMARKS FOR SOUTH AFRICAN BOYS AND GIRLS BY SCHOOL TYPE²



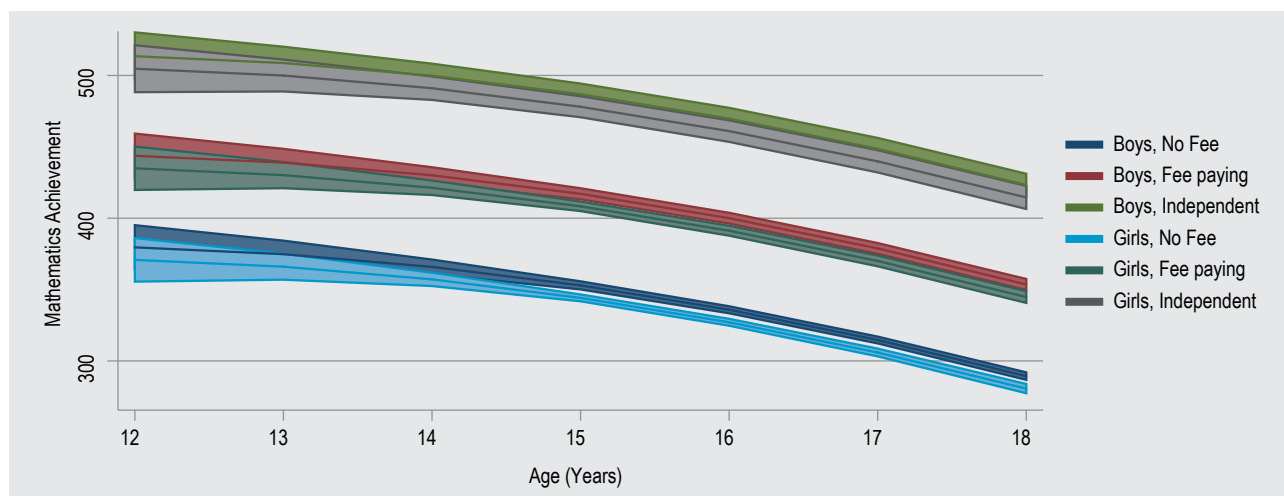
Boys attending public schools who progress through school without delays or interruptions perform significantly better than their older peers.

The TIMSS 2011 results revealed that South African girls and boys progress through school at different paces. On average, Grade 9 boys were older than Grade 9 girls at the time of the study. The average age of Grade 9 girls and boys was 15.8 and 16.3 years respectively. This would suggest that either boys started school later or that they repeated a grade once or more. Older learners were at a distinct disadvantage. Beyond the age of 14, test scores began to decline for all learners, irrespective of gender. However, it emerged that the gender-age achievement gap in better-resourced independent and fee paying schools was not significant. This is shown in the graph below by

² **Advanced** – Reason, draw conclusions, make generalizations, and solve linear equations; **High** – Apply knowledge and understanding in a variety of relatively complex situations; **Intermediate** – Apply basic knowledge in a variety of situations; **Low** – Some knowledge of whole numbers and decimals, operations, and basic graphs; **Below 400** – Learners who have not demonstrated a knowledge of the most basic skills in mathematics.

the overlapping horizontal lines for boys and girls at different ages. In no fee public schools, from about age 14, the average test scores of girls began to decline more rapidly than average test scores of boys, leading to a significant disadvantage for girls. Research has shown that dropout rates are higher for boys than for girls, meaning that the pool of older girls that remain in school probably includes a wider range of ability levels.

FIGURE 3: MATHEMATICS ACHIEVEMENT BY AGE, GENDER AND SCHOOL TYPE

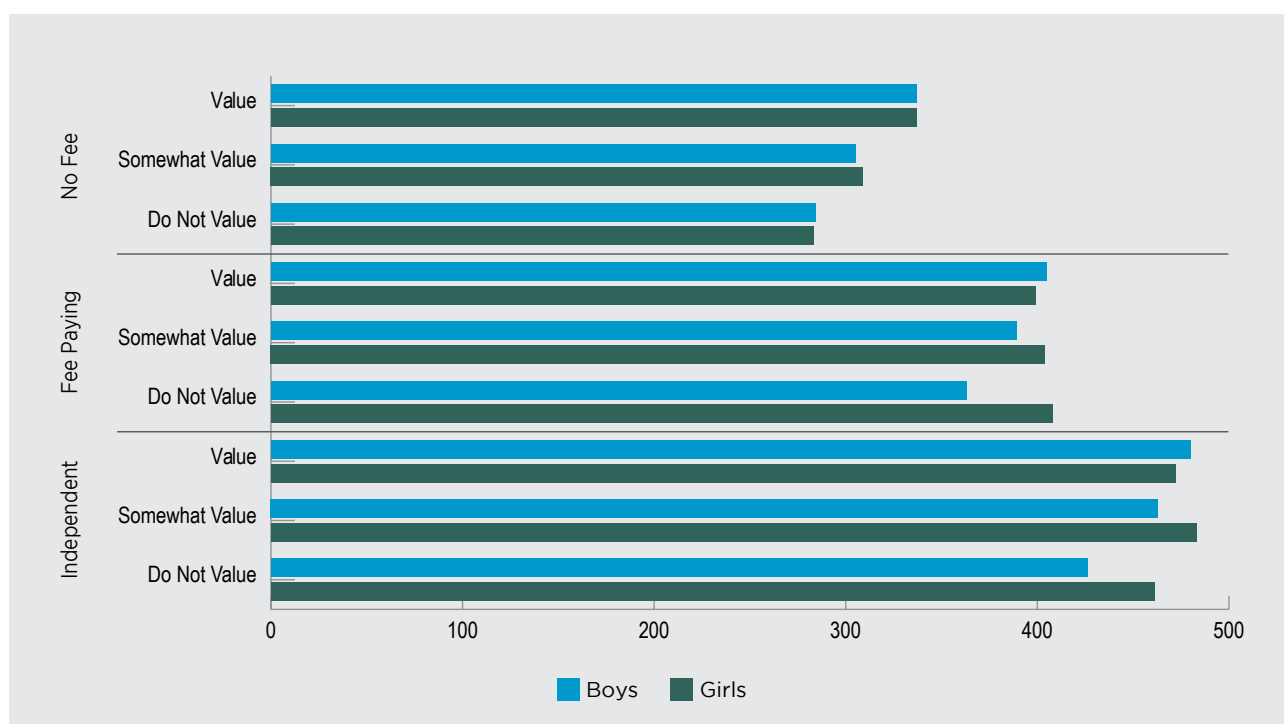


Attitudes about mathematics matter for both boys and girls but boys who attach less value to the subject are worse off.

Cross national studies have often shown that girls experience higher levels of anxiety and lower levels of confidence in mathematics, even when they are equally capable to boys. In 2011, TIMSS asked learners a series of questions to determine how much they enjoyed and valued mathematics and how confident they were in the subject. As with earlier results, the national pictures revealed few differences but a closer analysis unveiled some unexpected conclusions.

In general, positive attitudes about the subject were related to higher test scores for all learners, regardless of gender. In better resourced fee paying and independent schools, boys who saw no value in learning mathematics achieved lower test scores than girls with similar views. In fact, this group of boys achieved average test scores that were equivalent to boys and girls in no fee schools who attached a higher value to studying the subject.

FIGURE 4: ATTITUDES, ACHIEVEMENT AND SCHOOL TYPE



Girls have higher aspirations about their academic prospects than boys.

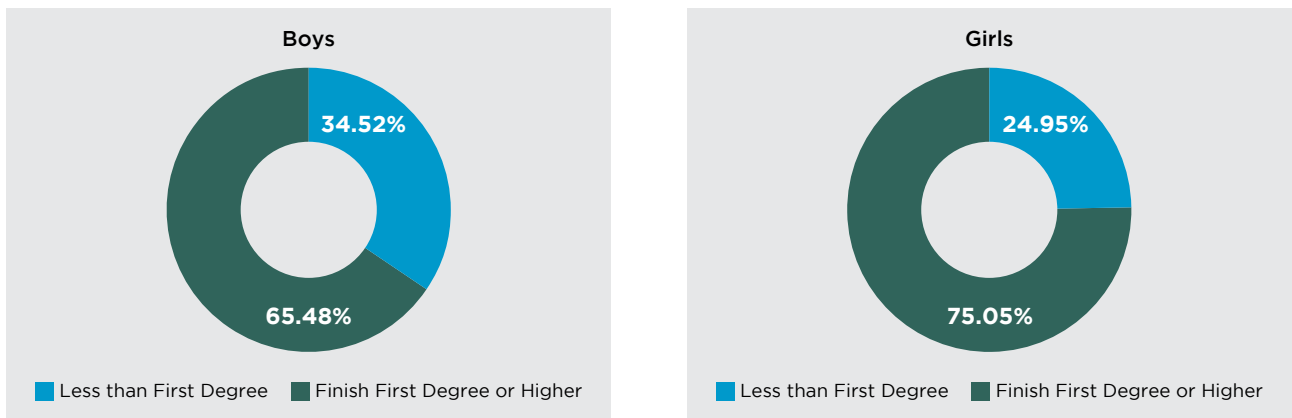
The TIMSS 2011 survey also asked learners how far they expected to progress in their studies. Girls generally expressed greater motivation about their academic prospects compared to boys. Girls in independent and fee paying schools were particularly optimistic about their educational careers. Of the learners attending independent schools, 90% of girls planned at least to complete a first degree compared to 82% of boys.

FIGURE 5: ASPIRATIONS AND ACHIEVEMENT IN INDEPENDENT SCHOOLS



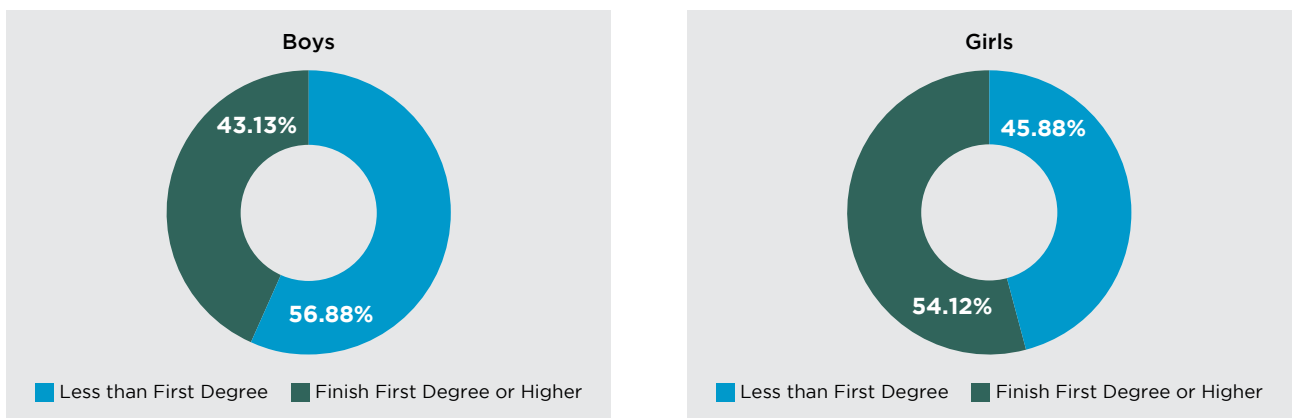
Although the percentage of girls and boys who aspired to tertiary studies was lower in public schools, the aspiration gap favouring girls within these schools was also about ten percentage points.

FIGURE 6: ASPIRATIONS AND ACHIEVEMENT IN FEE PAYING PUBLIC SCHOOLS



Boys in no fee schools had the lowest aspirations for traditional tertiary studies. Only two in five had this goal in mind. It could be that these boys had alternative career pathways in mind. Further investigation would be required for a clearer interpretation.

FIGURE 7: ASPIRATIONS AND ACHIEVEMENT IN NO FEE PUBLIC SCHOOLS



Girls reported receiving greater support for their studies outside of school.

In 2011, learners were asked about how often they interacted with an adult outside of school regarding their studies. Girls were consistently at an advantage in all forms of engagement with parents. They were more likely to speak to an adult on a daily basis about school. Girls also reported that parents set aside time for them to do homework on a regular basis. It is worth noting that girls in no fee schools reported receiving as much, if not more, parental support than girls in more resource rich environments. On average, 62% of girls in no fee schools compared to only 47% of girls in independent schools reported that parents asked them about what they were learning at school on a daily basis.

TABLE 2: PARENTAL INVOLVEMENT, GENDER AND SCHOOL TYPE

School Type	Parents Ask		Talk About School		Time for Homework	
	Boys	Girls	Boys	Girls	Boys	Girls
No Fee						
Less Often	35%	30%	43%	34%	33%	27%
Every Day	57%	62%	47%	56%	58%	64%
Omitted/ invalid	8%	8%	10%	10%	9%	9%
Total	100%	100%	100%	100%	100%	100%
Fee Paying						
Less Often	41%	42%	52%	44%	34%	32%
Every Day	54%	54%	42%	52%	60%	64%
Omitted/ invalid	5%	4%	6%	4%	6%	4%
Total	100%	100%	100%	100%	100%	100%
Independent						
Less Often	49%	51%	60%	49%	39%	37%
Every Day	48%	47%	38%	49%	59%	61%
Omitted/ invalid	2%	2%	2%	2%	2%	2%
Total	100%	100%	100%	100%	100%	100%

Boys are more likely to be the victims of regular bullying

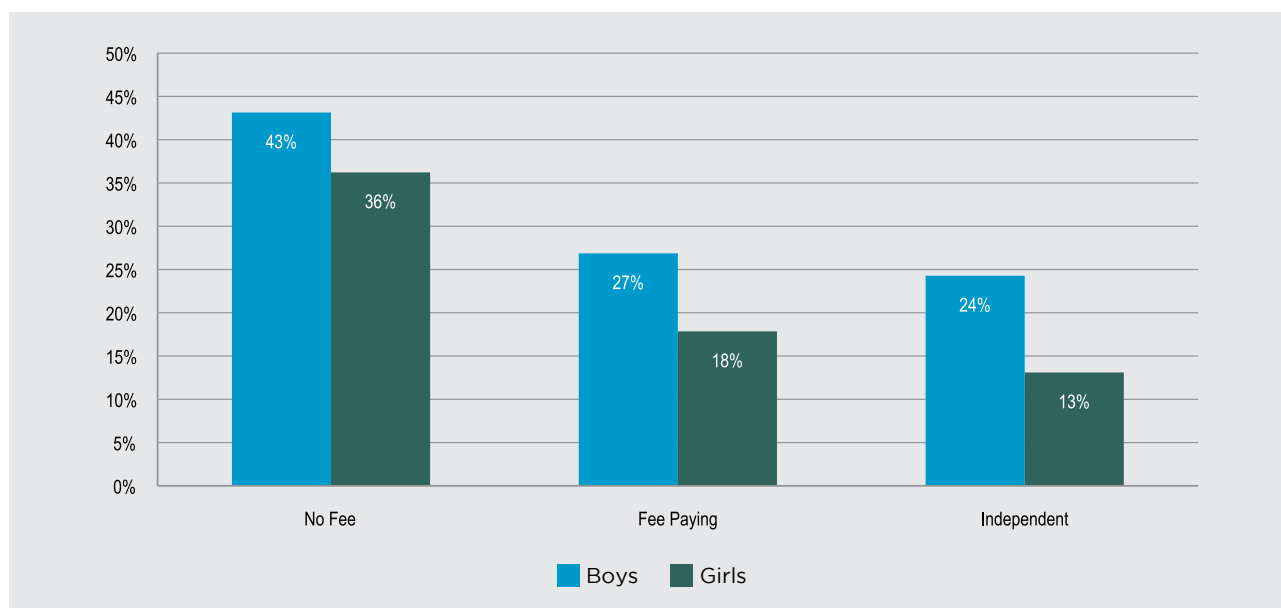
Studies have shown that boys are more likely than girls to be the victims of bullying, particularly when physical forms of bullying are considered. The TIMSS 2011 study collected information on how frequently students experienced physical and verbal forms of bullying. The options provided ranged from 'on a weekly basis' to 'never'. Less frequent bullying was related to higher average achievement. What is particularly worrisome is that the percentage of learners that were exposed to bullying on a weekly basis in South Africa was three times as high as the international estimate.

TABLE 3: BULLYING, ACHIEVEMENT AND SCHOOL TYPE

	Almost Never		About Monthly		About Weekly	
	% learners (SE)	Average Achievement (SE)	% learners (SE)	Average Achievement (SE)	% learners (SE)	Average Achievement (SE)
Mathematics (SA)	25 (0.7)	393 (3.9)	42 (0.8)	362 (2.3)	33 (1.0)	322 (3.0)
Mathematics (Int. Avg.)	59 (0.2)	473 (0.6)	29 (0.1)	467 (0.7)	12 (0.1)	441 (1.0)
Science (SA)	25 (0.7)	392 (5.1)	42 (0.8)	346 (3.4)	33 (1.0)	287 (4.4)
Science (Int. Avg.)	59 (0.2)	483 (0.6)	29 (0.1)	478 (0.7)	12 (0.1)	452 (1.1)

In terms of gender, bullying was experienced more regularly by South African boys in all types of schools. In no fee schools, 43% of boys and 36% of girls reported being bullied on a weekly basis. In fee paying public schools 27% of boys and 18% of girls were bullied on a weekly basis and in independent schools it was 24% of boys and 13% of girls.

FIGURE 8: PERCENTAGE OF BULLYING ON A WEEKLY BASIS BY GENDER AND SCHOOL TYPE



Summing it up

This report on gender gaps in mathematics among South African learners highlights the complexity of the issue of gender inequality in education and the need for deeper and on-going analysis. At first glance, it would appear that gender gaps have narrowed sufficiently and that South African girls and boys are afforded equal opportunities in their educational careers. Indeed there was much that was similar among Grade 9 boys and girls in 2011. Girls and boys attending different categories of schools in equal numbers, achieved comparable test scores, and were equally represented amongst the lowest and highest achievers. They were also alike in their knowledge of specific areas of mathematics. There are several important results that confirm that maintaining a gender focus on education remains warranted.

1. Overall achievement levels in mathematics remain low for all learners regardless of gender. Only a fraction of boys and girls at independent and fee paying schools were among the highest international achievers and the vast majority of learners did not achieve even the lowest level of competency. It remains to be seen whether gender gaps will shift when achievement patterns improve, as has been the case elsewhere. What is certain is that without steady progress towards improvements in mathematics competency in the future, notions of equality remain fairly hollow.
2. Although gender gaps within school types were narrow, gender gaps across school types remained wide. Opportunities for girls in no fee schools remain vastly different to girls in fee paying and independent schools. The same holds true for boys in different educational environments. Gender targeted policies need to keep in mind these intersections of inequality.
3. Overage learners were academically weaker when compared to learners who were on age for their grade. However, the role of age on Grade 9 mathematics mattered considerably more for gender patterns of performance in no fee public schools. As learner age increased, test scores among girls deteriorated more rapidly. This resulted in statistically significant gender gaps favouring boys among older learners in the least resourced schools. These results raise questions about the internal efficiency of the education system as a whole, how repetition policies are applied and attitudes towards overage learners in secondary school. Understanding these issues is especially important given the strong link between grade repetition and dropout.
4. There was a level of indifference among boys about their education that is worrisome. This attitude prevailed even among boys attending schools with better support structures. Boys were found to have lower aspirations about their academic careers, showed less interest in mathematics, and engaged less often with an adult regarding their school work. The link between negative attitudes and weak performance was stronger for boys than for girls. At times boys in middle class environments appeared to be particularly vulnerable. Boys were also at a higher risk of being victims of bullying than girls, irrespective of the type of school that they attended. Taken together, these findings raise questions about how seriously boys take school and how safe they feel in their educational environments.



So what can we do to help South African boys and girls have successful educational careers?

- **Raise Performance:** Engage both boys and girls in activities that help them to build their competence in mathematics. Ensure that teachers respond to the different learning needs of girls and boys and how these needs may change for age-specific groups.
- **Transform Attitudes:** Nurture an awareness of the utility of mathematics for both boys and girls, especially those with weak academic backgrounds. Provide opportunities for boys to connect with male role models and mentors so that their commitment to their studies increases.
- **Improve the Climate:** Encourage schools to develop and communicate their school safety policies. Where bullying is embedded in school culture and codes of silence, provide independent outlets for learners (especially boys) to raise issues without being isolated or jeopardising their academic careers.

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