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Changing lives of ordinary people through human and social sciences

Highlights from TIMSS 2011: South Africa

Towards Equity and Excellence

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY (TIMSS 2011)

- TIMSS is an opportunity to assess and benchmark South African mathematics and science performance in an international study. TIMSS is conducted every four years since 1995. In TIMSS 2011, 45 countries participated at the grade 8/9 level.
- It is important to measure learner achievement through national, regional and international measures. These studies provide information about the well being of our educational system; so that we could better manage and improve our systems.
- In August 2011, the HSRC administered the TIMSS 2011 mathematics and science instruments in 285 schools to 11969 grade 9 learners.
- We had conducted previous TIMSS in 1995, 1999 and 2002 and have comparable data to monitor system-level trends in a global context.

Today's Presentation

- We present initial analysis from TIMSS 2011 data.
- We describe patterns for now. With further analysis we will discuss the factors impacting on educational performance.
- Explaining the terms: score estimates & distributions.
- We will report on:

  (i) TIMSS 2011 achievement

  (ii) Trends in achievement since 1995

  (iii) Comparison between TIMSS 2002 & 2011

Key messages from TIMSS 2011

- South African mathematics and science national average scores, although still low, has improved from 2002.
- The difference between the highest and lowest scores in 2002 to 2011 has decreased.
- The greatest improvements in scores is observed at the lowest end, from the lowest performing schools and provinces, and in schools formerly designated for Africans.
- The top end has not shown any major improvements and the former House of Assembly and Independent schools perform at similar levels, but lower than the middle (Centrepoint) score.

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1. Distribution of Mathematics and Science achievement in participating countries

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Exhibit 1.2: Distribution of Mathematics Achievement

TIMSS 2011 Mathematics 8th Grade

Country	Average Scale Score	Mathematics Achievement Distribution
Korea, Rep. of	613 (2.9)	▲
2 Singapore	611 (3.8)	▲
Chinese Taipei	609 (3.2)	▲
Hong Kong SAR	586 (3.8)	▲
Japan	570 (2.6)	▲
2 Russian Federation	539 (3.6)	▲
3 Israel	516 (4.1)	▲
Finland	514 (2.5)	▲
2 United States	509 (2.6)	▲
‡ England	507 (5.5)	
Hungary	505 (3.5)	
Australia	505 (5.1)	
Slovenia	505 (2.2)	▲
1 Lithuania	502 (2.5)	
TIMSS Scale Centerpoint	**500**	
Italy	498 (2.4)	
New Zealand	488 (5.5)	▼
Kazakhstan	487 (4.0)	▼
Sweden	484 (1.9)	▼
Ukraine	479 (3.9)	▼
Norway	475 (2.4)	▼
Armenia	467 (2.7)	▼
Romania	458 (4.0)	▼
United Arab Emirates	456 (2.1)	▼
Turkey	452 (3.9)	▼
Lebanon	449 (3.7)	▼
Malaysia	440 (5.4)	▼
1 Georgia	431 (3.8)	▼
Thailand	427 (4.3)	▼
Ψ Macedonia, Rep. of	426 (5.2)	▼
Tunisia	425 (2.8)	▼
Chile	416 (2.6)	▼
Ψ Iran, Islamic Rep. of	415 (4.3)	▼
Ψ Qatar	410 (3.1)	▼
Ψ Bahrain	409 (2.0)	▼
Ψ Jordan	406 (3.7)	▼
Ψ Palestinian Nat'l Auth.	404 (3.5)	▼
Ψ Saudi Arabia	394 (4.6)	▼
Ψ Indonesia	386 (4.3)	▼
Ψ Syrian Arab Republic	380 (4.5)	▼
※ Morocco	371 (2.0)	▼
Ψ Oman	366 (2.8)	▼
※ Ghana	331 (4.3)	▼
Ninth Grade Participants		
Ψ Botswana	397 (2.5)	▼
※ South Africa	352 (2.5)	▼
2 ※ Honduras	338 (3.7)	▼

100 200 300 400 500 600 700 800

▲ Country average significantly higher than the centerpoint of the TIMSS 8th grade scale

▼ Country average significantly lower than the centerpoint of the TIMSS 8th grade scale

Percentiles of Performance

5th 25th 75th 95th

95% Confidence Interval for Average (±2SE)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2011

- For mathematics, Asian countries – Korea, Singapore, Chinese Taipei, Hong Kong and Japan - are top performers.
- South Africa, Botswana and Honduras conducted the study at Grade 9 level.
- South African performance is still at the low end, but has improved since 2002. In 2002 South Africa scored 285 points at the grade 9 level. In 2011 the score was 352.
- The top South African performers approached the average performance of the top performing countries.

2. Trends in Mathematics and Science achievement in South Africa: 1995, 1999, 2002 and 2011.

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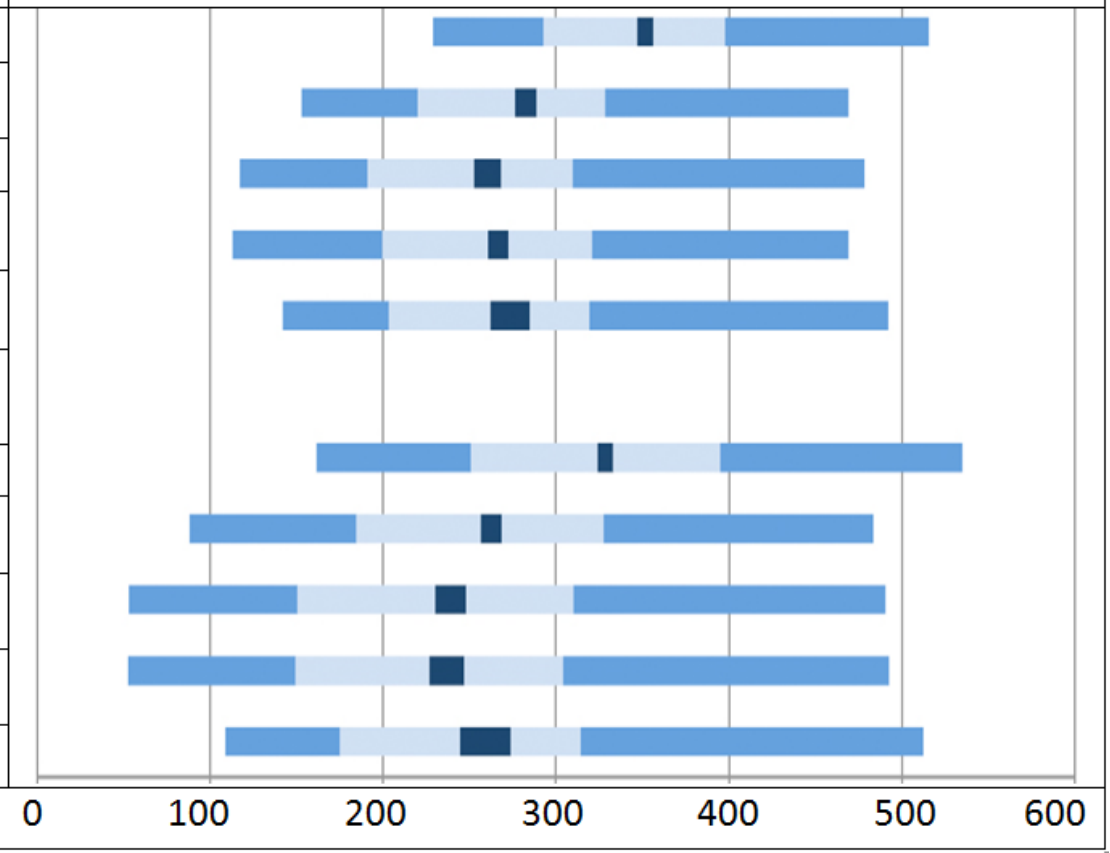
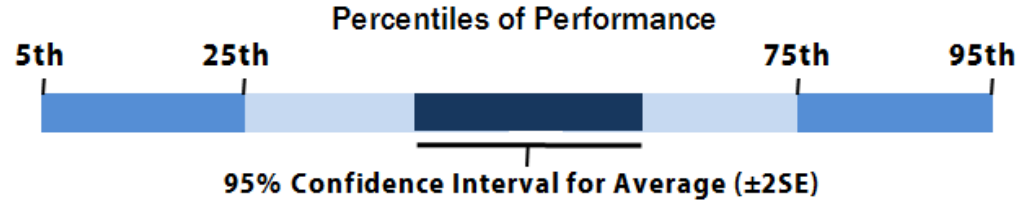
MATHEMATICS	Average scale score	Achievement distribution
Grade 9 TIMSS 2011	352 (2.5)	
Grade 9 TIMSS 2002	285 (4.2)	
Grade 8 TIMSS 2002	264 (5.5)	
Grade 8 TIMSS 1999	275 (6.8)	
Grade 8 TIMSS 1995	276 (6.7)	
SCIENCE		
Grade 9 TIMSS 2011	332 (3.7)	
Grade 9 TIMSS 2002	268 (5.5)	
Grade 8 TIMSS 2002	244 (6.7)	
Grade 8 TIMSS 1999	243 (7.8)	
Grade 8 TIMSS 1995	260 (7.9)	





Trends between TIMSS 1999 and TIMSS 2011

- For TIMSS 1995, 1999 and 2002, the average score remained the same – perhaps due to the structural and educational changes in the country since 1994.
- Between TIMSS 2002 to 2011, there is an increase in achievement scores.
- Score distribution: the scores at the lower end increased.
- TIMSS estimates within a 4-year cycle a country could expect up to 40 point improvement –i.e. improve by one grade level.
- South African scores improved by around 60 points – general improvement by 1.5 grade levels between 2002 and 2011.

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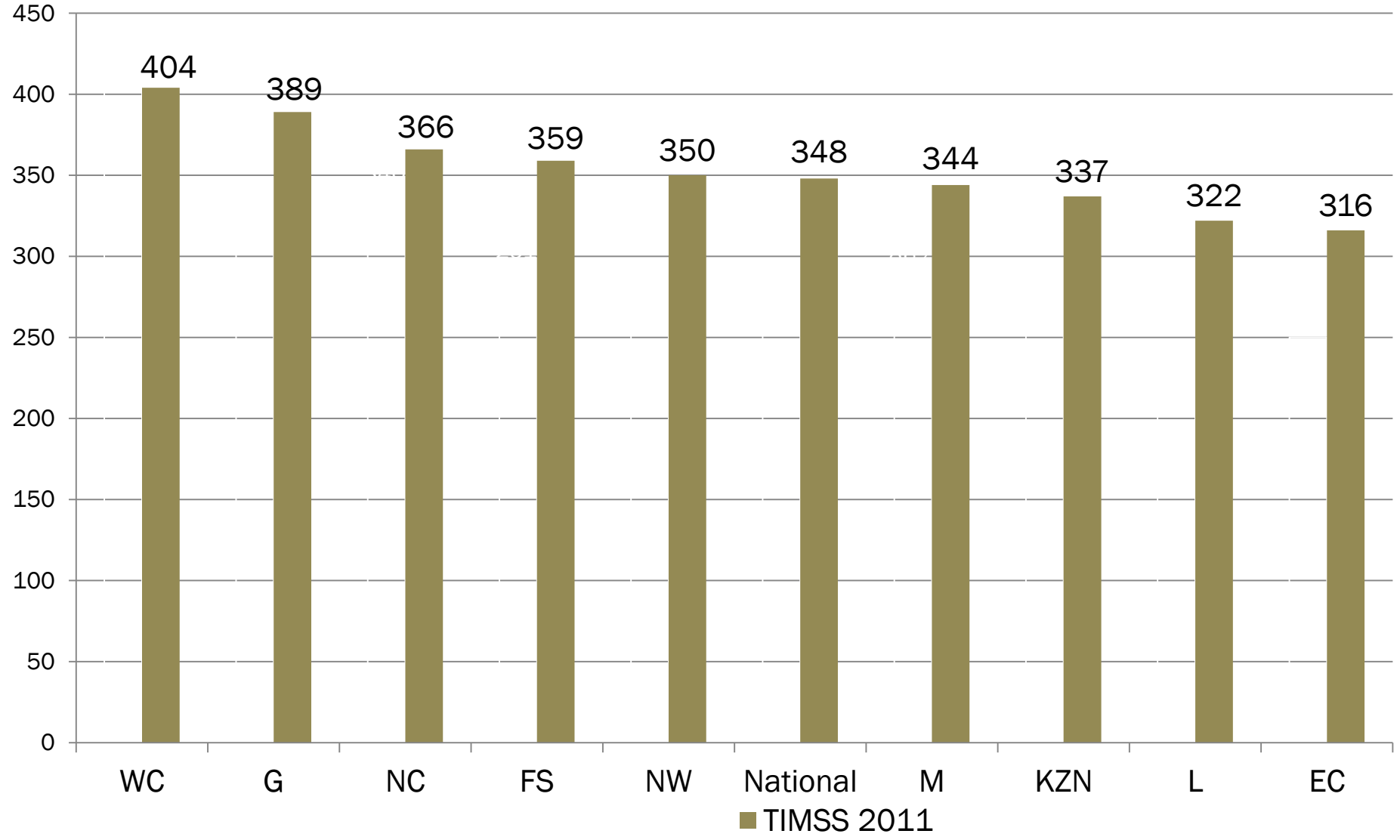
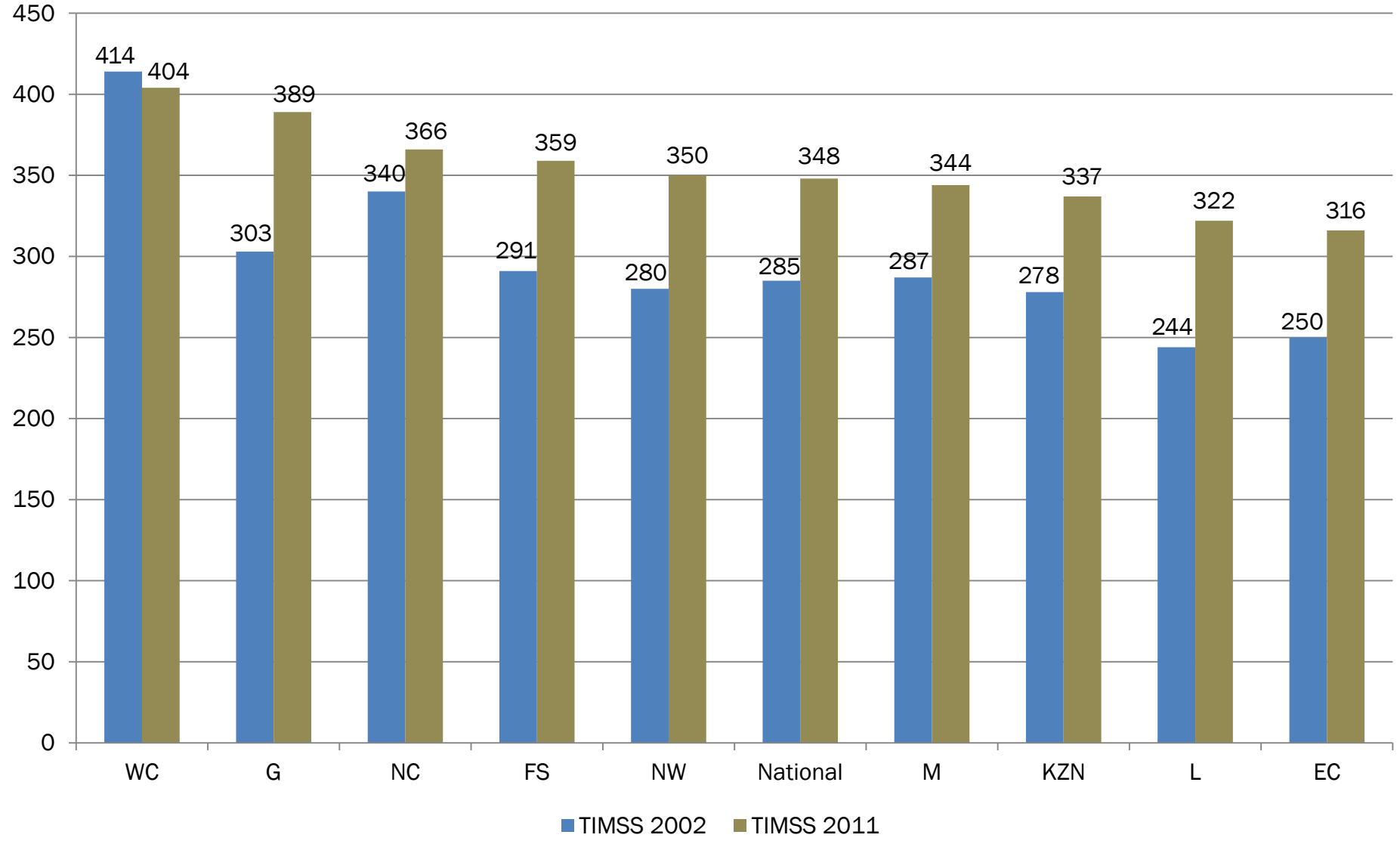
3. Provinces: Achievement and Change in Achievement between 2002 to 2011.

Change in achievement by province between 2002 to 2011



Change in achievement by province between 2002 to 2011



Provincial performance

- All provinces, except Western Cape, increased the mathematics and science scores between 2002 and 2011.
- The changes in the Western Cape and Northern Cape scores is not statistically significant.
- The order of greatest improvement in mathematics scores are: Limpopo (1.33), Gauteng (1.31), Eastern Cape (1.27), NorthWest (1.26), Free State (1.24), KwaZuluNatal (1.23), Mpumalanga (1.2), Northern Cape (1.07), Western Cape (0.99).
- In 2002, the difference between highest and lowest performing province was 170 points. This decreases to 86 in 2011 – moving towards equitable outcomes.

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4. School Type: Achievement and change in achievement

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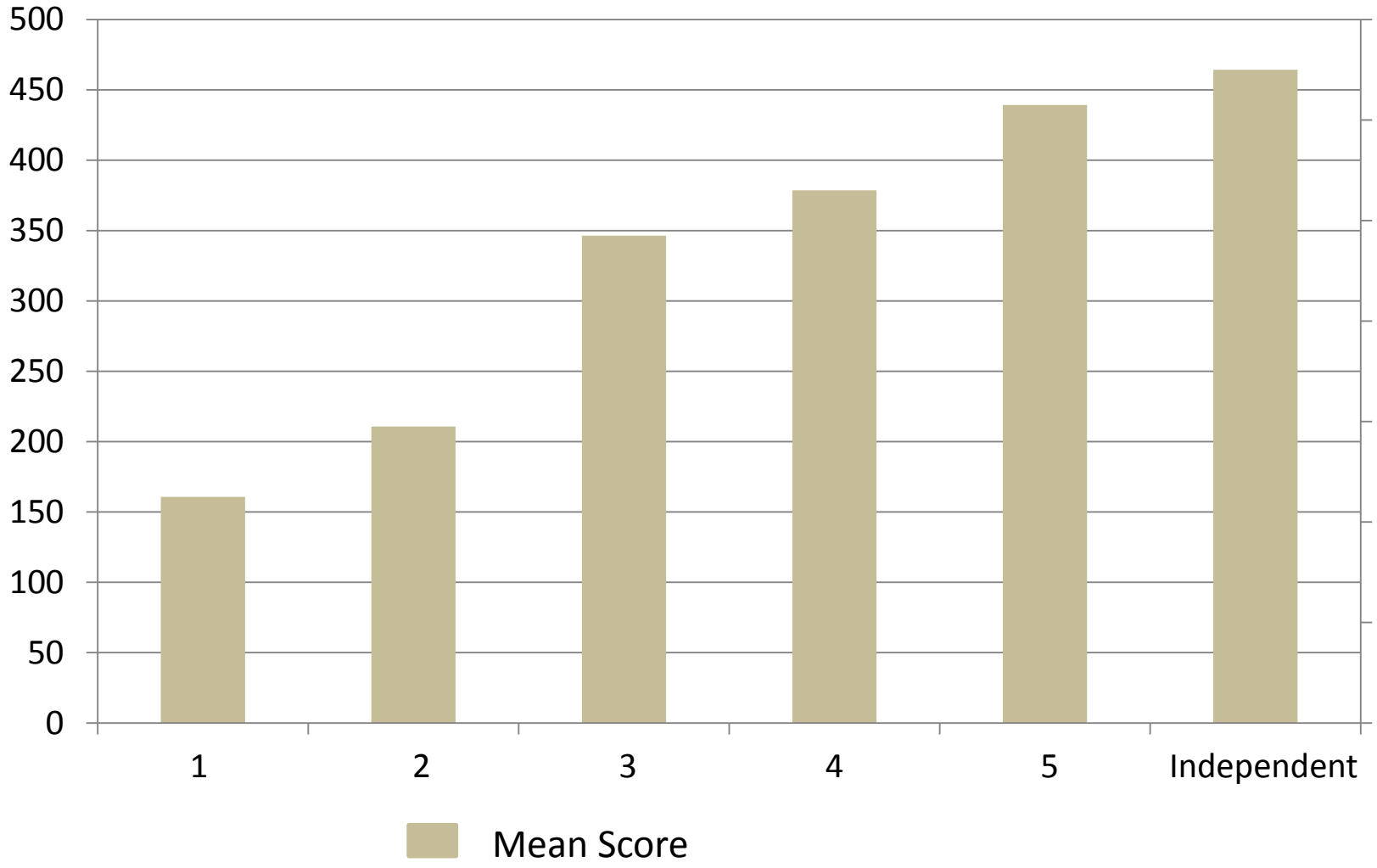
4.1.Public and Independent Schools

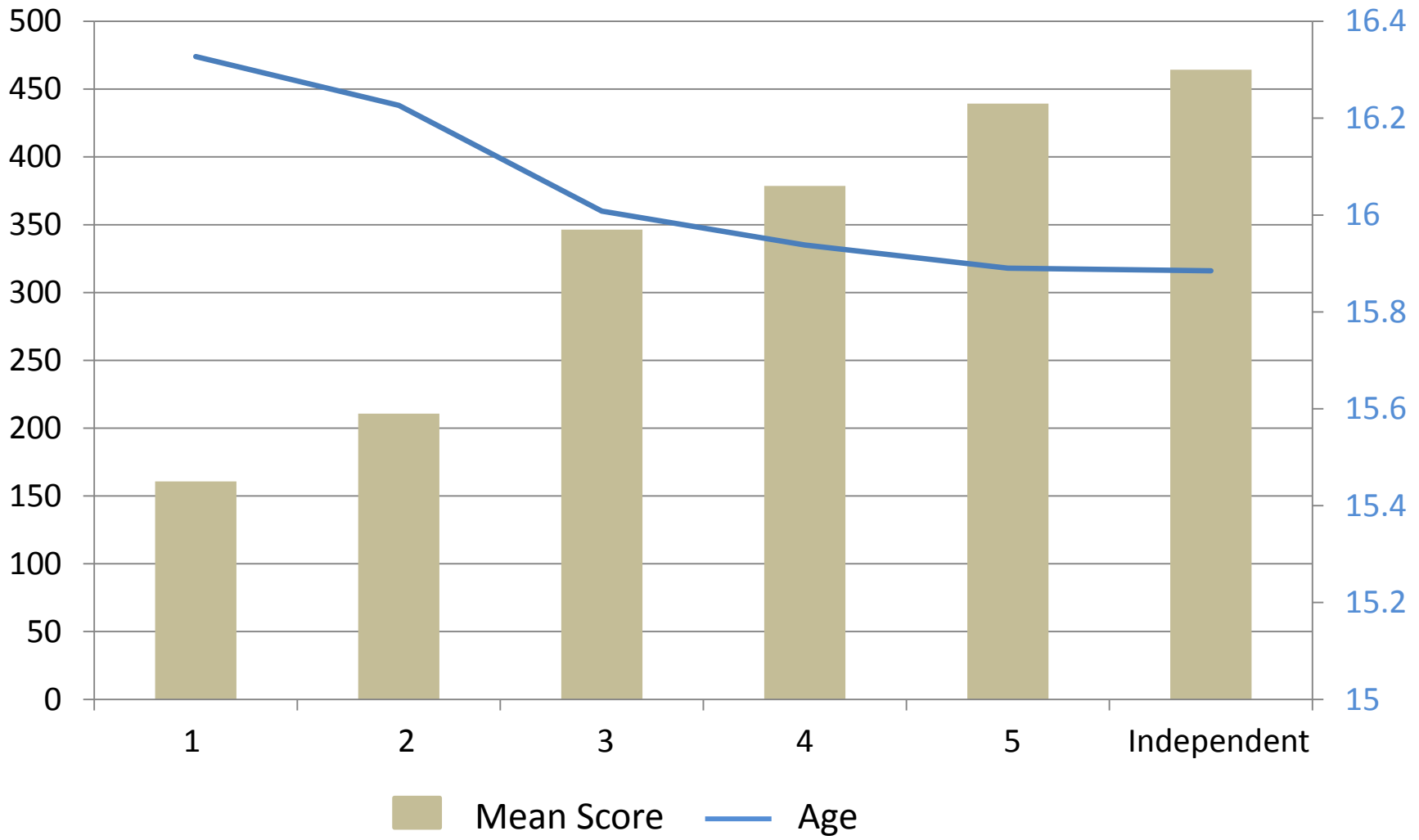
- In the study we oversampled the group of independent schools so that we could report on performance in public and independent schools.
- Independent schools scored higher than public schools. For mathematics:

Public schools:	348 points
Independent schools:	474 points

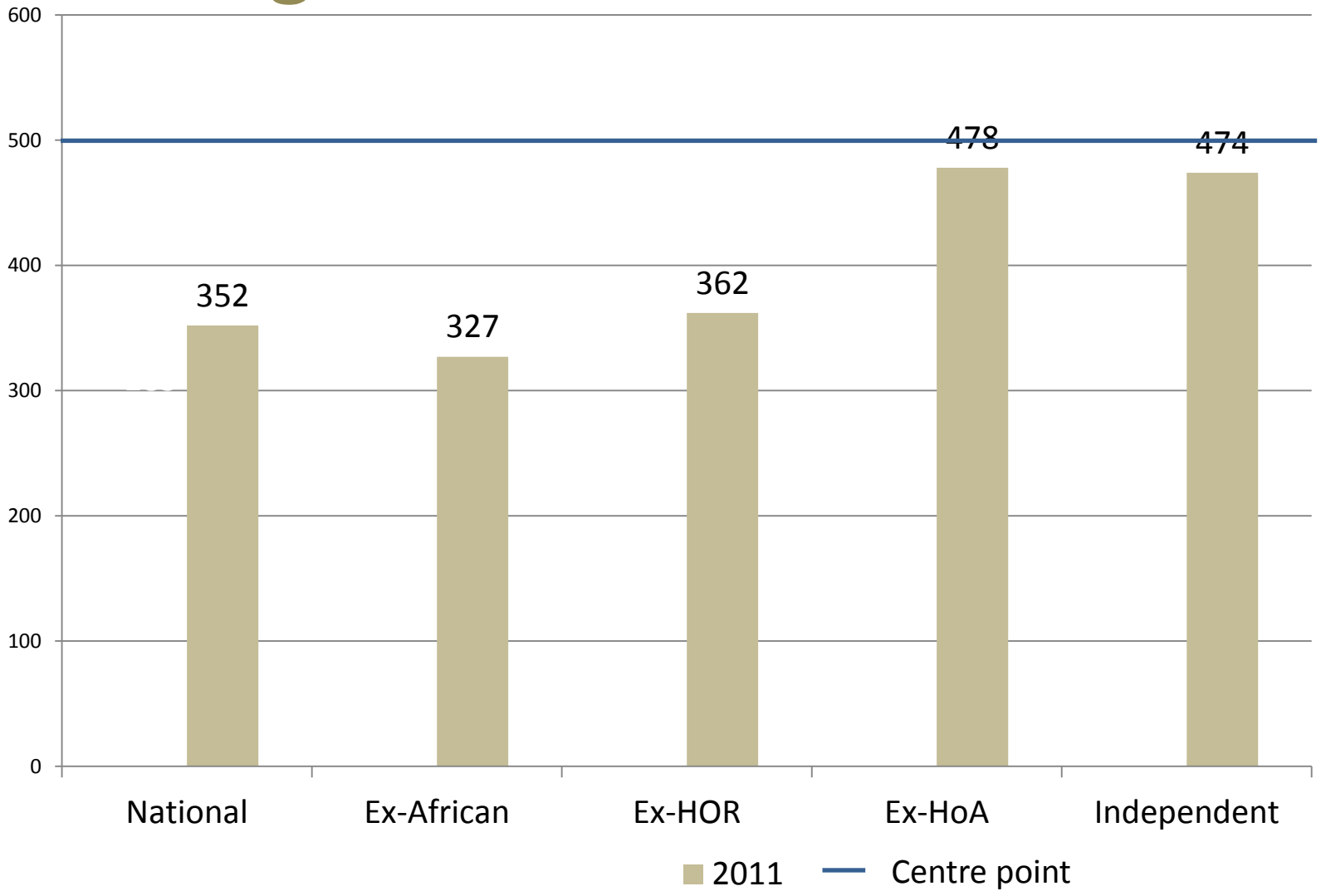
4.2. Performance by the poverty index of schools



4.2. Performance by age



4.3. Former racial departments: Changes between 2002 to 2011



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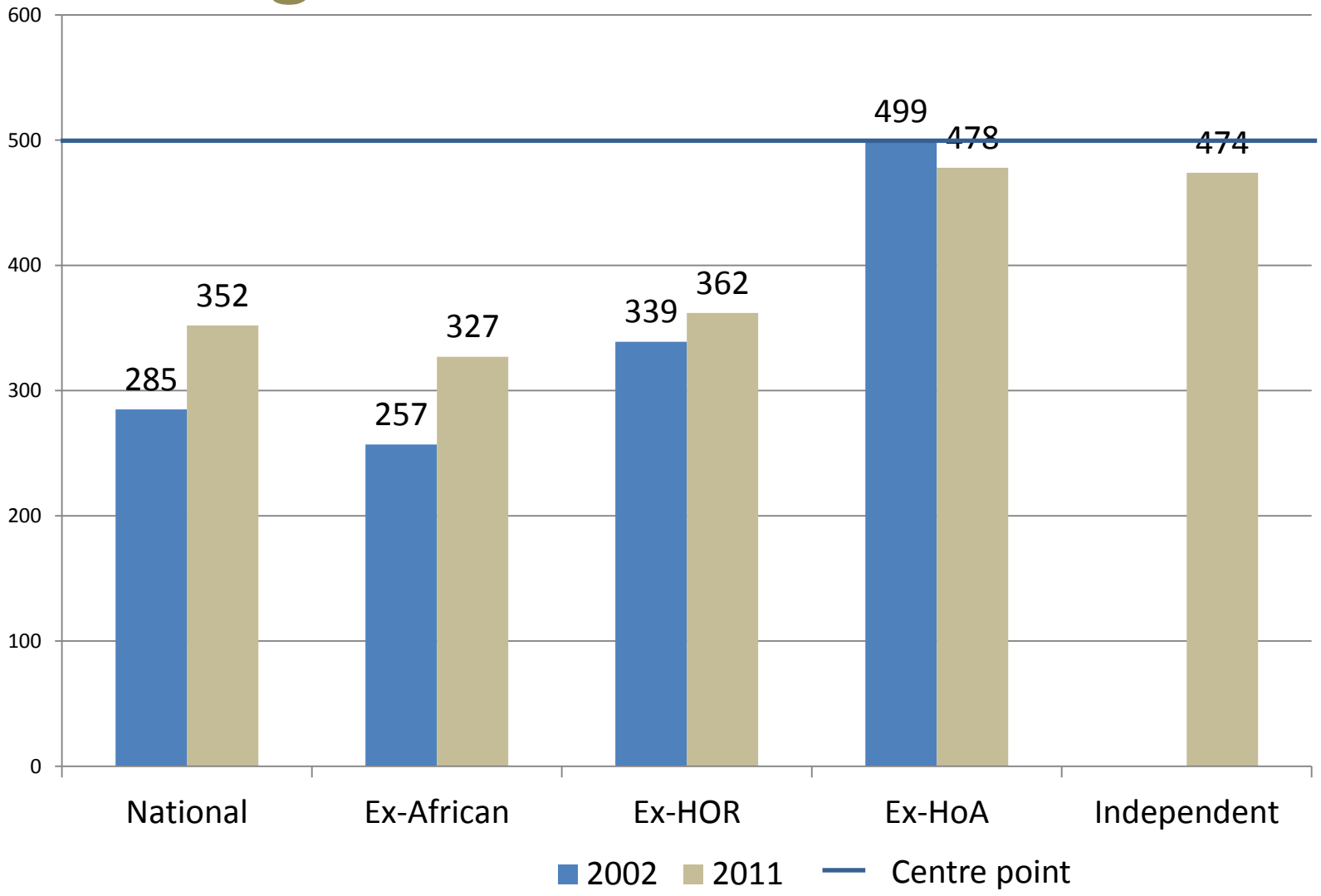

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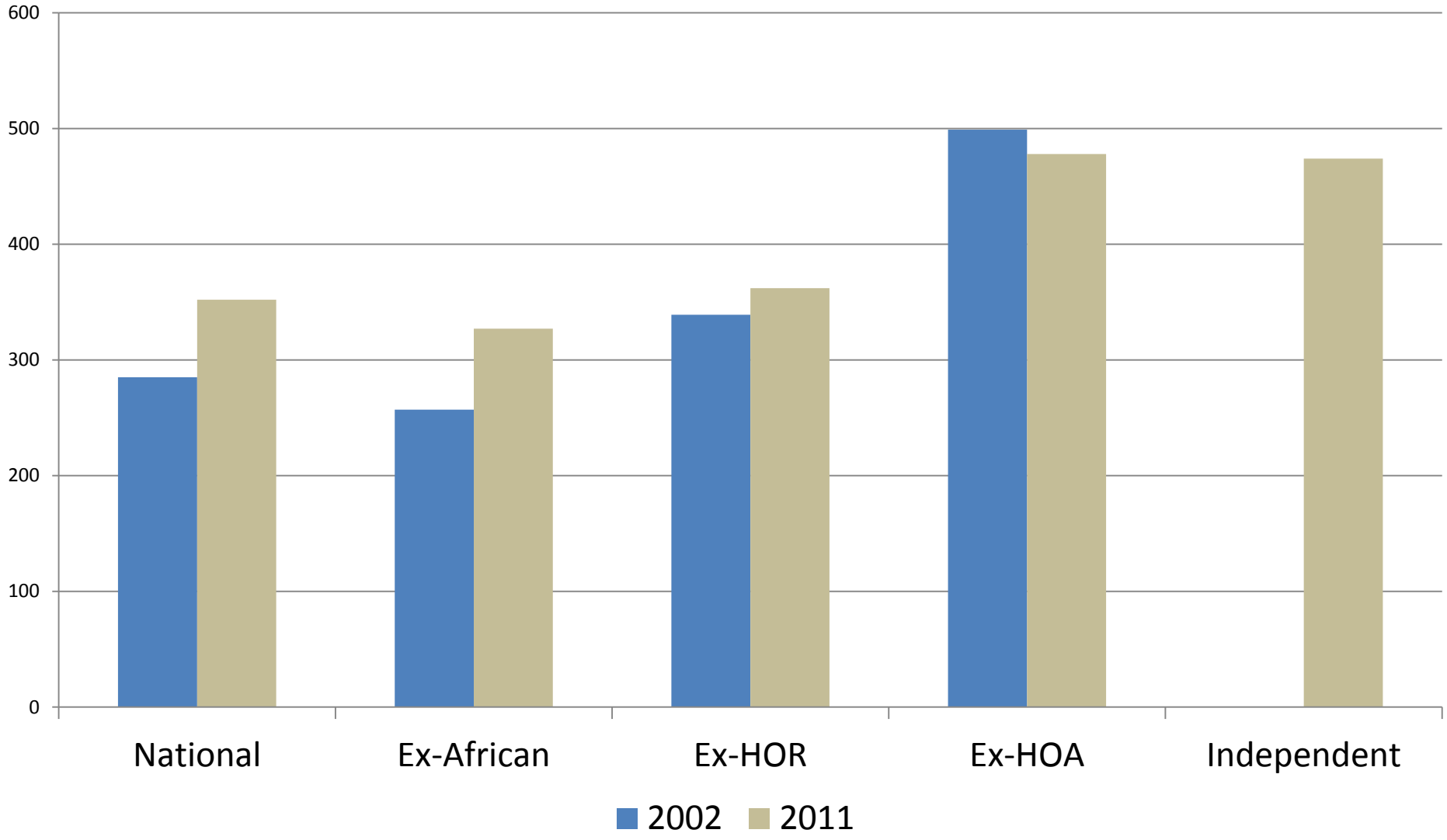

Performance by School Types

- The greatest improvement in average achievement scores, between 2002 and 2011, was in former African schools.
- The Independent Schools and former House of Assembly schools perform at similar levels.
- Former HoA, Quintile 5 and Independent schools achieve average scores below the Centrepoint/ middle score of 500.

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5. Achievement by gender, age and gender & age

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5.1. Achievement by gender

- Nationally, for both mathematics and science, the girls outperform the boys, but this difference is not statistically significant.
- At a provincial level, there is no statistically significant gender difference for mathematics and science, except for the Western Cape, where boys outperform girls and the difference is statistically significant.

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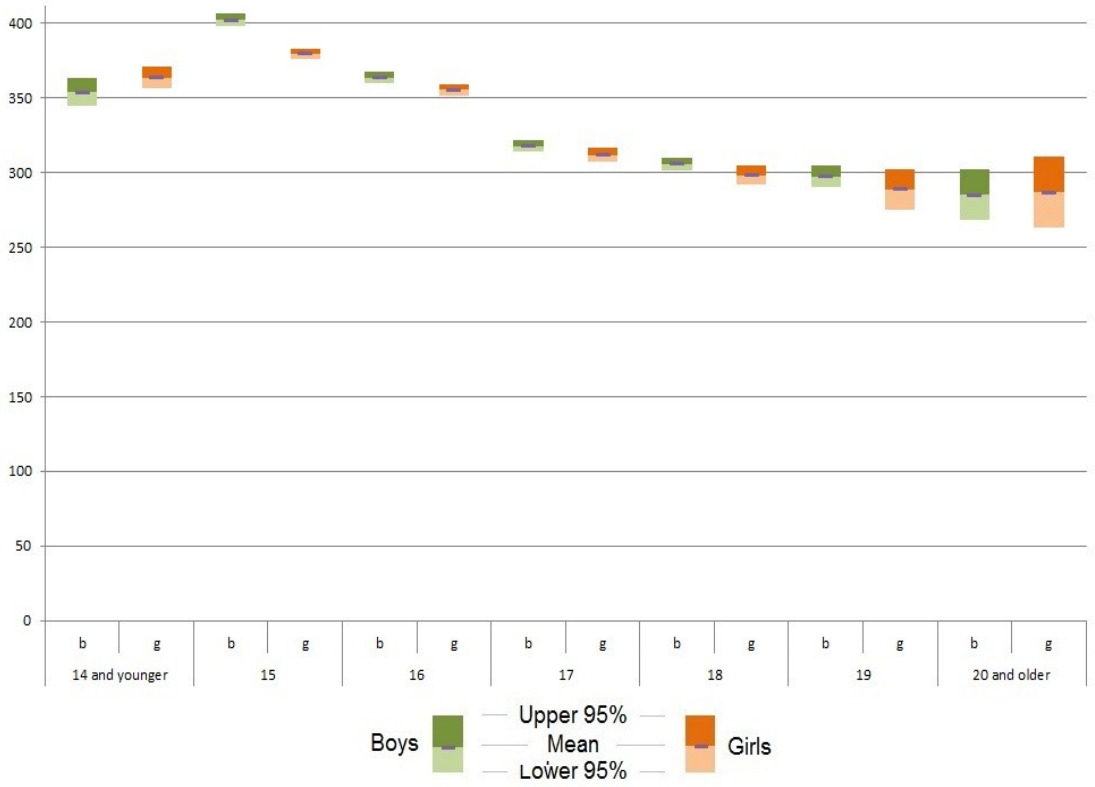
5.2. Achievement by Gender & Age

The pattern for mathematics and science is the same:

- At younger ages, girls outperform boys.
- At grade-age appropriate points, boys outperform girls.
- For overage students, there is no gender difference.



6. Performance at International Benchmarks

Describe what learners know and can do.

Helps identify learners that can perform at high skills level

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Performance at scores above 400: access to S&T careers and indicator of quality

	Advanced Benchmark (%) >625	High Benchmark (%) >550	Intermediate Benchmark (%) 475	Low Benchmark (%) >400	Less than 400 points
Gr 8 TIMSS 1995	0.3	2	6.6	13.6	**87%**
Gr 8 TIMSS 1999	0.2	1.5	5.7	13.2	**86.8%**
Gr 9 TIMSS 2002	0.6	1.5	2.8	10.5	**89.5%**
Gr 9 TIMSS 2011	1	3	9	24	**76%**

Performance at scores above 400: access to S&T careers and indicator of quality

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Gr 8 TIMSS 1995	0.3	2	6.6	13.6	**87%**
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Gr 9 TIMSS 2002	0.6	1.5	2.8	10.5	**89.5%**
Gr 9 TIMSS 2011	1	3	9	24	**76%**
BOTSWANA	0	2	15	50	**50%**

7. CONTEXTUAL INFORMATION : Using Learner, Teacher, School & Curriculum Questionnaires

Provide insights into factors that are positively related to academic success.

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7.1. Curriculum and Teachers

- For the period 2002 to 2011, the Revised National Curriculum Statements guided classroom instruction.
- There is over 90% overlap between RNCS & TIMSS curriculum.
- 60% of math learners and 53% of science learners were taught by teachers with a degree. Internationally close to 90% of teachers have a degree qualification.
- Around 40% of teachers indicated they were 'satisfied with their profession'. Internationally 47% of teachers were 'satisfied with their profession'.

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7.2. School Climate and Classroom Resources

- School safety is an issue of concern:
  - 41% of learners attended schools where Principals identified discipline and safety as a moderate problem. Internationally this was 18%.
  - 75% of South African learners reported some sort of bullying compared to 41% internationally.
- Resources to schools have been improving – with around 10% of math and science learners being affected 'a lot' by lack of resources.

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7.3. Home: parental education & language

- There is a strong relationship between achievement and parental education.
  - TIMSS 2011, 19% of parents completed a university degree.
  - In 2002, 11% of parents completed a university degree.
  - Internationally one third (32%) of learners have one parent with a university education.
- In TIMSS 2011, 26% (a quarter) of learners reported they 'always or almost always' spoke the language of test at home and 9% 'never' did.
  - Internationally 79% of learners reported they 'always or almost always' spoke the language of test at home

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8. Towards Equity & Excellence

- Continued investment in schools and households for the poorest and continue to increase these scores so that we move to a narrower distribution of scores.
- Need to challenge and support traditionally more resourced schools, and we need to re-affirm the agenda for excellence and high skills & high performance.

9. Future.....?

- Participation in TIMSS 2015.
- Work towards improvement of both lower and top end of performance.
- With the effort and commitment of schools, teachers and learners and support from the educational departments we should set the target for an improvement by **30 points to reach a score of 382 in 2015 & 40% score above 400 points.**

Projected scores

YEAR	Grade 9 Mathematics scores
2023	**442**
2019	**412**
2015	**382**
2011	**352**
2002	**285**
1999	**296 (extrapolated)**
1995	**294 (extrapolated)**