



TIMSS 2015

Grade 9 and Grade 5

Performance

Trends in International Mathematics and Science Study



Grade 4/5

48 countries

Science and mathematics

- First time South Africa participated in TIMSS at the Grade 5 Math. Assessment is a baseline against which to track future performance.
- Sample
 - 297 schools
 - 11 000 learners
 - 297 mathematics educators
 - 10 500 parents/ care givers

Grade 8/9

- 36 countries
- Science and mathematics
- Tested at Grade 8 level in 1995, 1999, 2003 and the Grade 9 level in 2003, 2011 and 2015.
- TIMSS 2015 South African sample
 - 292 schools
 - 12 500 learners
 - 330 mathematics and science teachers

“Green Shoots” Metaphor for TIMSS Results



- The emergence of green shoots in nature represents the **potential for growth**
- If nurtured, these shoots will produce **strong, healthy and resilient** plants.
- In our analysis of TIMSS at the Grade 9 and Grade 5 level we looked for improvements and potential places for interventions so that learners improve mathematics and science achievement.
- “Green Shoots” & environmental sustainability.

Story 1:

TIMSS Grade 9 in South Africa

- What is the South African achievement in mathematics and science in TIMSS 2015?
- How has South African achievement (and health of our education system) changed from 2003 to 2015?
- How do we explain this achievement?

Grade 9 achievement expectations set in 2011

“In TIMSS 2015, with effort and commitment of schools, teachers and learners and support from the educational departments we must set the target for an improvement by



30 points to reach a score of 382 in 2015”

**So, how does
TIMSS 2015 look?**



Year	Math	Science
2023	442	422
2019	412	392
2015	382	362
2011	352	332
2003	285	268
1999	295	263
1995	296	280

TIMSS Grade 9 performance internationally

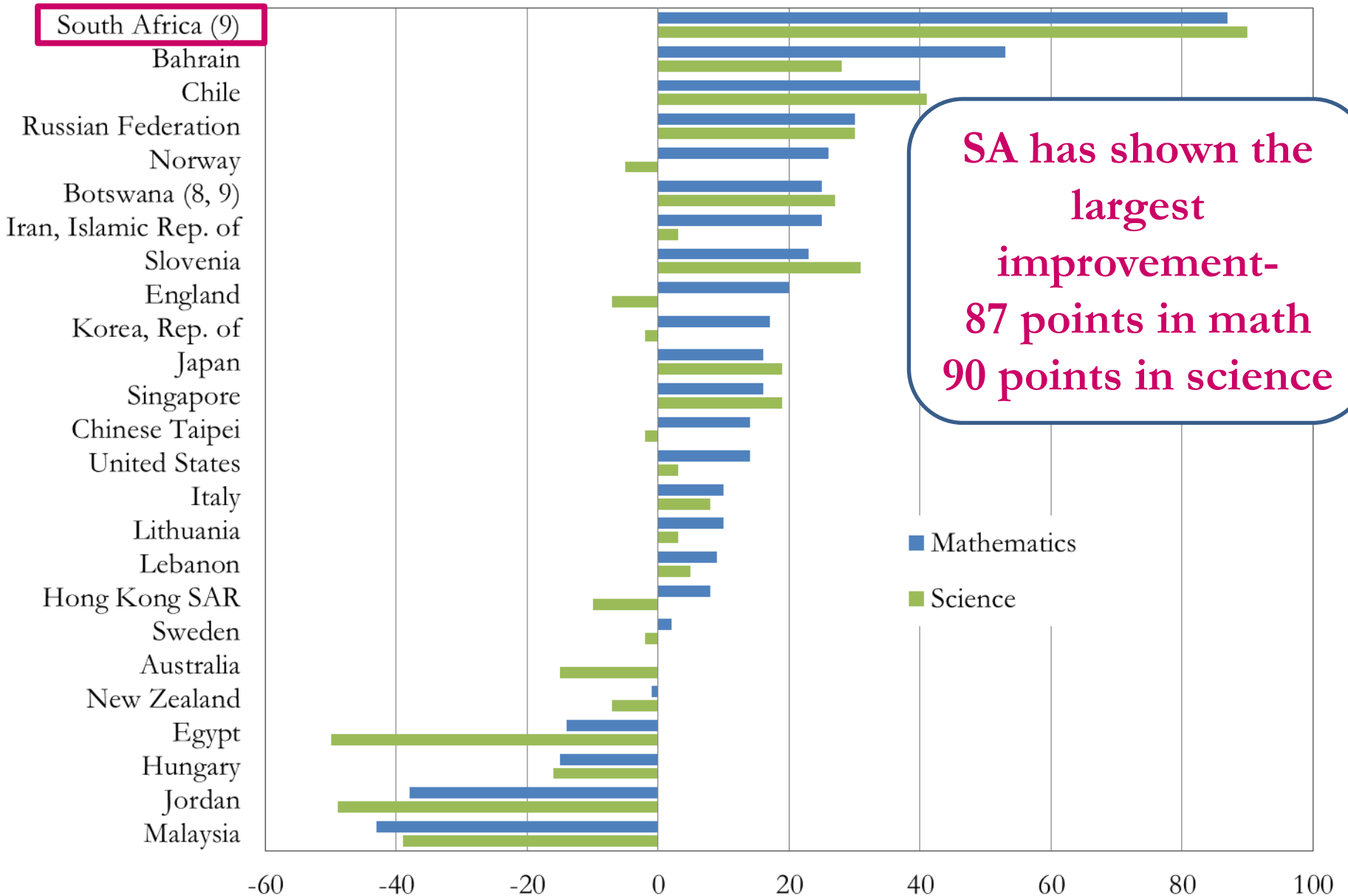
Mathematics

Country	Score	SE
Singapore	621	3.2
Korea, Rep. of	606	2.6
Chinese Taipei	599	2.4
Hong Kong SAR	594	4.6
Japan	586	2.3
		
Australia	505	3.1
Sweden	501	2.8
TIMSS Centerpoint	500	
Italy	494	2.5
Malta	494	1.0
New Zealand	493	3.4
		
Botswana (9)	391	2.0
Jordan	386	3.2
Morocco	384	2.3
South Africa (9)	372	4.5
Saudi Arabia	368	4.6

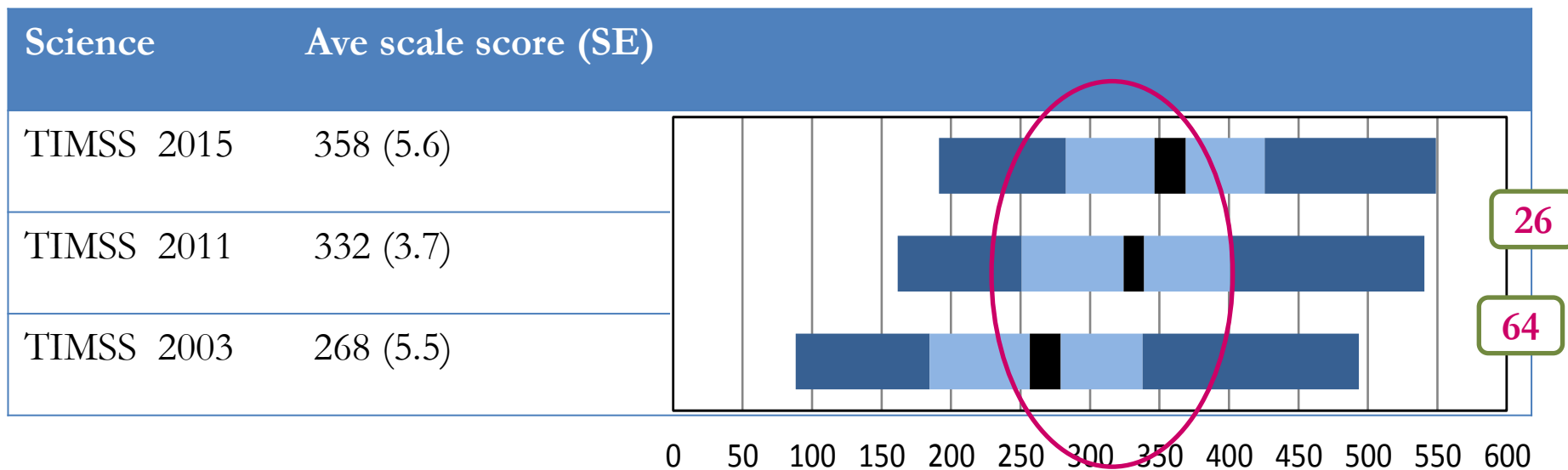
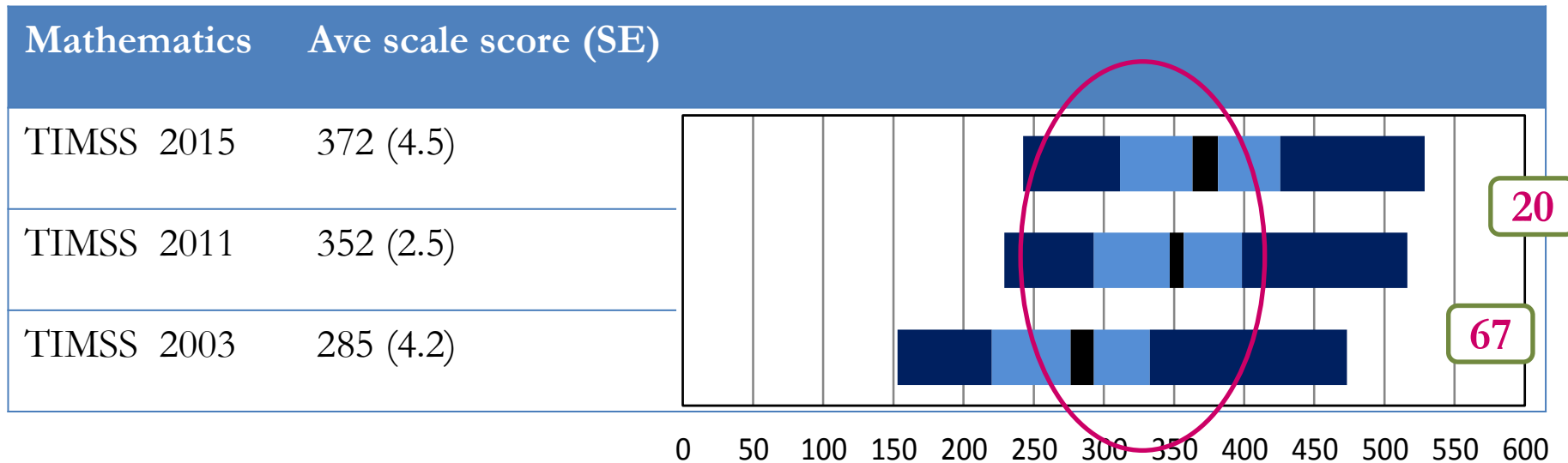
Science

Country	Score	SE
Singapore	597	3.2
Japan	571	1.8
Chinese Taipei	569	2.1
Korea, Rep. of	556	2.2
Slovenia	551	2.4
		
Australia	512	2.7
Israel	507	3.9
TIMSS Centerpoint	500	
Italy	499	2.4
Turkey	493	4.0
Malta	481	1.6
		
Saudi Arabia	396	4.5
Morocco	393	2.5
Botswana (9)	392	2.7
Egypt	371	4.3
South Africa (9)	358	5.6

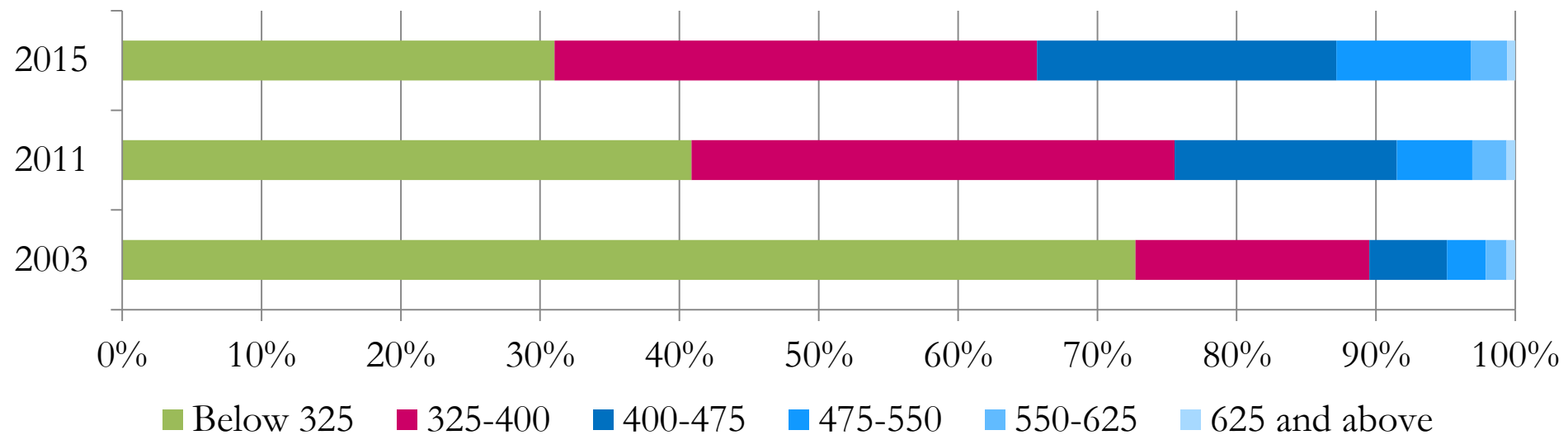
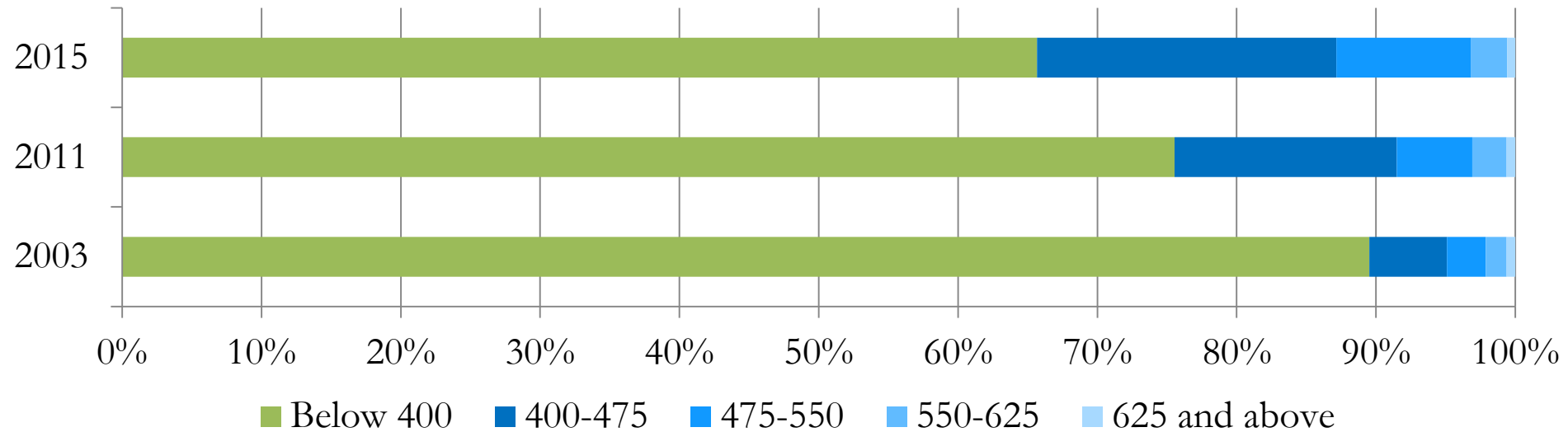
Change in achievement between 2003 and 2015



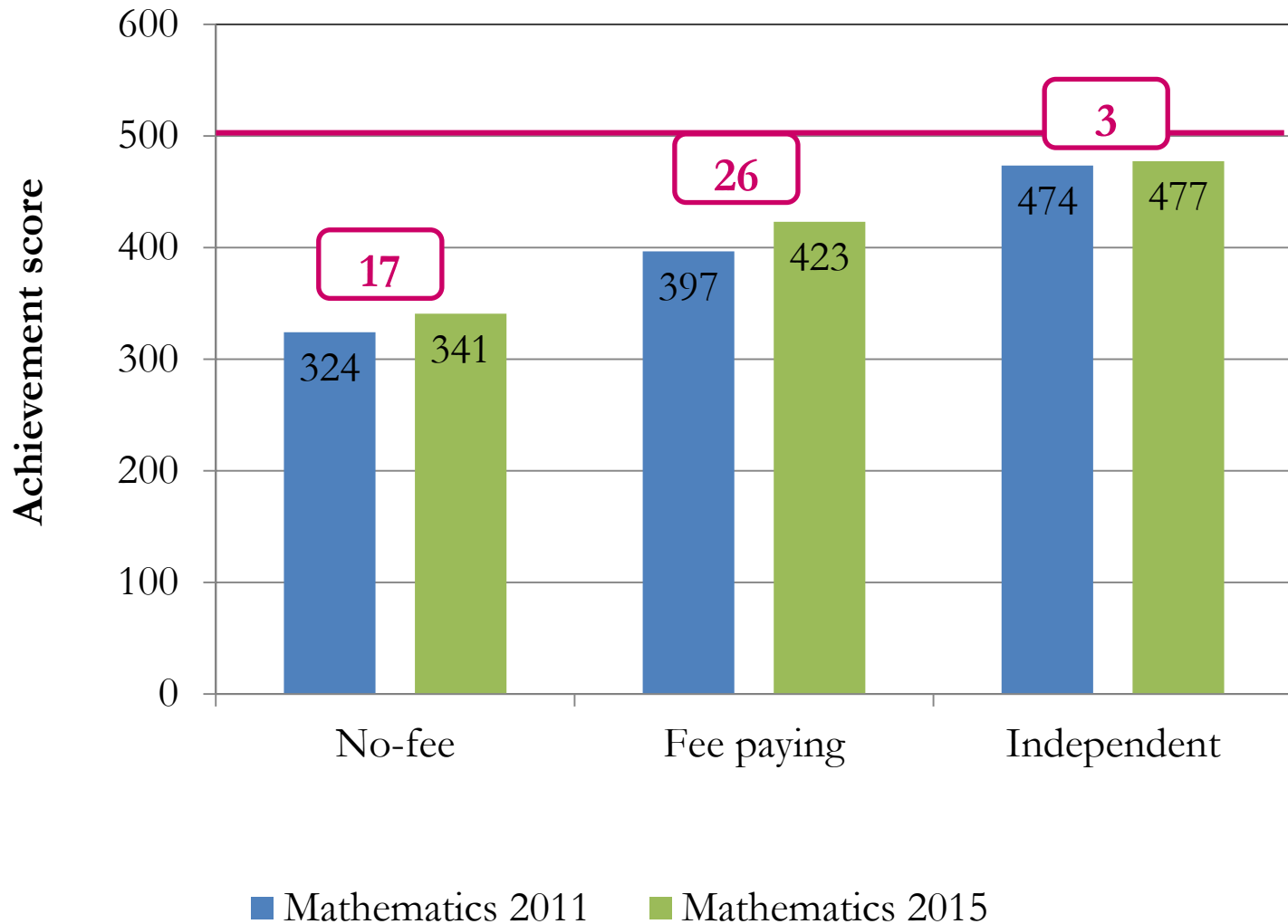
South African achievement from 2003 to 2015



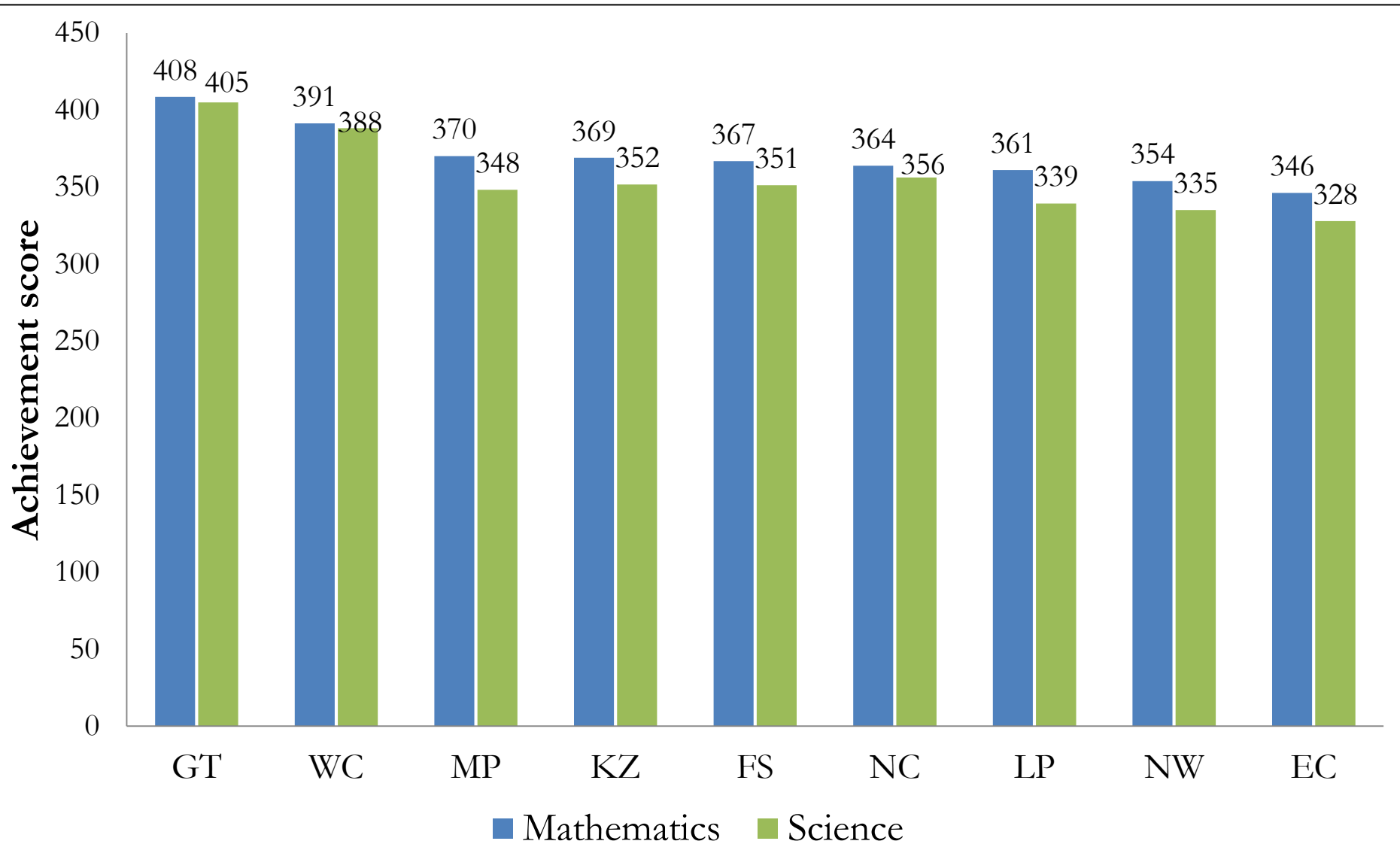
Mathematics achievement by TIMSS benchmarks, 2003 to 2015



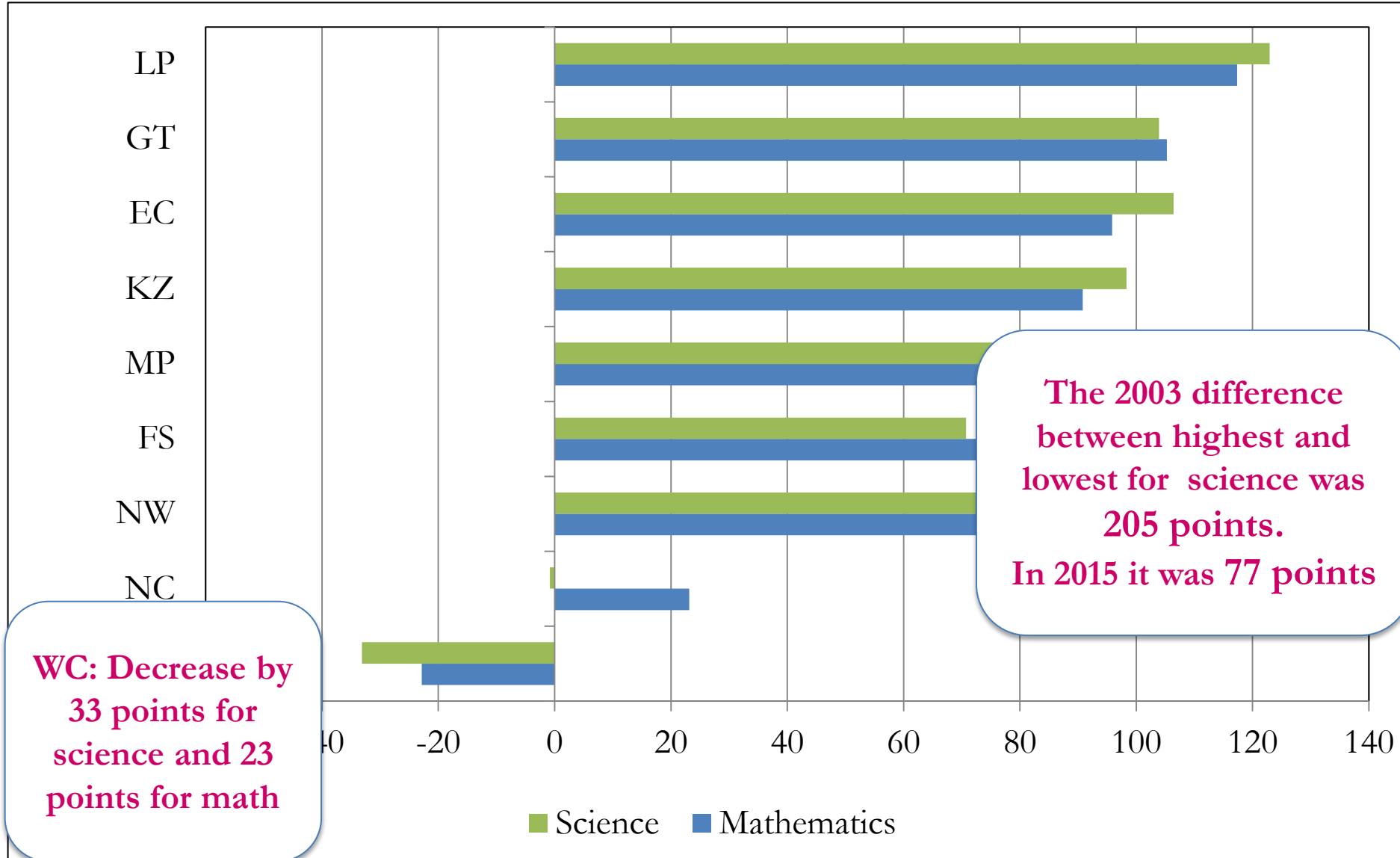
Mathematics performance by school type



Performance by province, 2015

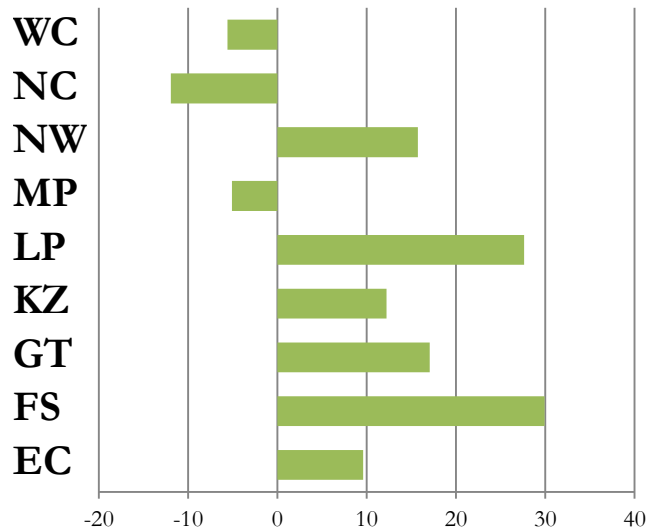


Change in provincial achievement 2003 to 2015

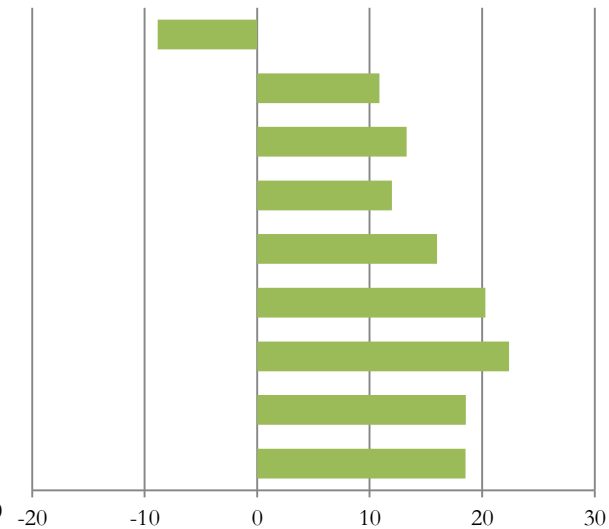
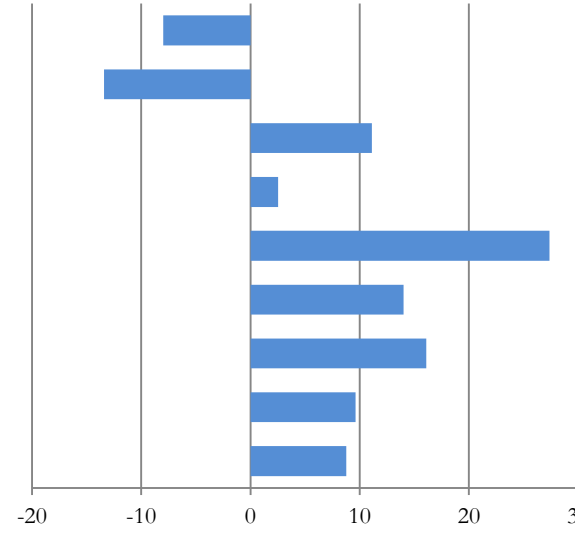


Change in home provincial contexts (2003-2015)

Access to flush toilet



Access to running tap water Household education above matric



Learners in households with flush toilets score

56 points

higher in Math than those who do not.

Learners in households with running water score

54 points

higher in Math than those who do not.

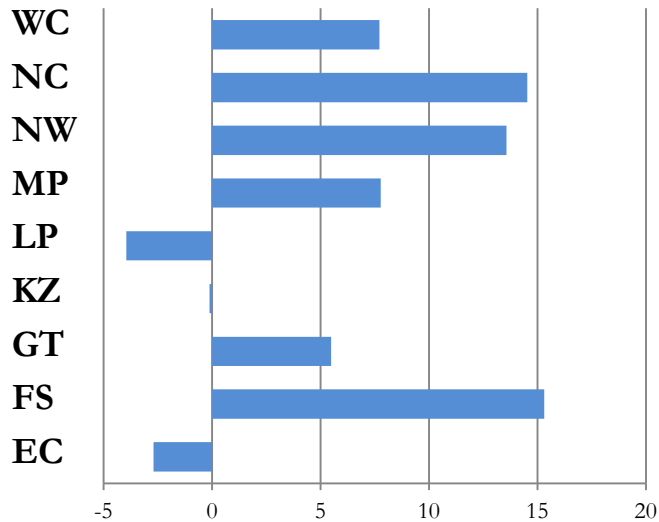
Learners in households with post Grade 12 education score

43 points

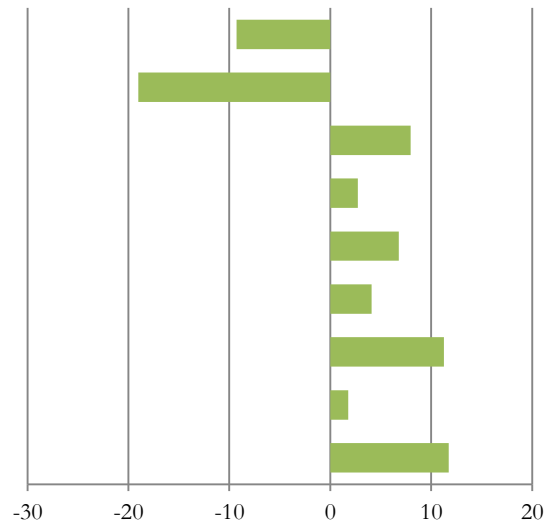
higher in Math than those who do not.

Change in school provincial contexts (2003-2015)

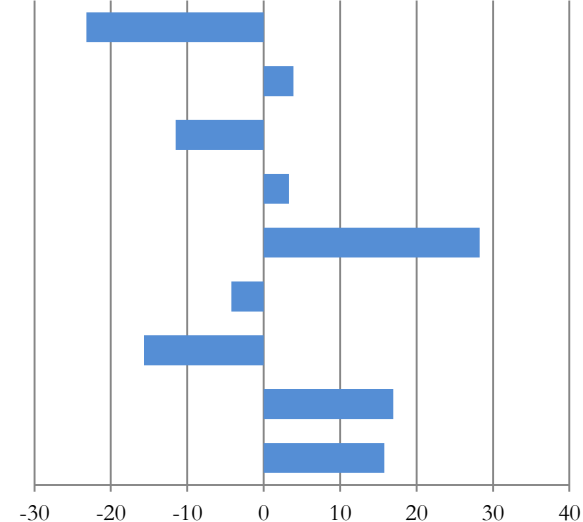
Bullied on a weekly basis



Frequently speaking the language of the test



High emphasis on academic success



Learners who do not experience bullying score

68 points

higher in Math than those who do not.

Learners who frequently speak the language of the test at home score

60 points

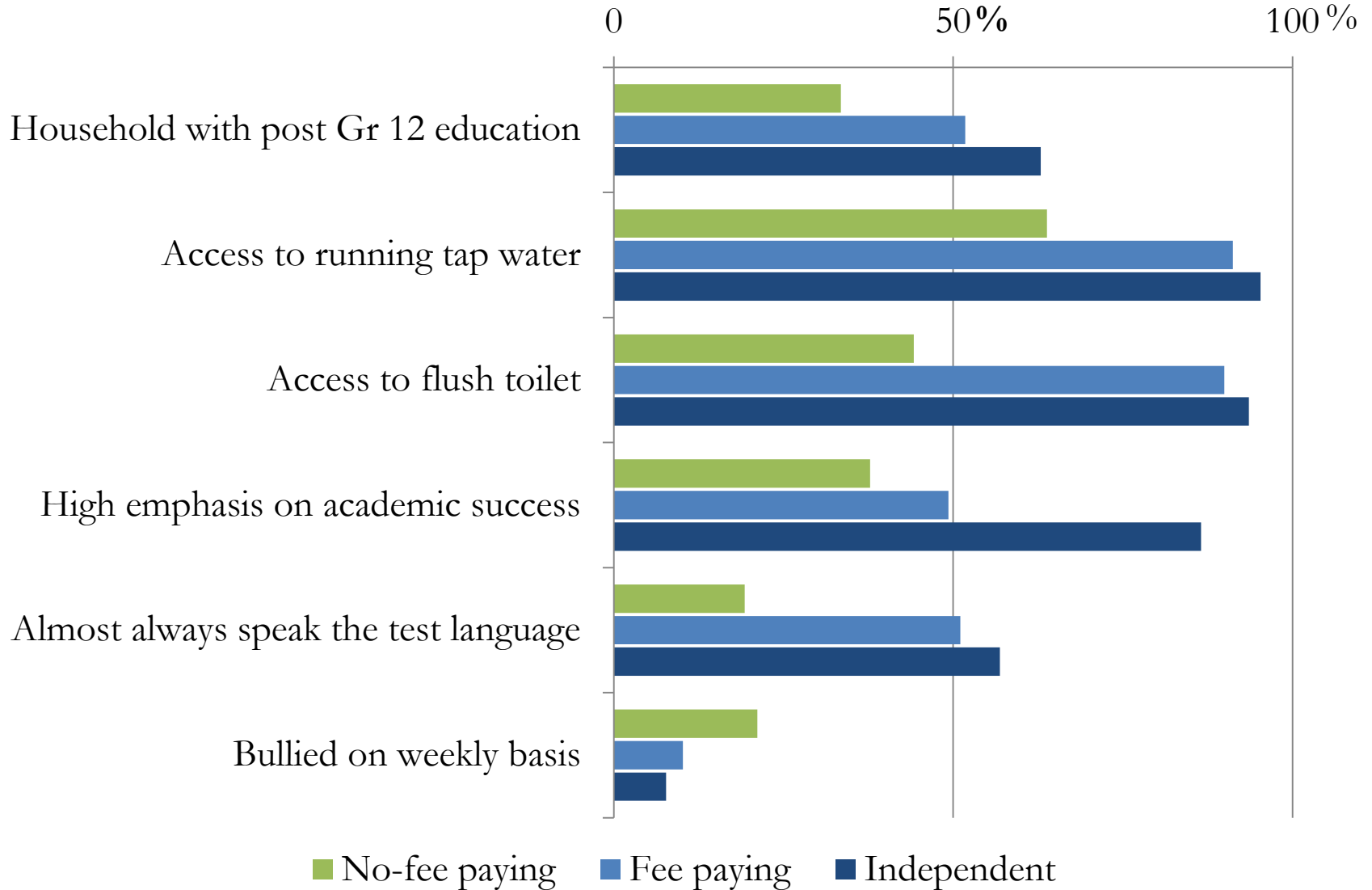
higher in Math than those who do not.

Learners in school with a high emphasis on academic success score

34 points

higher in Math than those who do not.



School and home contexts, by school type, 2015




Story 2: TIMSS 2015 at Grade 5 level


- What is the South African mathematics achievement in Grade 5?
- What are the pre-grade 1 educational activities and how does that influence Grade 5 mathematics?

TIMSS Grade 5 performance internationally

Country	Ave scale score	SE
Singapore	618	3.8
Hong Kong SAR	614	2.9
Korea	608	2.2
Chinese Taipei	596	1.8
Japan	593	1.9
		
Spain	505	2.5
Croatia	502	1.7
TIMSS Centrepont	500	
Slovak Republic	498	2.5
New Zealand	491	2.3
France	488	2.9
		
Jordan	389	3
Saudi Arabia	384	4
Morocco	378	3
South Africa (5)	376	3.4
Kuwait	354	4.6

Mathematics achievement by TIMSS benchmarks

 1,3% (>625)

 4% (550 to 625)

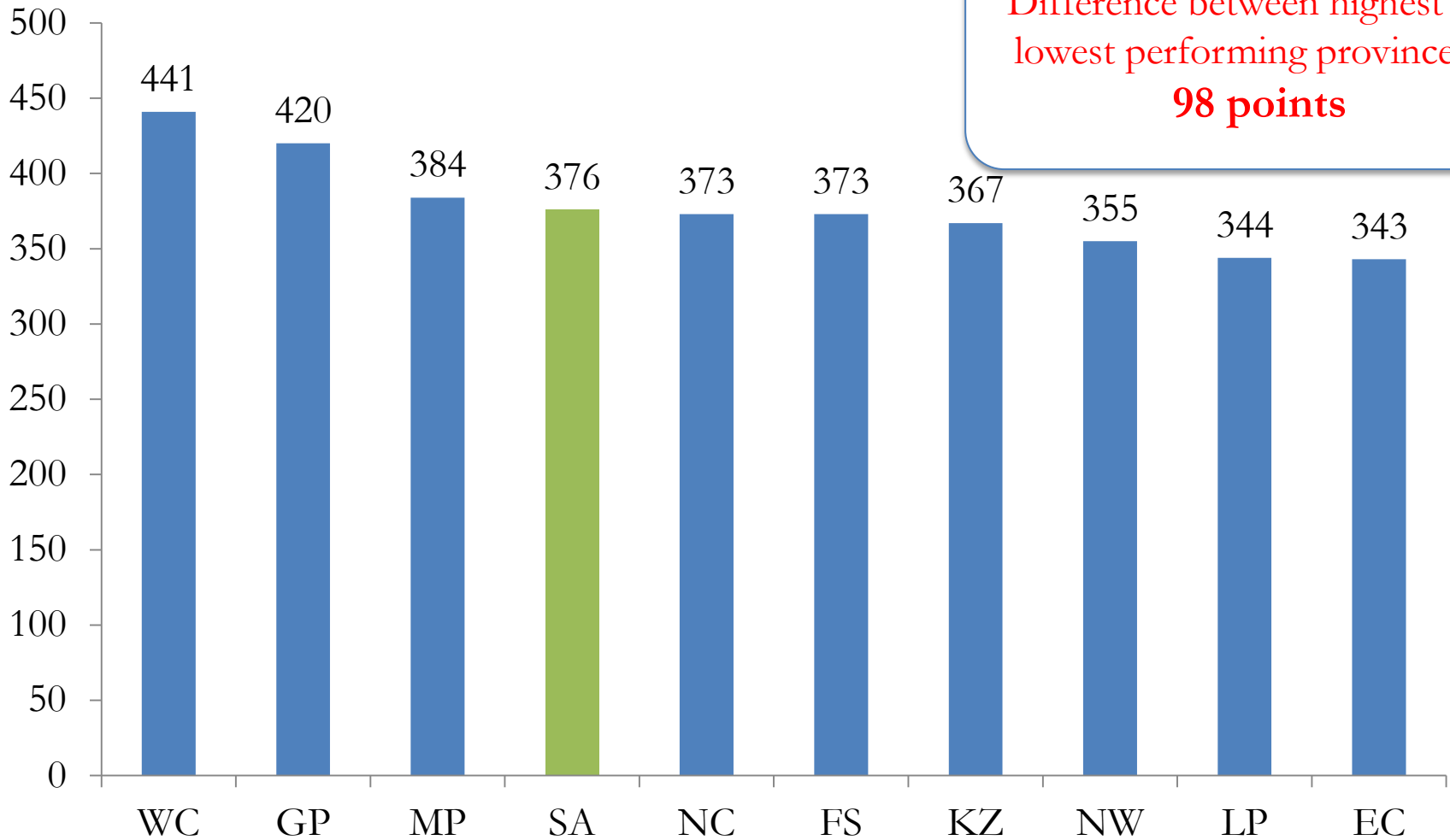
 12% (475 to 550)

 22% (400 to 475)

 28% (325 to 400)

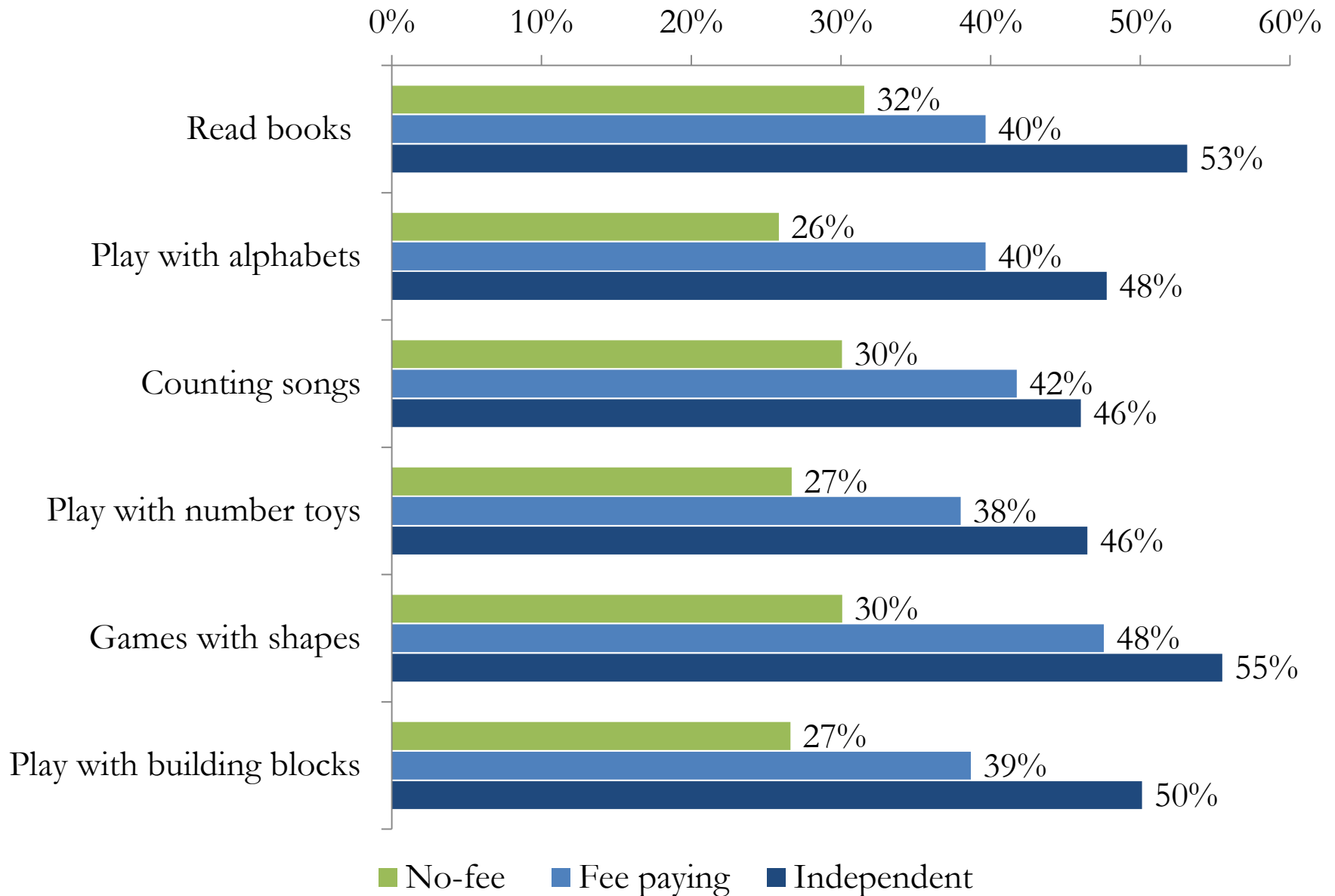
 33% (< 325)

Provincial mathematics performance

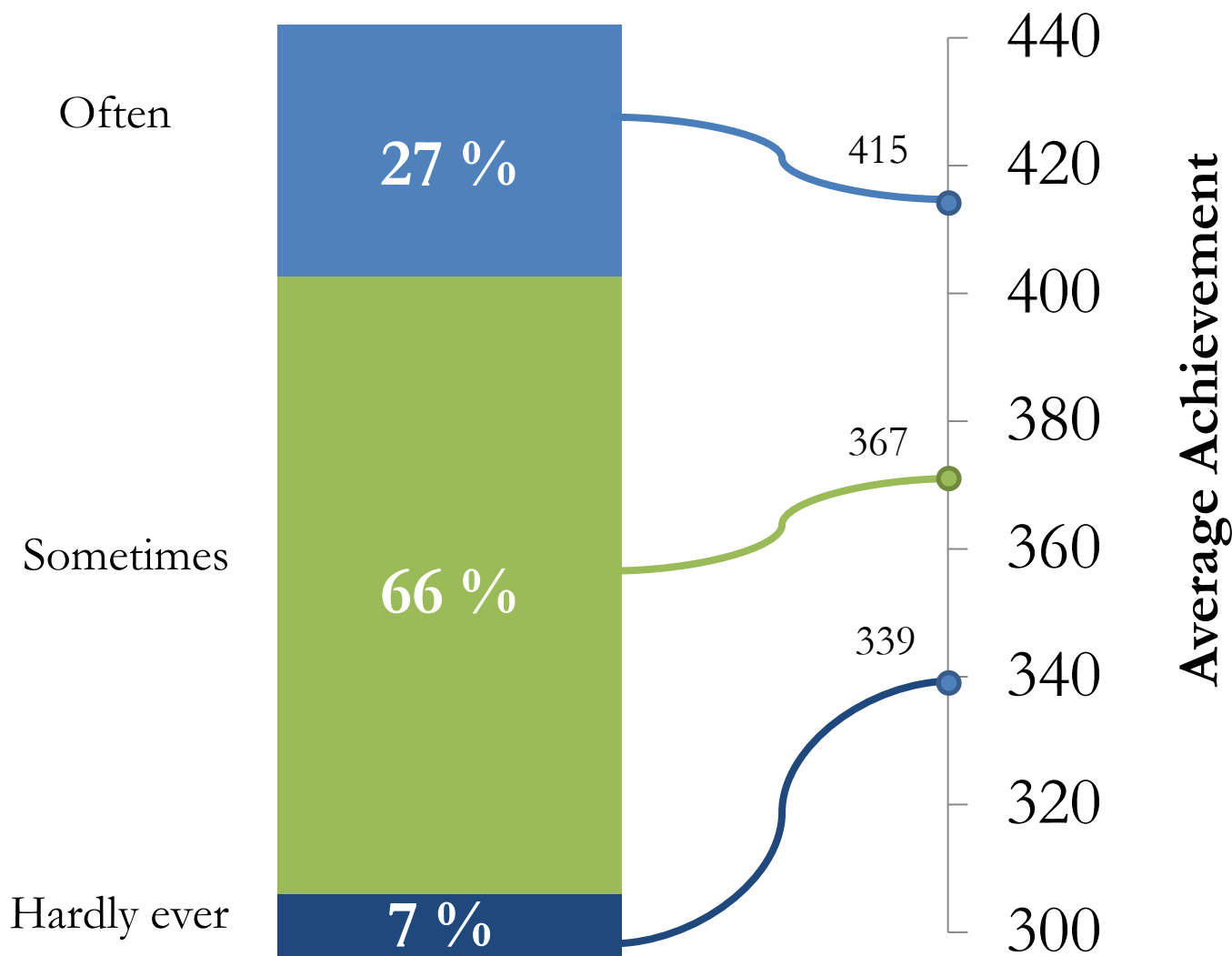


Difference between highest and lowest performing provinces is **98 points**

The early educational home environment

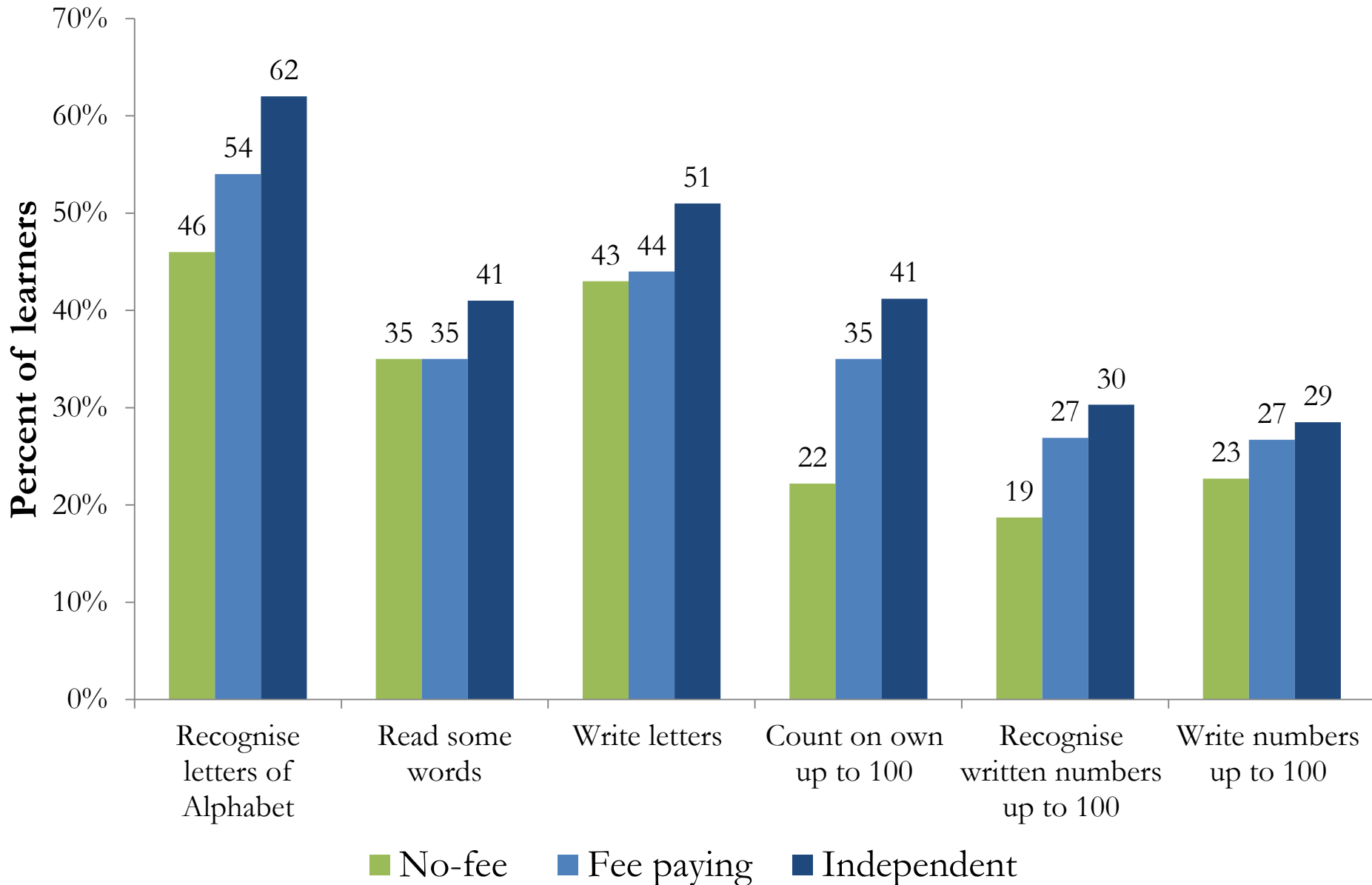


Home literacy and numeracy activities and achievement

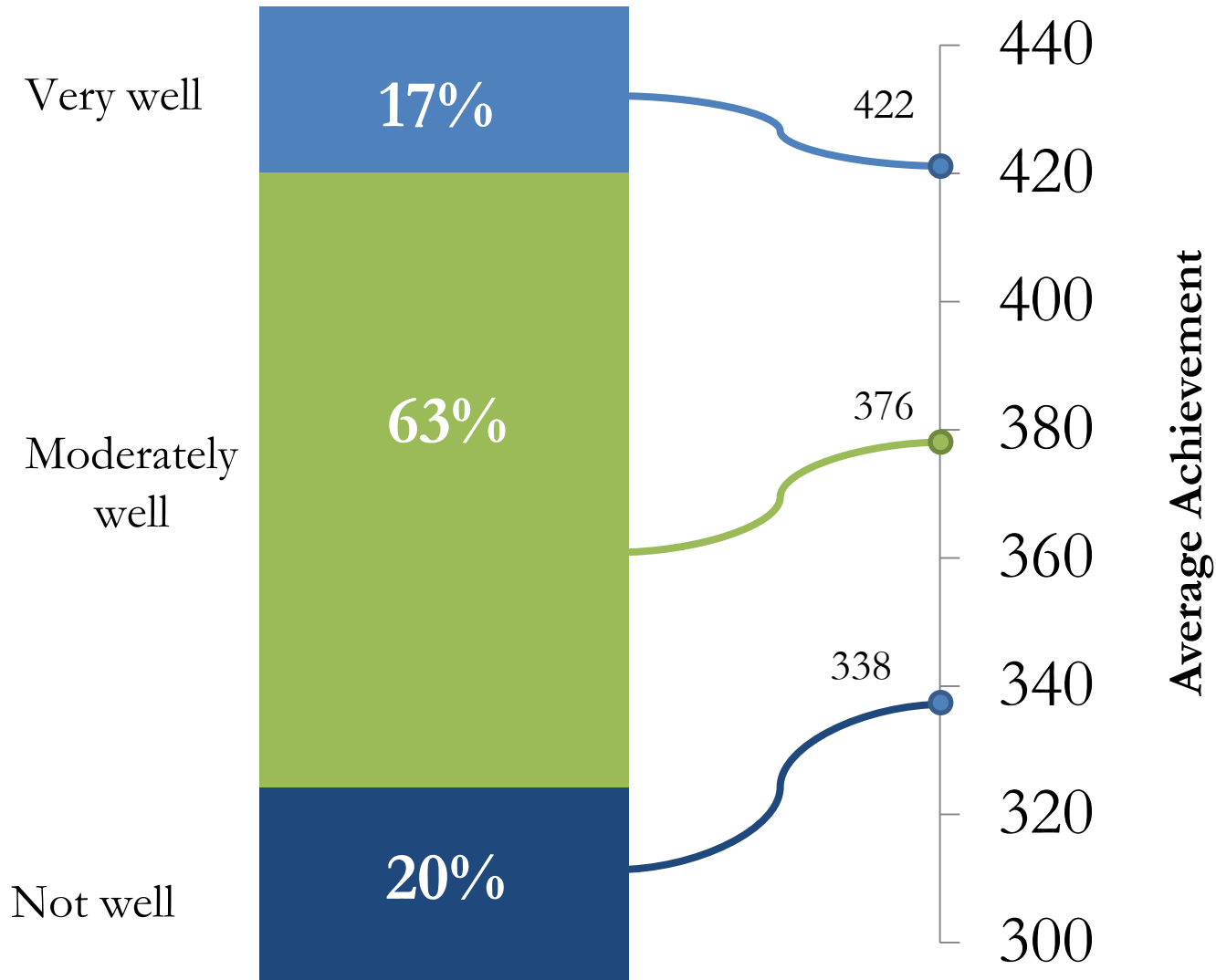


Learners whose parents reported spending time with them on early literacy and numeracy activities had higher achievement.

How ready are learners for school?



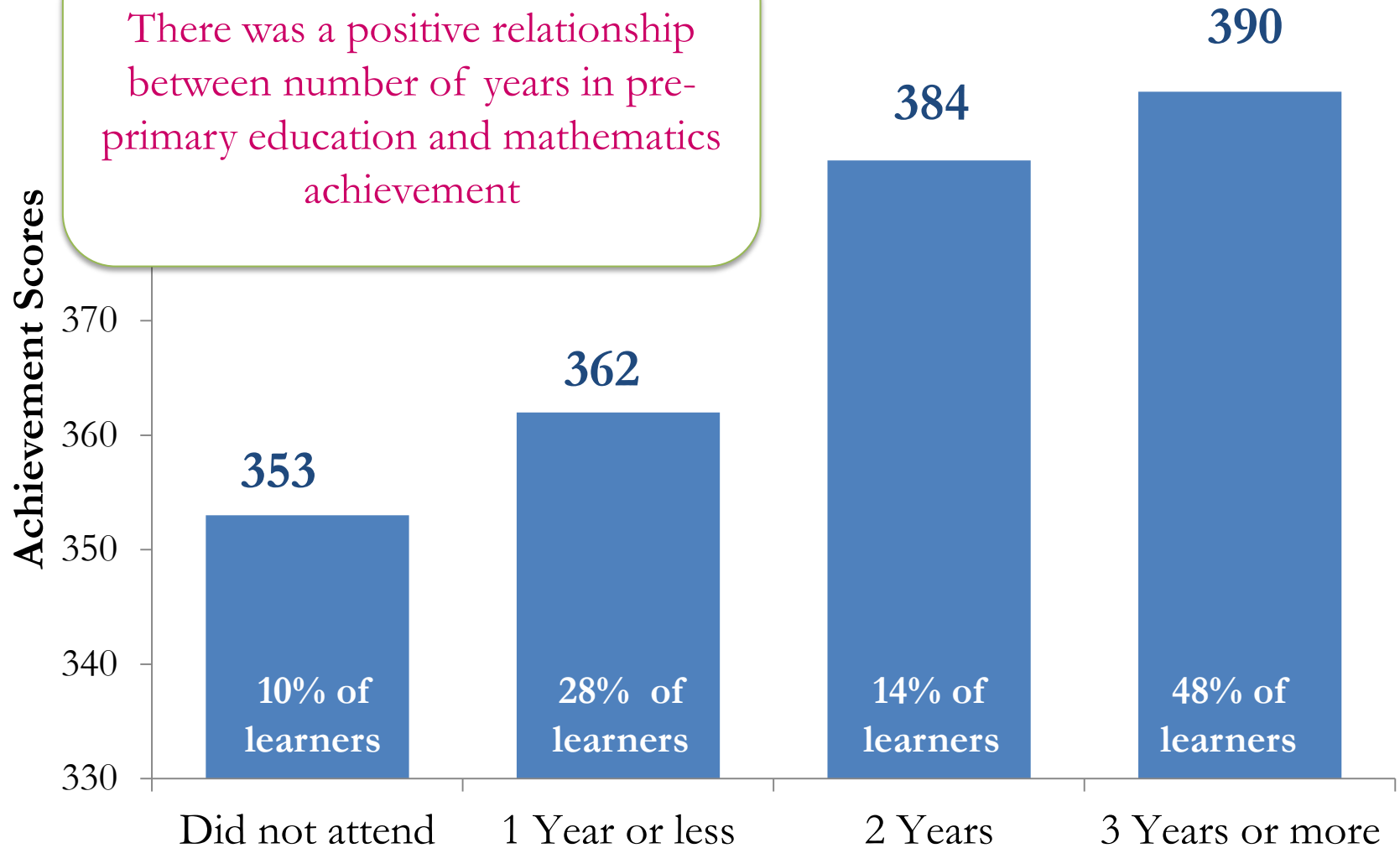
School readiness and achievement



Parents' reports of school readiness illustrates that early preparation has an effect on achievement

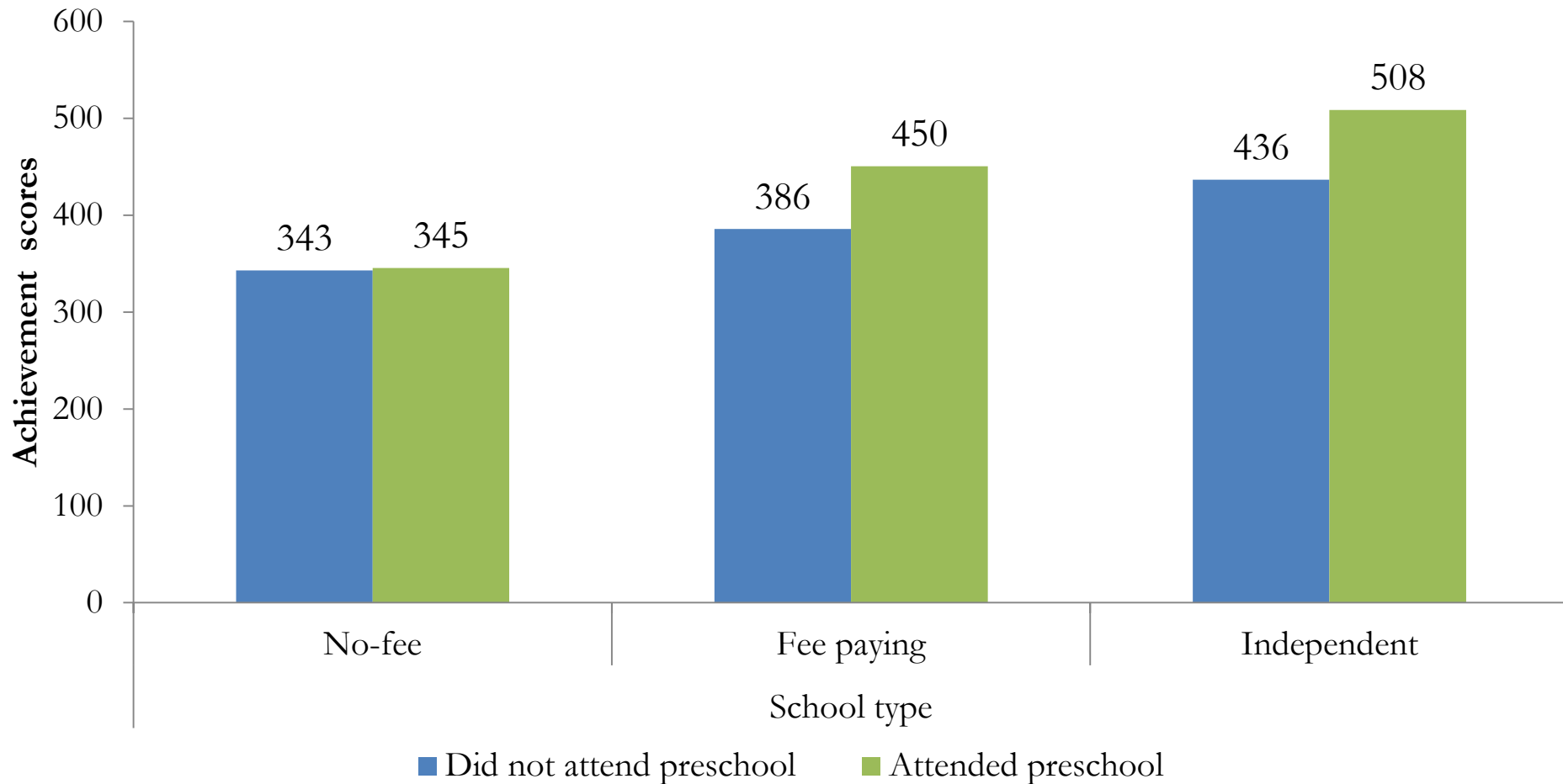
An early start in school

There was a positive relationship between number of years in pre-primary education and mathematics achievement



Pre-school attendance and achievement

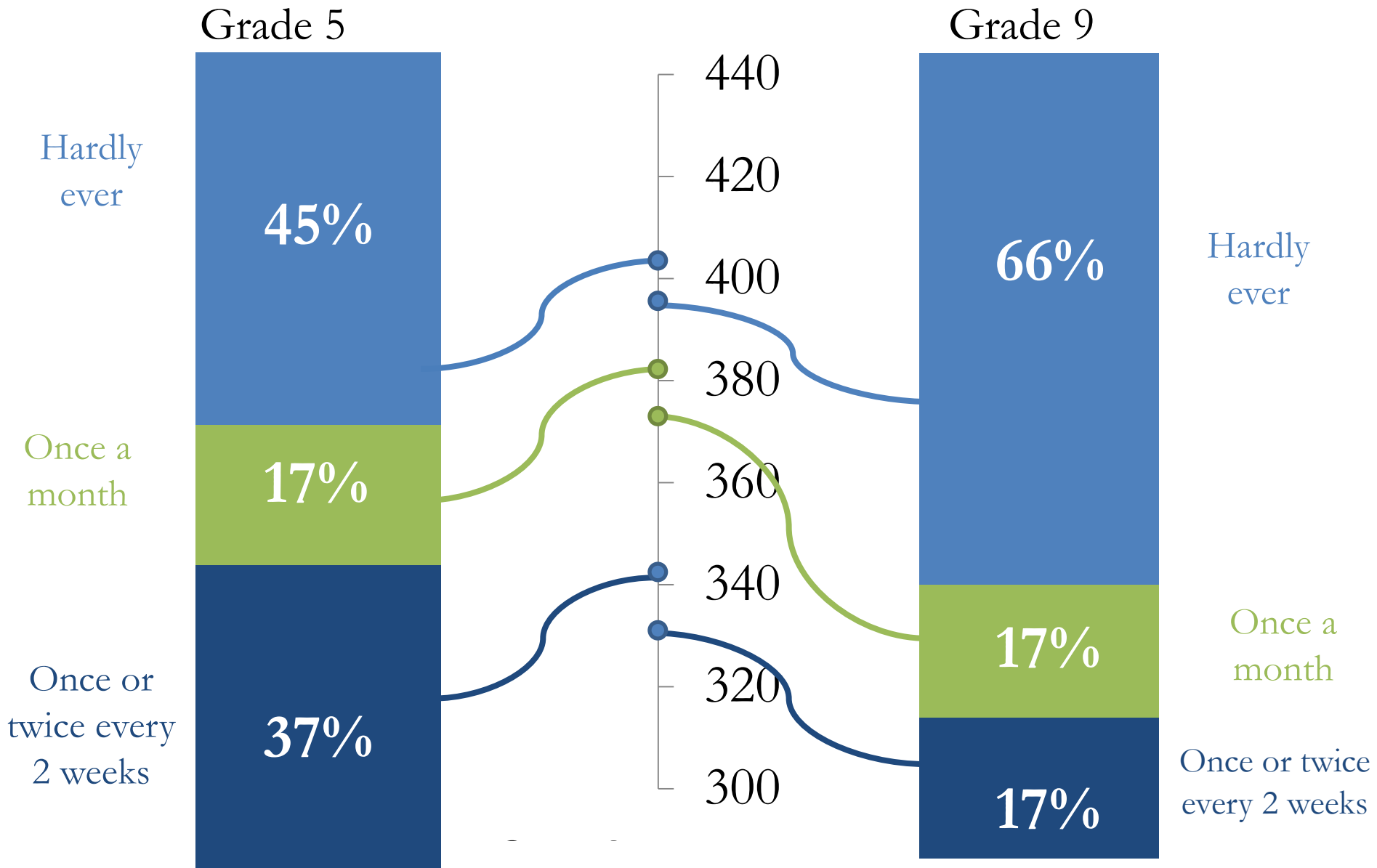
Importance of **quality** pre-school education for children from low income households



Story 3: Context and Conditions Matter

The home and school conditions that influence
achievement scores.

Learner absence and mathematics achievement



Gender and achievement



Boys, especially those from poorer environments and schools, are a vulnerable group.



Grade 5

384

368

Difference is statistically significant

Grade 9 Maths

376

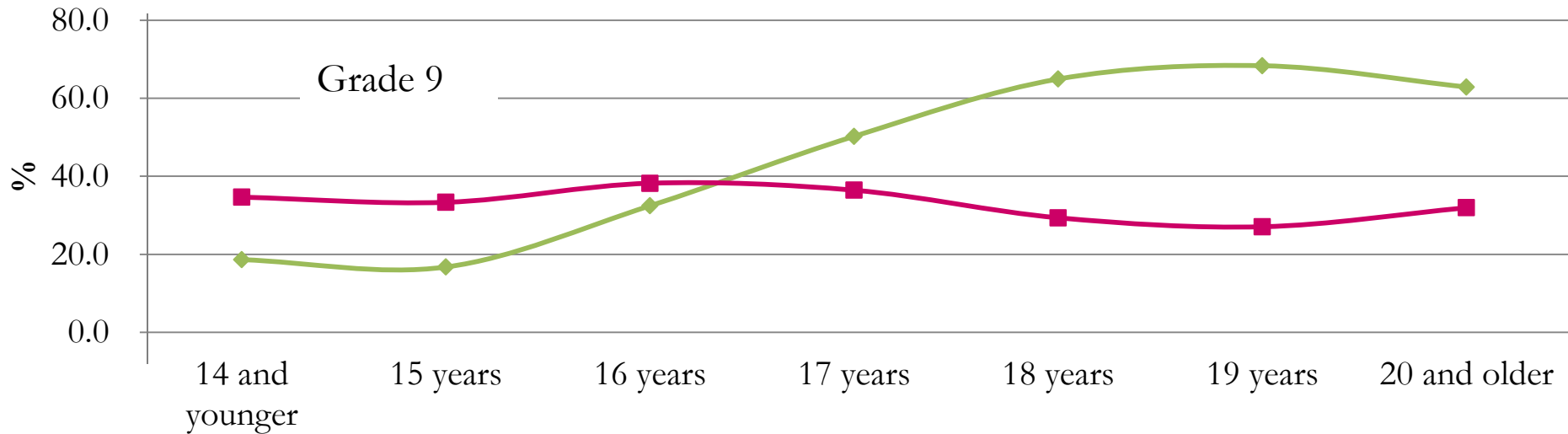
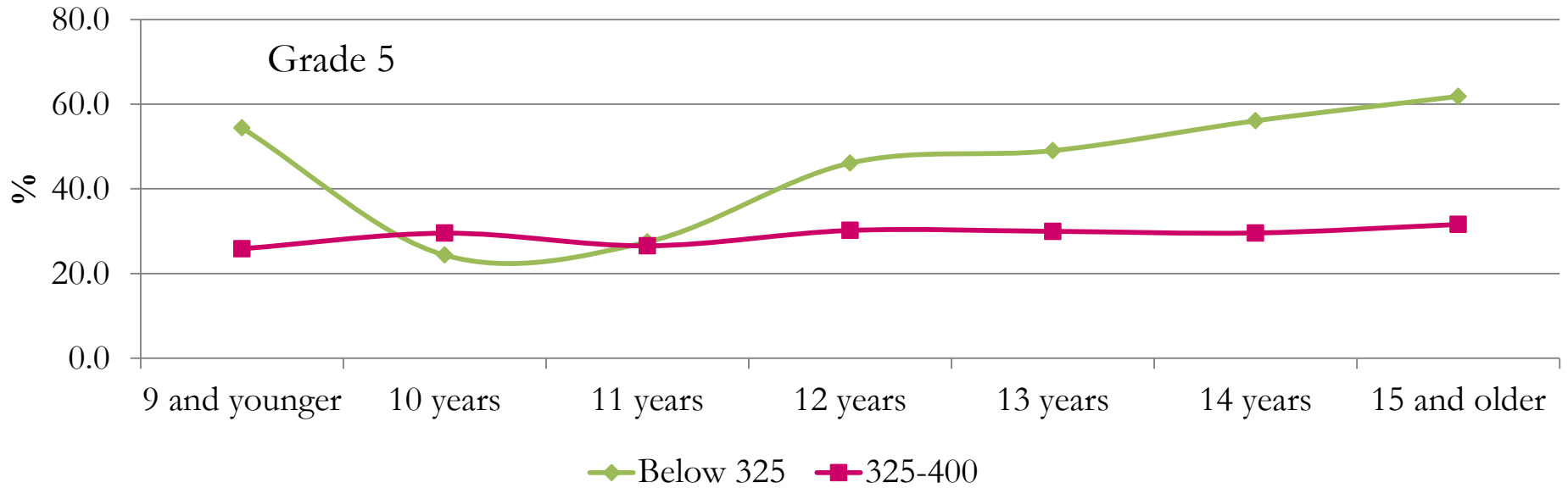
369

Grade 9 Science

362

353

Mathematics achievement by age



Resources: workbooks and textbooks

Grade 5 workbooks

- 88% of Grade 5 learners reported having their own workbooks.
- Those with own workbooks scored **60** points higher than those who did not
- **Policy question:** At what level should we pitch the workbooks?

Grade 9 textbooks

- 82% of learners have their own math textbook
- 69% of learners have their own science textbooks
- Learners scored **24 points** higher for math and **31 points** higher for science if they had a textbook than not.
- **Policy question:** How do teachers and learners USE textbooks?

Findings and Green Shoots for Education

- Mathematics and Science achievement scores improved from ‘very low’ to a ‘low’ national average. Change is possible, we must continue to strive for higher scores, but we must **accelerate the pace of change**.
- Achievement continues to remain highly unequal. Learners’ home and school environments differ, contributing to intergenerational inequality. The conditions and climate for learning in homes and schools is improving, but the **pace of change is slow**.
- What parents do alongside what parents have influences achievement: Socio-economic factors and early educational environments influence later achievement. The educational inequalities apparent early on, persist through education and life.

- Good quality pre-school settings should offer a boost for learners. Learners in independent and fee-paying schools benefit the most but learners in no-fee schools do not seem to benefit. **Quality pre-school education is crucial for those most in need.**
- Teaching and learning interventions must focus sharply on what happens inside schools and classrooms. Classroom teaching must emphasise a strong knowledge base.
- Both the tangible assets (books, calculators, labs) and non-tangible assets (attitudes, expectations, safety, caring) matter.

- Girls outperform boys in mathematics and science. Boys experience higher levels of bullying and are not enthusiastic about school. Boys are a vulnerable group.
- The more “good” elements within both the home and the school contexts that a learner experiences, the better. Effects are **additive**.
- The national narrative must emphasise the value of education, and involve schools, homes and communities.

Grade 9 achievement expectations for 2019?

With appropriate national and provincial strategic interventions we must set the target for an improvement by **35 points, to reach average scores 400 and 45% of learners scoring above 400 points in TIMSS 2019.**

Year	Math	Science
2023	442	429
2019	407	393
2015	372	358
2011	352	332
2003	285	268
1999	295	263
1995	296	280