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Perspectives on improving education in SA; Education Summit of the Department of Basic Education

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(Based on version prepared by CH Prinsloo & S Rogers for North-West Province Education Indaba; presented on behalf of TIMSS National Research Coordinator and team by CH Prinsloo)

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 has been 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 11 969 Grade 9 learners.
- We conducted previous TIMSS in 1995, 1999 and 2002 and have comparable data to monitor system-level trends in a global context.

Today's Presentation

- Very brief key findings from TIMSS 2011 data
- Placing provincial achievement in national context
- Selected interesting observations
- Implications for Education in South Africa
- (Presentation of Feb '13 to National DBE HEDCOM meeting refers, and is not cited in detail. It covered:

i. methodology, trends in achievement since 1995, comparison between TIMSS 2002 & 2011, curriculum coverage, school & home resources, teacher & classroom resources, language & achievement, attitudes)

TIMSS 2011

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Trends: TIMSS 1995 to 2011

- The TIMSS achievement scale has a centre point of 500 and a standard deviation of 100 which were metrics established in 1995 (first cycle of TIMSS).
- It is scaled to remain constant so that comparisons can be made between countries and across years.
- Data from the previous cycle and data from successive cycles are scaled using a process called concurrent calibration.
- Hence placing all data on the same scale for comparability.

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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/ Model C and Independent schools perform at similar levels, but lower than the middle (Centrepoint) score.

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Exhibit 1.2: Distribution of Mathematics Achievement

TIMSS 2011 Mathematics 8th Grade

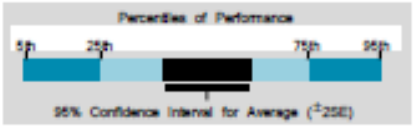
Country	Average Scale Score	Mathematics Achievement Distribution
Korea, Rep. of	613 (2.9)	▲
2 Singapore	611 (3.8)	▲
Chinese Taipei	609 (3.2)	▲
Hong Kong SAR	586 (3.8)	▲
Japan	570 (2.6)	▲
2 Russian Federation	539 (3.6)	▲
3 Israel	516 (4.1)	▲
Finland	514 (2.5)	▲
2 United States	509 (2.6)	▲
‡ England	507 (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

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

▲ 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



- 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.

Provincial comparison (Maths; 2002 to 2011)

Country as a whole: 285 to 348

Lowest Provinces: EC 250 to 316

LP 244 to 322

Highest Provinces: WC 414 to 404

GP 303 to 389

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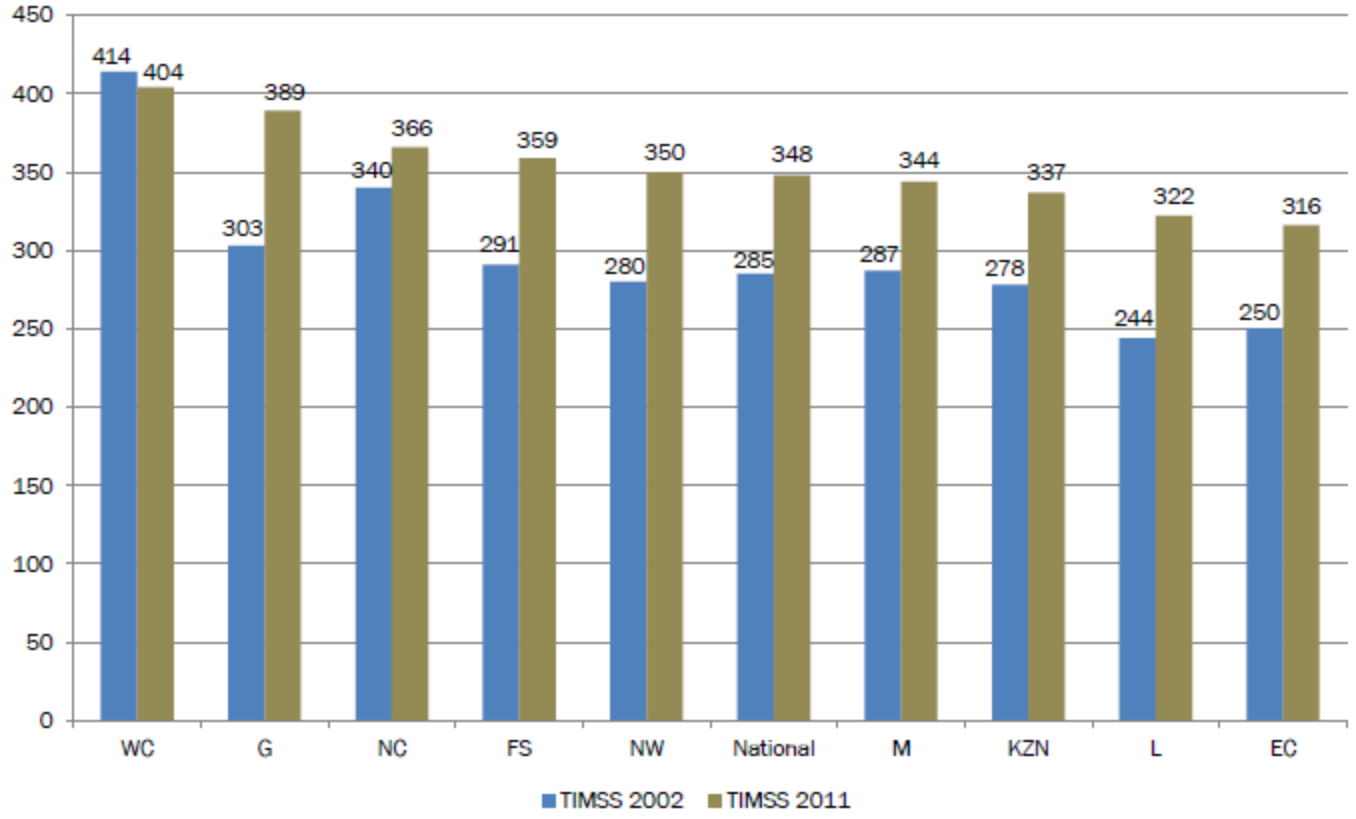
Change in achievement by province between 2002 to 2011



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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%**

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Gr 9 TIMSS 2011	1	3	9	24	**76%**
BOTSWANA	0	2	15	50	**50%**

6. 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% of learners 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)**

SOME IMPLICATIONS ABOUT CONTEXT

School and home resources

- Higher levels of resources are linked to better educational outcomes
- Learning is more difficult in learning environments where discipline, absenteeism, safety/fear of injury or loss of personal property is a problem
- In EC, MP, NC, NW all learners attended schools with discipline and safety problems. Three in every four learners (75%) in SA experience bullying weekly/monthly – the international figure is 41% of learners

Curriculum

- Curriculum stability for the ten-year period
- Schools / teachers should know and adhere to national curriculum – curriculum challenges continue
- Curriculum coverage and learner achievement do not necessarily overlap

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Changes in Curriculum landscape

Curriculum	Years	Reasons	Duration	
Interim syllabus	1995 - 1997	Changing from Apartheid system to the democratic system	2 years	
Curriculum 2005	1998 - 2001	Skewed curriculum, lack of human resources for implementation, curriculum and assessment policy not aligned policy overload, no classroom transferability, inadequate teacher training, and inequitable quality of materials.	3 years	
Revised National Curriculum Statement	2002 - 2011	Lack of a plan for implementation, an overabundance of policies, guidelines and interpretations of policies and guidelines at all levels of the education system, and unclear role of subject advisor.	9 years	
Curriculum Assessment Policy Statement	2012		→	

Curriculum coverage in percentages

	IEA TCMA intended	SA Intended	SA reported implemented
Mathematics	100	94	72
Science	100	90	62

SOME IMPLICATIONS ABOUT CONTEXT

Teachers

- Findings indicative rather than representative of SA teachers; learners remain the unit of analysis
- South African TIMSS 2011 teachers are: older, experienced, well qualified, well prepared, confident, satisfied
- Audit of teacher qualifications: at national level, or for representative sample
- Emphasise combination of subject & subj. pedagogy/didactics training

Importance of language for achievement

- Learners move from "learning to read" to "reading to learn"
- Text-rich, language-dependent background and activity enhance conceptual, cognitive and academic proficiency among learners
- See next few slides

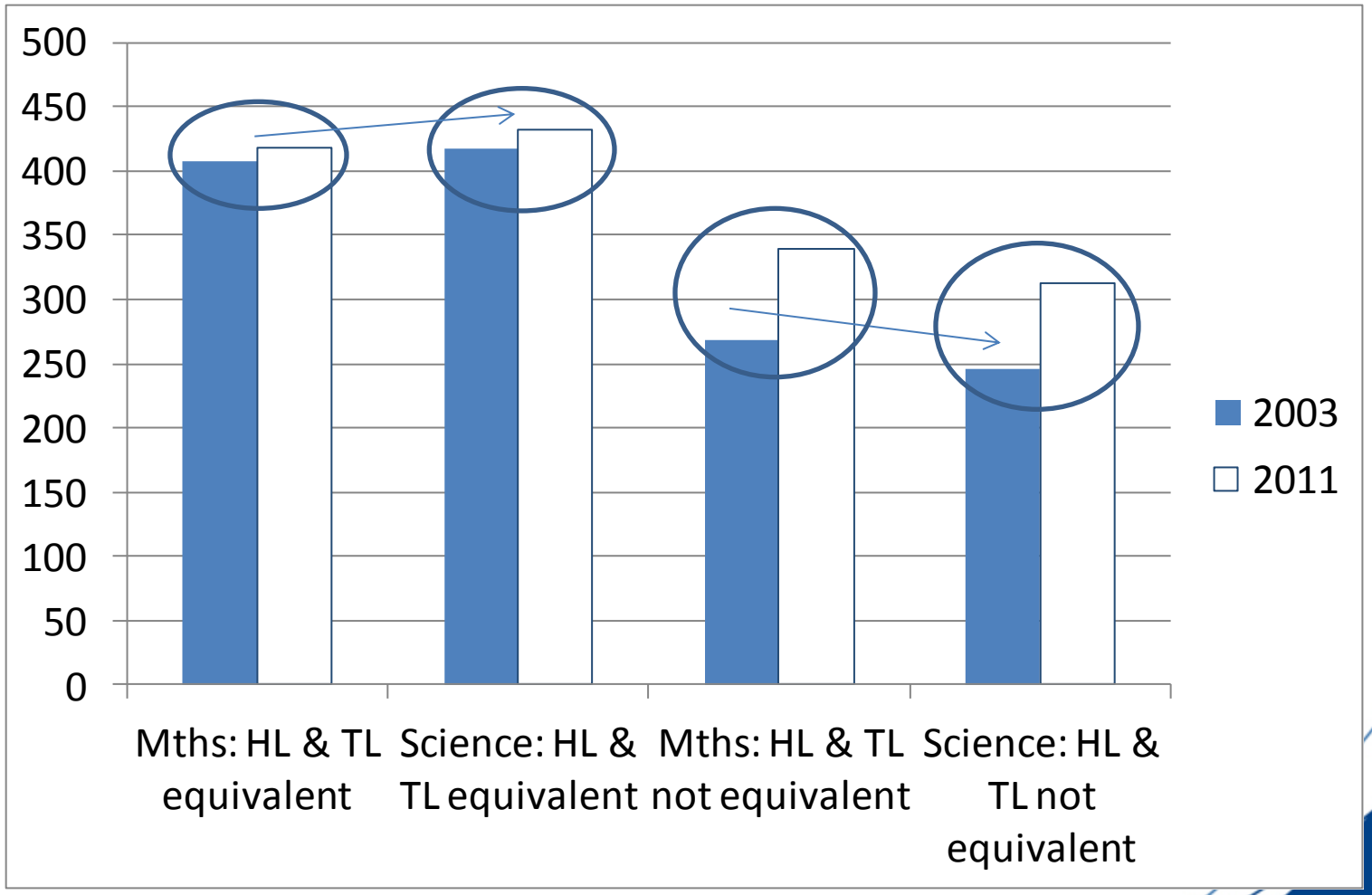
Context and learner achievement

Factor affecting lo-hi score differences in the next column	For Maths
I. Demographic and structural conditions	
Home and instructional/test language equivalence	80
Perceived learner difficulty understanding spoken school lang.	65
Female & male parent/caregiver qualification level	85 & 90
II. Access to language opportunities and support	
Schools sending extra learning materials home	37
Exposure to writing through homework (frequency ; volume) (3+ times per week; 16-30 to 31-60 minutes in volume)	35 (teachers) 40 (learners)
Frequency of speaking the test language at home	84
Number of books at home	46
III. Resource constraints and limitations	
Effect of textbook/learning material shortages on instruction	107
Resources: - software use in class - computers, Internet, TV, dictionaries* at home	40 46 (39*)

… Language vulnerability of Science

Factor affecting lo-hi score differences in the next column/s	Maths	Science
I. Demographic and structural conditions		
Home and instructional/test language equivalence	80	120
Perceived learner difficulty understanding spoken school lang.	65	65
Female & male parent/caregiver qualification level	85 & 90	118 & 122
II. Access to language opportunities and support		
Schools sending extra learning materials home	37	45
Exposure to writing through homework (frequency ; volume) (3+ times per week; 16-30 to 31-60 minutes in volume)	35 (teachers) 40 (learners)	Erratic
Frequency of speaking the test language at home	84	141
Number of books at home	46	61
III. Resource constraints and limitations		
Effect of textbook/learning material shortages on instruction	107	135
Resources: - software use in class - computers, Internet, TV#, dictionaries* at home	40 46 (39*)	57 66 (76#)

Home / test language equivalence



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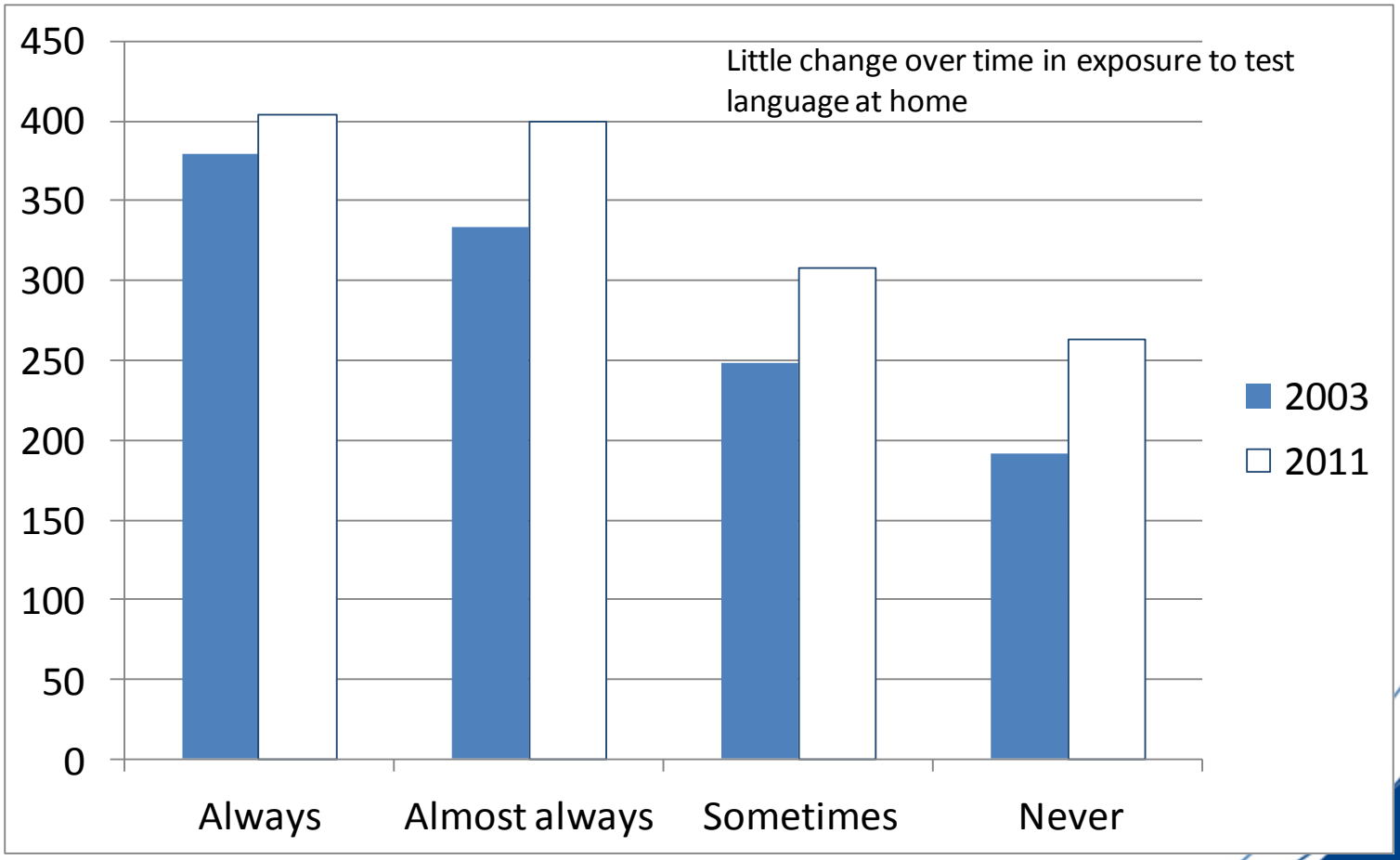
Science and speaking Test Lang. at home



Only 25% of learners always or almost always speak test language at home

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Synthesis and implications

- Many language-linked learning conditions have improved
- The school system has to ensure that as many as possible learners' home and test languages are the same; else learners' proficiency in the language of learning and teaching (testing) should be increased
- The latter will benefit from greater exposure of learners to reading and writing of extended text, and to speaking the language of instruction at home, especially with a view to increasingly language-dependent contents/subjects
- Strong efforts are required to overcome constraints associated with language-based resources

Concluding remarks

- At broadest level – school functionality is key
- Teachers – improve relevance and completeness of teacher qualifications in both the subject and its didactics
- Curriculum – enhance coverage (as delivered), especially pertaining to core, foundational concepts
- Resources – expand appropriateness and saturation
- Language – improve overlap (and mastery) of home and instructional languages, especially earlier in the system
- Increase accountability forces by communicating the individual learner and school achievement results widely to parents and the community

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