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Sub-national Disparities in Learning

An Analysis of Differentials in Learning Scores in 25 Countries, and the Correlations with School Entry and Retention Rates and Pupil-Teacher Ratios

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ABSTRACT

The most important outcome of schooling is skills, including (but not limited to) academic capabilities in subjects such as reading, mathematics, and science. Assessments and exams can provide insight into how much children are learning and the relative performance of children from different backgrounds. Earlier studies have found significant differences by household characteristics, by rural or urban location, and in some instances, by gender. This study examines sub-national differences by province or state in 25 developing countries using a range of assessments and exams. The study develops a method for comparing the results of different sets of surveys and a variety of learning measures. The study finds that learning disparity depends, in part, on the difficulty of achieving the learning measure. Using measures that account for the difficulty of the learning measure, the study finds significant sub-national disparities in student learning in 14 of the 25 countries, and relatively consistent across the country in 9 out of the 25. The study analyzes whether the learning disparities are correlated to disparity in other measures of school quality, such as entry, enrolment, retention and the pupil teacher ratio. No consistent relationships could be confirmed. At best, there is a majority of countries where there is a positive correlation between learning measures and attendance and school entry. School survival rates and the pupil-teacher ratio are found to be poor predictors of learning scores at the sub-national level.

The **Education Policy and Data Center (EPDC)**, a partnership of FHI 360 and the US Agency for International Development, was founded in 2004 to contribute to better education policy making and planning through improved access to and use of data and analysis. For more information, see www.epdc.org.

[‡] This report has been prepared by the Education Policy and Data Center (EPDC) from a series of studies commissioned by the GMR as background to the *2009 EFA Global Monitoring Report*.

INTRODUCTION

The question of what children are learning in school is at the heart of the Education for All discourse. As a result, learning assessments and monitoring of learning have taken a central place, even while we realize that monitored learning is not the only important aspect of school quality (e.g. Pigozzi, 2006). In the foreword of the Global Monitoring Report 2005 on quality, UNESCO Director General K. Matsuura states that while there are divergent views of what quality means, there is some general consensus that

> In most [countries] two principal objectives are at stake: the first is to ensure the **cognitive development** of learners. The second emphasizes the role of education in **nurturing the creative and emotional growth** of learners and in helping them to acquire values and attitudes for responsible citizenship. Finally, quality must pass the test of **equity**: an education system characterized by discrimination against any particular group is not fulfilling its mission (bold added by EPDC). (UNESCO, 2005)

International learning assessments at the primary level, such as TIMMS and PISA, have focused attention on cross-national learning differences; SACMEQ in southern Africa has done the same for that region. SACMEQ also highlighted sub-national differences in learning by region, household income, and urban/rural residence. The recent 2008 Global Monitoring Report (GMR, UNESCO, 2007) analyzed national assessments and inequity of learning within countries measured by national assessments as well as change in learning over time. The 2008 GMR and the accompanying papers show that there are gender differences in learning scores and even larger differences between urban and rural areas (Xin, 2007; Benavot and Tanner, 2007, Murillo, 2007, Balázsi, 2007). In some countries, the differentials are substantially larger than in others (e.g. Peru has very large urban/rural differences; El Salvador small ones, UNESCO, 2007:72). The 2008 GMR shows that national assessments can be highly relevant for evaluation of student learning, even in the context of international comparisons.

This study builds on and expands that work. It presents sub-national and national assessment and exam scores from 25 countries and assesses the *sub-national* variability. The assessments and exams include the SACMEQ 2003 tests from 13 southern Africa countries, and national level assessments and exams from countries in Africa (5), Asia (5), and Latin America (2). These sub-national scores are presented and discussed in the first section of the report. As it turns out, there are multiple scores available for most countries, and *the sub-national disparity differs depending on the learning measure.* The study analyzes the different learning scores to select the measure(s) that best represent the extent of sub-national disparity in countries.

An important observation on the relationship between quality and other, more quantitative measures of education, was given in the 2006 GMR report. It stated that, at the international level, "countries that are farthest from achieving goals 1 to 5 are also farthest from achieving goal 6" (UNESCO, 2005 Executive Summary) – that is, where quality is low, so are the other EFA measures – early childhood care, basic education, gender equity, youth opportunities and literacy. Does this international pattern also hold within countries, that is, regions with low learning scores also perform poorly along other education measures? To answer this question, this study *investigates the correlation of sub-national levels of testing scores with survival and school entry.*

The extent to which learning, survival and entry to school are correlated or not suggests the extent to which children in disadvantaged regions face multiple or single deterrents to a complete and high quality basic education. It also indicates how well more common indicators such as attendance and survival can serve as proxies for the more sparsely available learning measures.

Factors that affect learning and quality in schools have been much studied (although the silver bullet for quality education remains elusive). The GMR reports that these factors include: enough and well-trained teachers; enough instructional time (850-1000 hours per year); core subjects such as literacy; good pedagogy; first language for the early years of schooling; good and sufficient learning materials (books); adequate facilities including classrooms, bathrooms, water; and good leadership in the school system (UNESCO 2005).

Of all these measures, only the quantity of teachers, by training and gender ("enough teachers") is available at the sub-national level for a large group of countries. At the same time, of all the above measures, the quantity of teachers (measured by PTR) is most inconclusively linked to student performance. Hanushek (1995, 1997, and 2003) maintains there is no conclusive evidence to support the link between PTR and student performance (he finds teacher quality to be a more important factor); others, including Krueger (2003) disagree. Yet, PTR is persistently used as a proxy of quality, perhaps because there are no alternatives. For example, in their work on sub-national PTR, Sherman and Poirier (2007a and 2007b) refer to PTR as "quality".

This study contributes to the literature on PTR and learning by looking at the sub-national patterns of the relationship across developing countries. Earlier work (Sherman and Poirier, 2007a and 2007b) shows there are wide disparities in PTR within many countries, but, this study implies, they are not correlated with learning measure scores.

MEASURES OF STUDENT LEARNING

Students are tested on their knowledge of school curriculum material for a variety of reasons and using different tools. Tests can be used for monitoring (in the classroom or on a larger scale) – hereafter referred to as *assessments* - and as portals to entry or completion of a particular school or school level – called *exams*. For most of these assessments and exams, multiple scores are presented, e.g.: % of pupils who pass the exam; average score for French; % pupils who achieved competency in English. These indicators of achievement are hereafter referred to as *learning measures.*

There are a few international assessment series where the tests and the scores are internationally comparable. The TIMMS, PIRLS, and PISA[2] assessments have been made around the world, mostly in industrialized countries, but also in a few developing countries. Regional assessment series are: the SACMEQ[3] assessments of countries in southern Africa in 1999 and 2003; the PASEC[4] assessments in western Africa; and the LLECE[5] assessment in Latin America in 1997 and 2007. The TIMMS, PISA, PIRLS and PASEC assessments contain no clear sub-national indicator in the datasets so they are excluded from this study, and the LLECE 1997 assessments were deemed too old to include (the 2007 results were not available at the time of writing). Of these international series, the 2003 SACMEQ assessments have sub-national scores and are included in this study. The SACMEQ scores are taken from the reports on the SACMEQ page (http://www.sacmeq.org).

In addition, many national assessments and exams are undertaken, developed within countries, and based on national criteria. The GMR team has been a leader in compiling and accessing reports and data on national assessments and exams. Some of these sources

[2] Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading and Literacy Study (PIRLS) are administered by the International Association for the Evaluation of Educational Achievement (IEA), while the Programme for International Student Assessment (PISA) is administered by the Organisation for Economic Co-operation and Development (OECD).

[3] Southern and Eastern Africa Consortium for Monitoring Educational Quality independently administers the assessment tests developed at International Institute for Educational Planning (IIEP) of UNESCO.

[4] Programme d'Analyse des Systemes Educatifs dela CONFEMEN (PASEC) is administered by La Conference des Ministres de l'Education Nationale (CONFEMEN).

[5] Latin Laboratory for the Assessment of Educational Quality (LLECE) administers the tests.

include learning scores by sub-national regions. For this study, the EPDC and GMR shared their compilations of national assessment and exam reports with sub-national data, resulting in a collection of an additional 12 countries.

Table 1 lists the countries included in this study and the assessments and exams used.

The assessment and exams included in the study come from a variety of sources and were conducted using an array of methodologies. It is not possible to compare the absolute levels of the tests, as some are certainly more difficult than others; however, to some degree, it is possible to compare the extent of the *sub-national disparity*. The sub-national disparity is an indicator of inequality of learning opportunities within the country.

The preferred learning measures from these assessments and exams is a *percent of students scoring above a particular score* rather than the average, because the average can be skewed by a few outliers at the high or low end of the score. Percent of pupils scoring higher than a particular achievement score is available for 21 of the 25 countries; for Ethiopia, Guinea, Indonesia, Mauritania, and Pakistan, *mean scores* are available as a measure of student performance.

Table 1. List of 25 countries included in the study and the names of the assessment or exam used.

Country	Assessment or Exam	Country	Assessment or Exam
Belize	Caribbean Secondary Education Certificate, 2003	Mauritius	SACMEQ, 2003
Botswana	SACMEQ, 2003	Mozambique	SACMEQ, 2003
Ethiopia	Ethiopian Second National Learning Assessment, 2004	Namibia	SACMEQ, 2003
Guinea	Les Competences des Eleves de 4A. En Comprehension des Textes Ecrits, 2006	Pakistan	National Assessment Report, 2005
Haiti	Evaluation des Acquis Scolaires, 2005	Senegal	Certificat de fin D'Etudes Elementaires, 2005
India	Annual Status of Education Report, 2007	Seychelles	SACMEQ, 2003
Indonesia	National School Examination, 2007	South Africa	SACMEQ, 2003
Kenya	SACMEQ, 2003	Swaziland	SACMEQ, 2003
Laos	National Assessment Survey, 2006	Tanzania including Zanzibar	SACMEQ, 2003
Lesotho	SACMEQ, 2003	Uganda	SACMEQ, 2003
Madagascar	Enquete sur les acquis scholaires des eleves de la 8eme annee en mathematiques et en sciences a la vie courante, 2004	Vietnam	Reading and Mathematics Assessment Study, 2001
Malawi	SACMEQ, 2003	Zambia	SACMEQ, 2003
Mauritania	Nationale d'Evaluation, 2005		

Many of the countries report different test results, or learning measures. For some countries, only one learning measure was available at the sub-national level; for others, there were many measures and a selection, described below, was made to use in this study.

Table 2 briefly summarizes each of the tests and the learning measures included.

Table 2. Description of the test results reported by country.

Countries	General description	Grade	Learning measures
Belize (Ministry of Education, Sports, Youth, and Culture, 2004)	Cambridge Certificate	Grade 12	% reached satisfactory level in English and mathematics
Ethiopia (National Organization for Examinations, 2004)	National assessment in English, mathematics, environmental science	Grades 4 and 8	Average % of correct answers to English and mathematics questions
Guinea (Blondiaux et al., 2006)	National assessment of French language ability	Grade 4	Average % of correct answers
Haiti (Desse, 2004)	National assessment of Creole, French and mathematics	Grades 1, 3, and 5	Average % of correct answers
India (Pratham, 2007)	National assessment of native language, English and mathematics	Grade 1-5	% of pupils achieving various levels of competency
Indonesia (Ministry of National Education, 2002)	National examination	Grade 9	% of students who passed language exam
Laos (Sisouk and Postlethwaite, 2007	National assessment of Lao and mathematics	Grade 5	% of pupils who reach functional and independent levels of competency
Madagascar (Ministry of National Education & Scientific Research and UNESCO, 2004)	National assessment of mathematics and science	Grade 8	% of students answering <50%, >50% and >75% of answers correctly.
Mauritania (Institute Pedagogique National, 2002)	National assessment of Arabic, French mathematics and environmental science	Grade 5	% of curriculum acquired by average student
Pakistan (Ministry of Education, 2005)	National assessment of Urdu and mathematics	Grade 4	Mean scores
Senegal (Ministry of Education, 2004)	National examination	Grade 4 and 10	Passing rate, all subjects
Vietnam (World Bank, 2004)	National assessment of Vietnamese and mathematics	Grade 5	% of pupils who reach functional and independent levels of competency
Botswana Kenya Lesotho Malawi Mauritius Mozambique Namibia Seychelles South Africa Swaziland Tanzania including Zanzibar Uganda Zambia (www.sacmeq.org)	SACMEQ - Assessment of language mathematics	Grade 6	Language and mathematics scores, in levels 1-8. Level 4 is the first of the reading levels, where “meaning” is introduced[6].

[6] Communication with Kenneth Ross, one of the developers of the SACMEQ assessment.

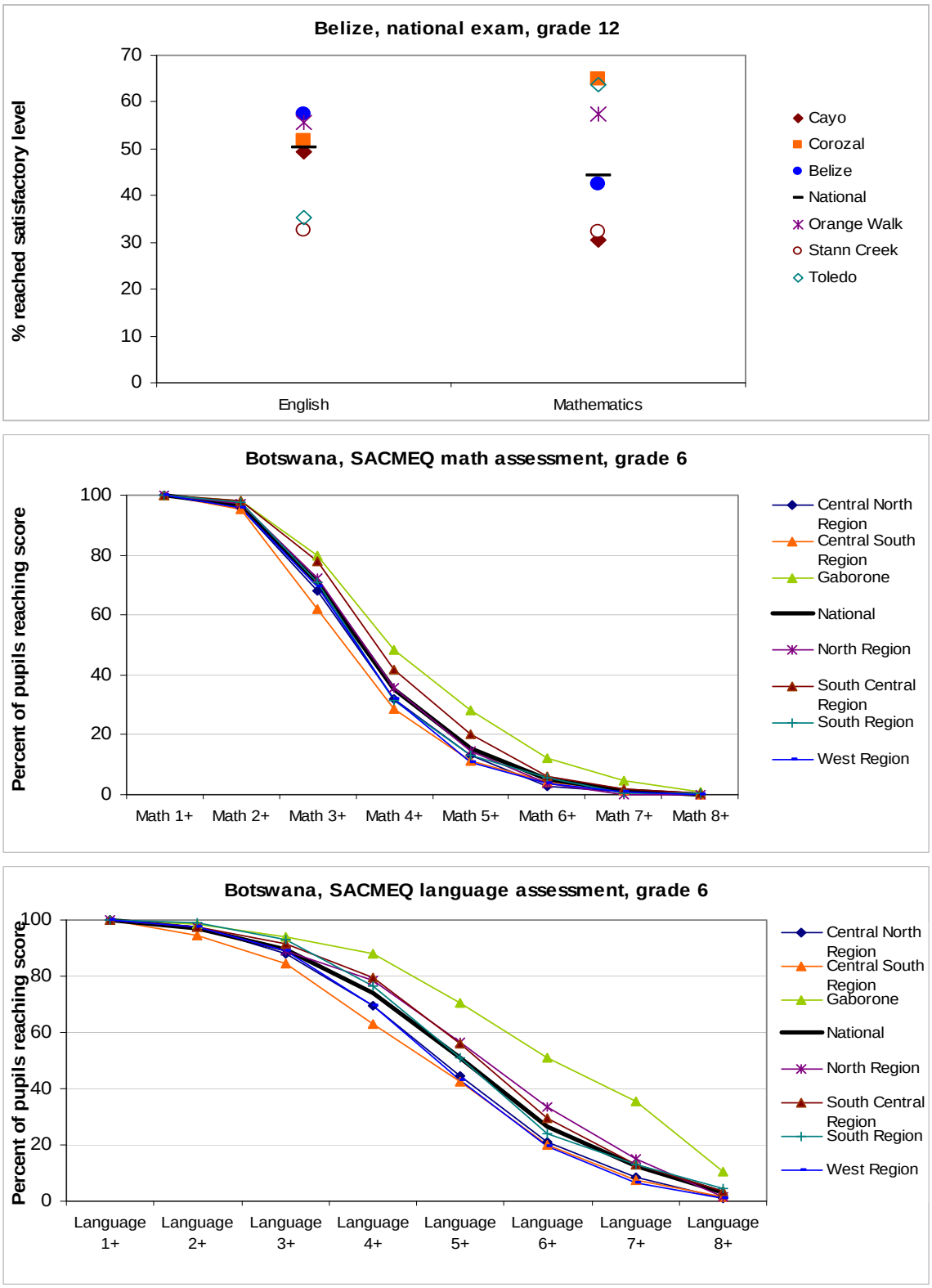
Figure 1shows these learning measures on a separate graph for each country. The graphs differ from each other because they show different scores; however, the scores are arranged in a similar order for each country. Along the x-axis from left to right scores are arranged from: lower to higher measures of competency (e.g. from level 1 to level 8, from level functional to level independent[7] and so forth), lower to higher grades, by subject in order of - all subjects, own language or language of instruction, colonial language (if tested separately), mathematics. The national averages for each learning measure are shown by bold black lines.

A few general observations from these figures are:

- Within countries, the sub-national disparity and the level of scores varies with the learning measure. For example, in Belize, there is more variability in the mathematics scores than in the English scores.
- Across subjects, there is not perfect correlation of the ranking of regions (from best to worst) – using Belize as an example again, the Corozal region has the highest mathematics scores, but is only third best in English.
- Across grades, there is not a perfect correlation of the ranking of regions, nor is there a relationship in the disparity of scores from one grade to another. For example, in Ethiopia, the range of scores for English in grade 4 is much higher than the range in grade 8, and the ranking of sub-national regions is not identical.
- Within one subject, and one grade, there is more consistency of ranking while level of disparity varies.
- The greatest disparity in percentage points tends to appear when the national score is in the mid-range, with lower disparity where the national score is close to perfect or very low. The graphs of countries with SACMEQ tests, as well as those of Laos mathematics (not language), the Madagascar grade 8 assessment and the Vietnam grade 5 assessment of mathematics and language show this larger disparity in the mid-range of achievement.

[7] Functional" and “independent” levels were used in assessment of grade 5 students in Laos and Vietnam. The functional level was defined as "sufficient for functional participation in Laotian/Vietnamese society" and the independent level was defined as "ready to pursue learning at the grade 6 level.

Figure 1. Test and assessment scores in various subjects and for various levels, at the sub-national level for 25 countries.



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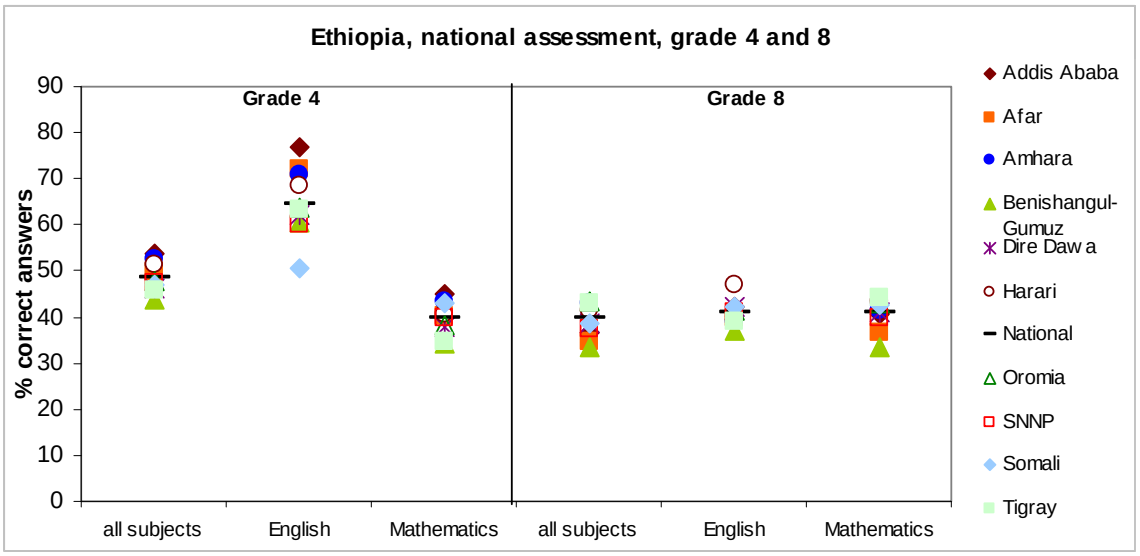

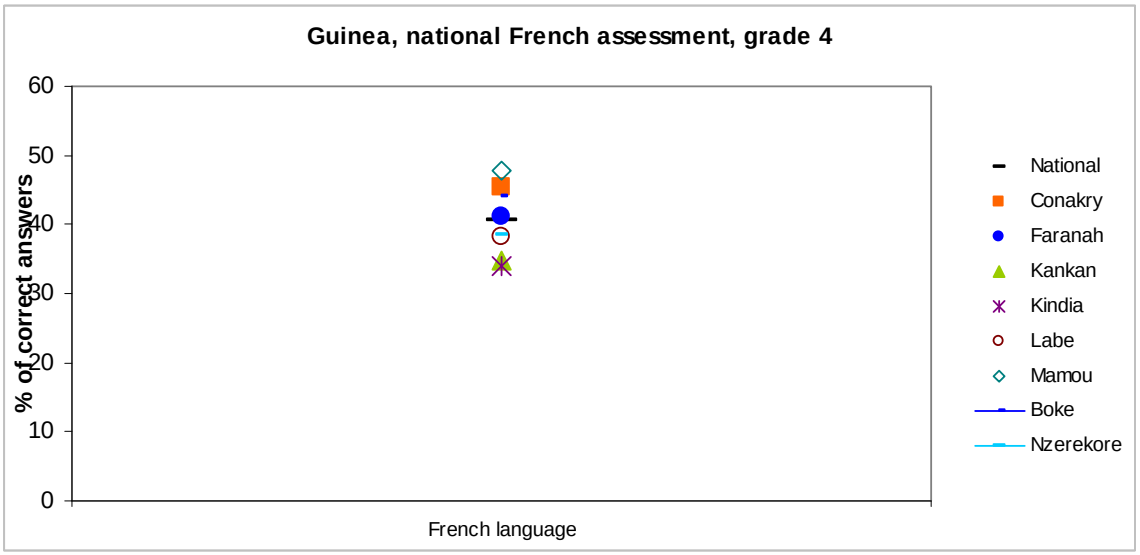

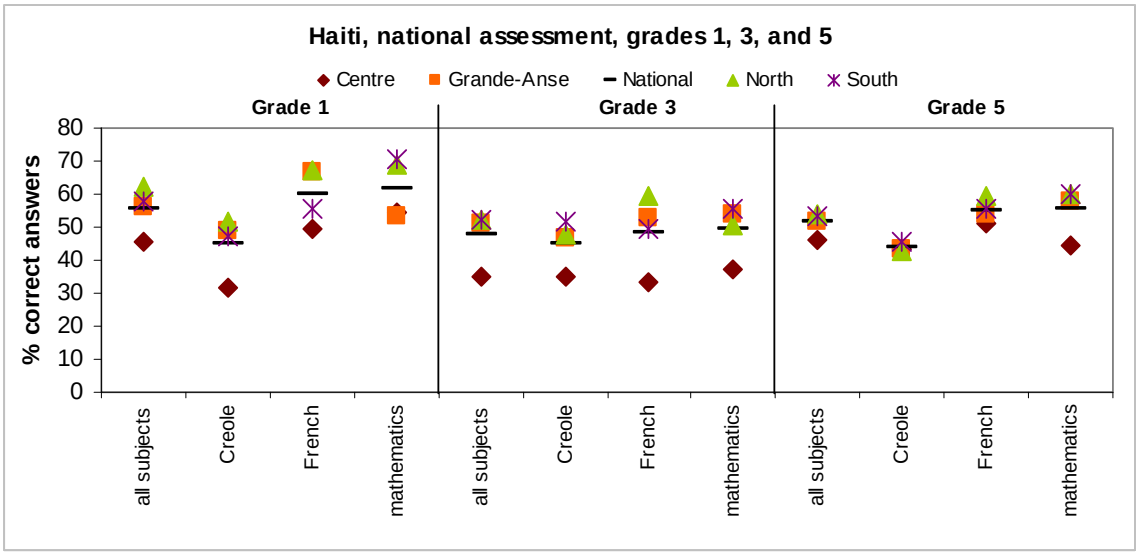

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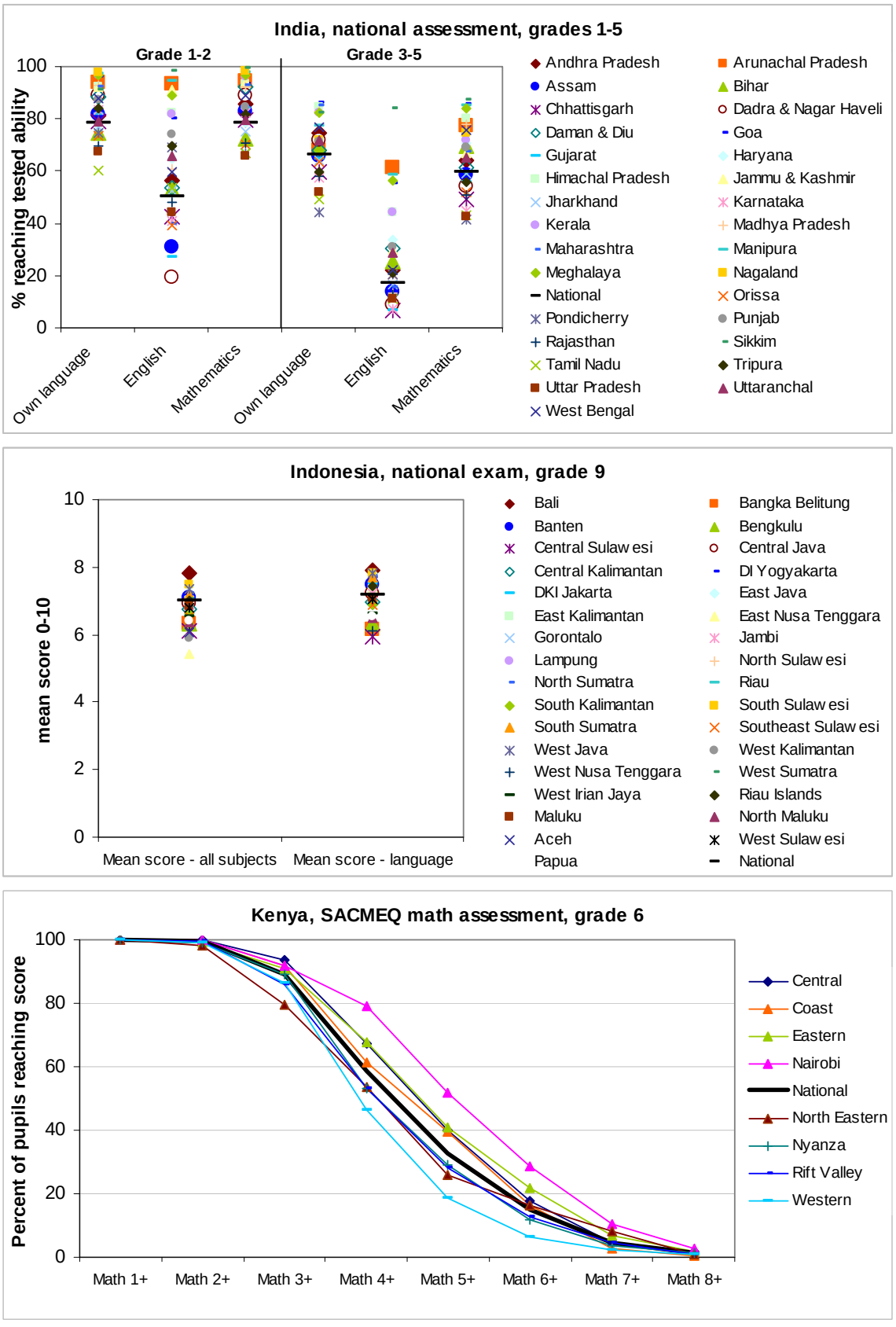

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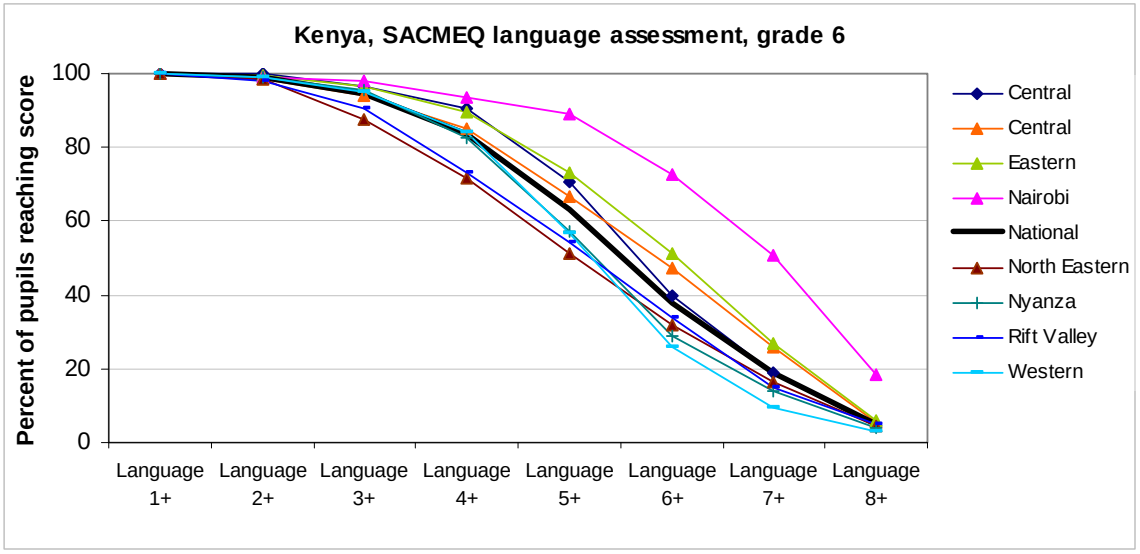

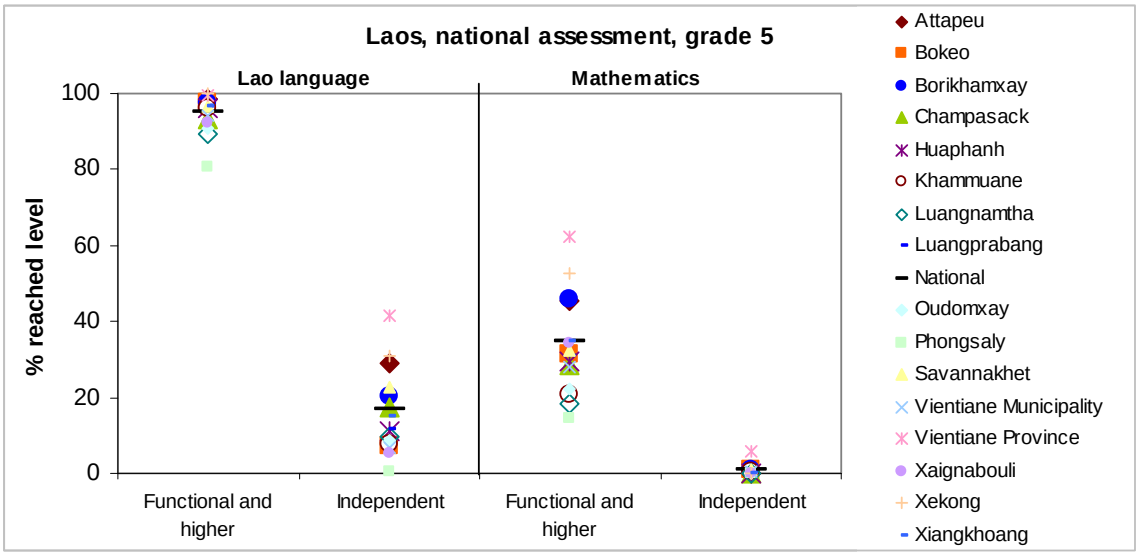

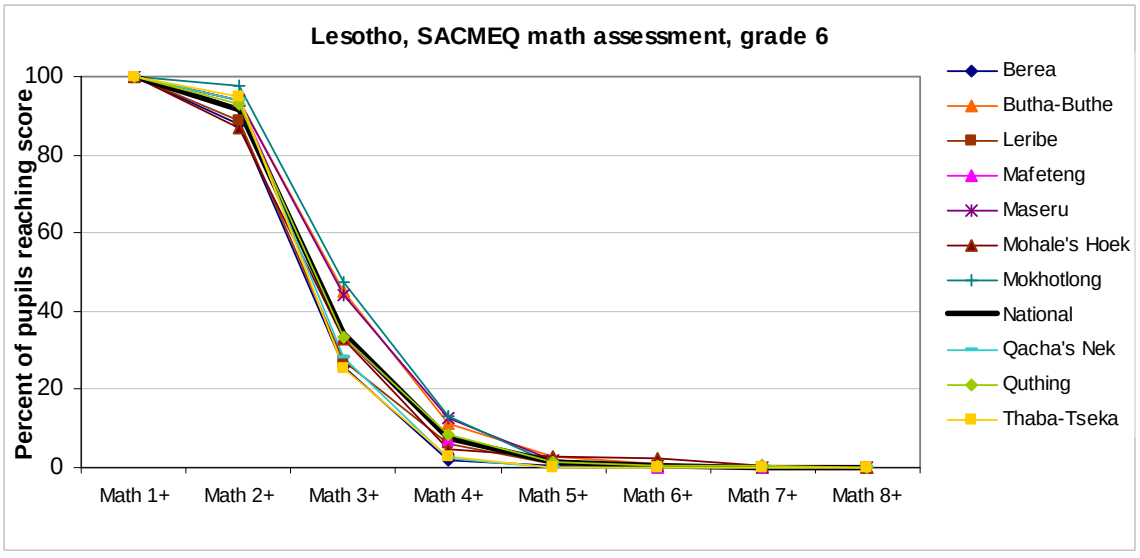

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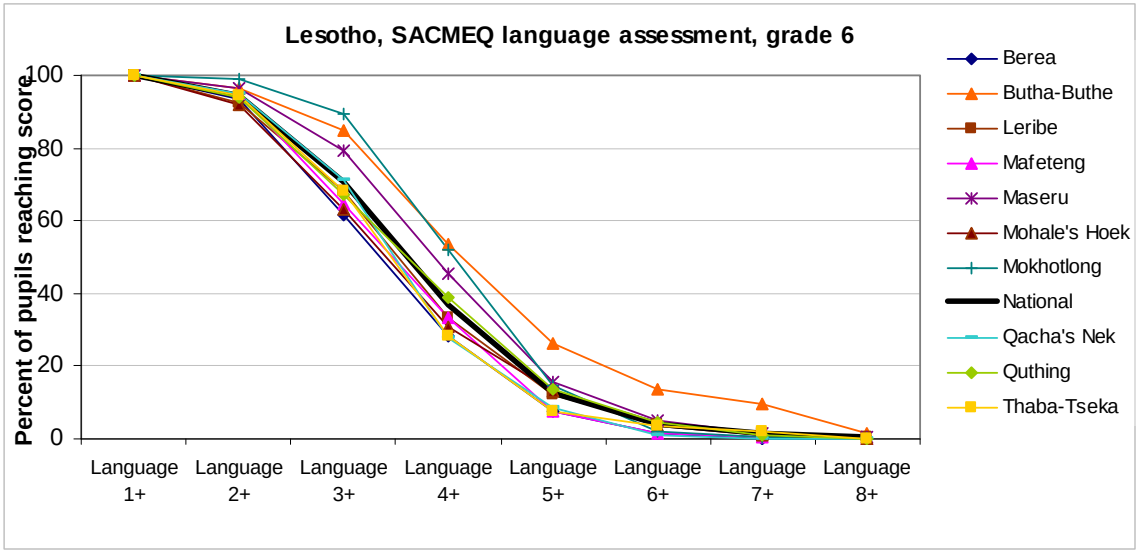

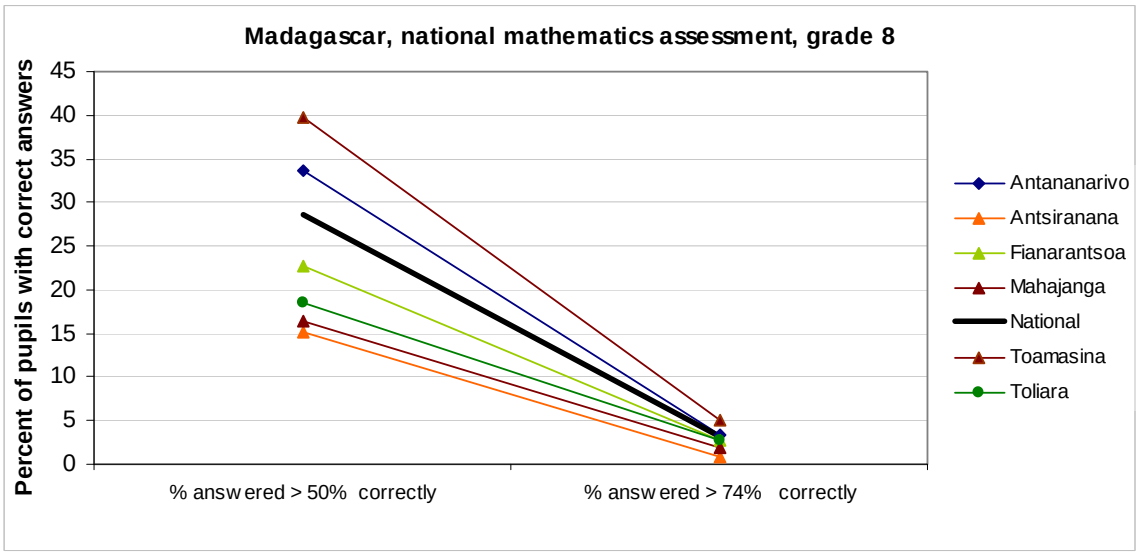

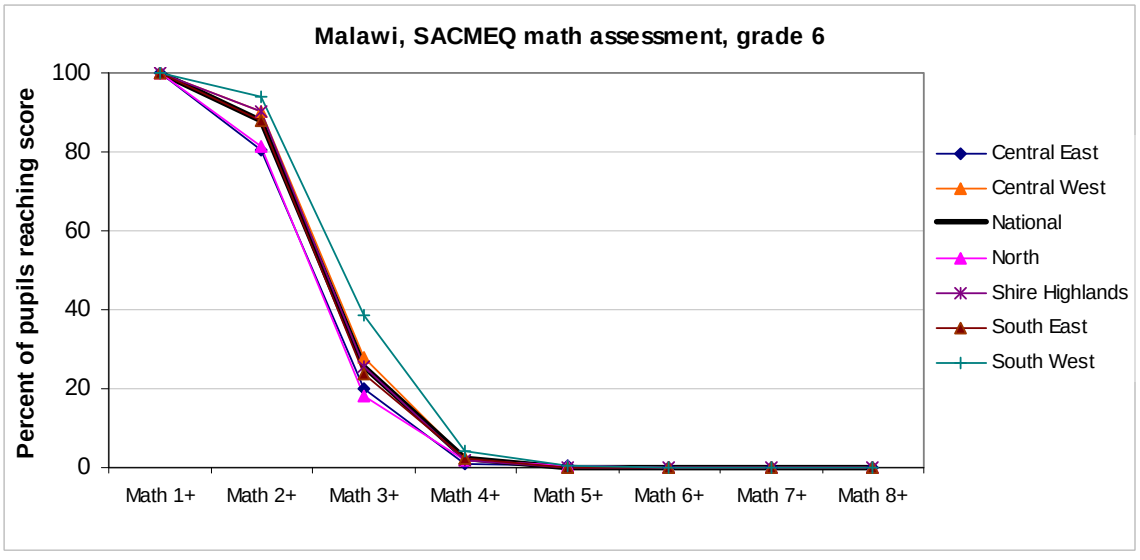

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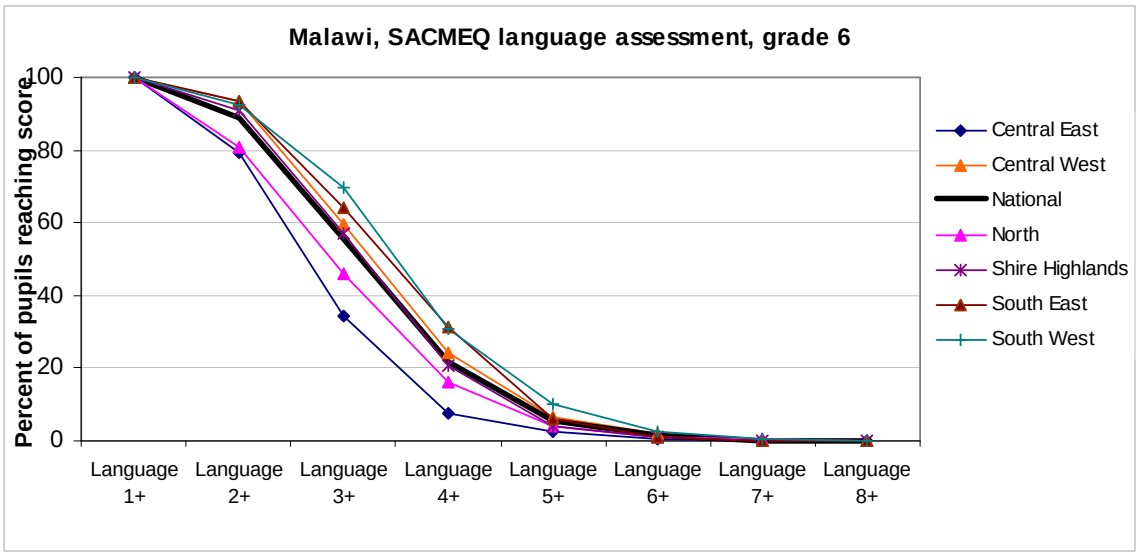

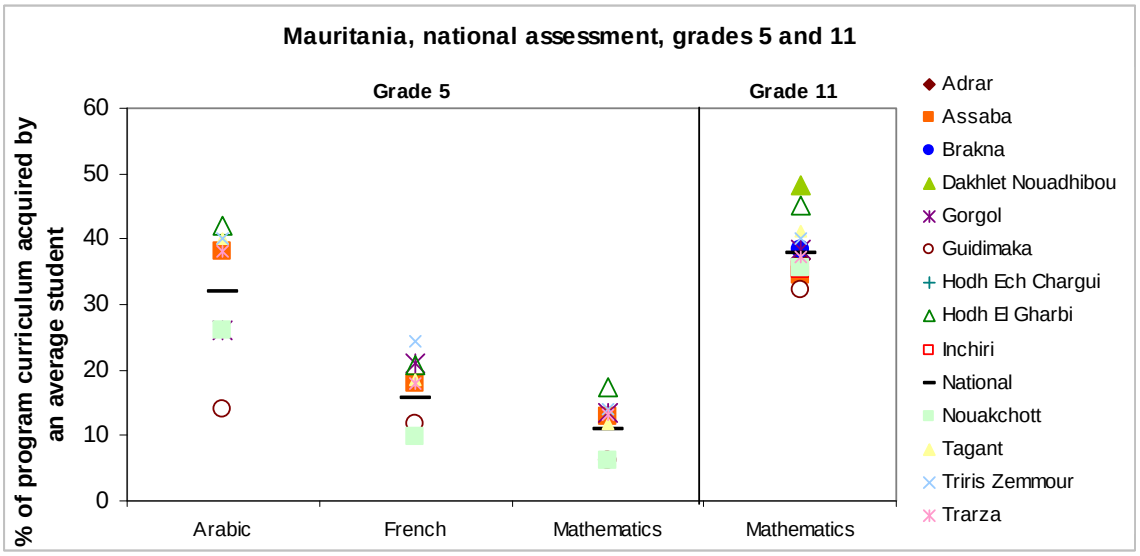

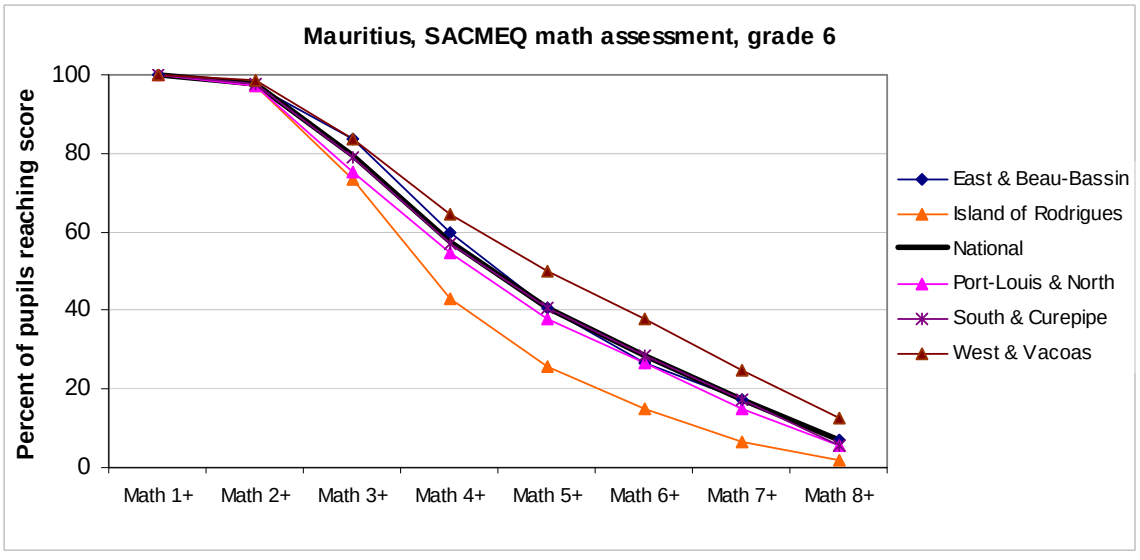

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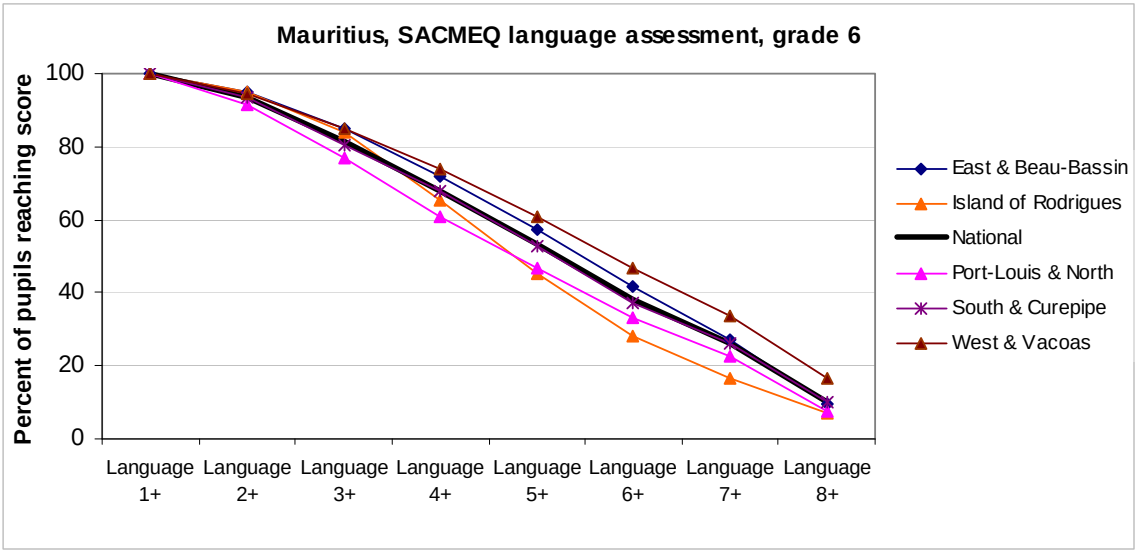

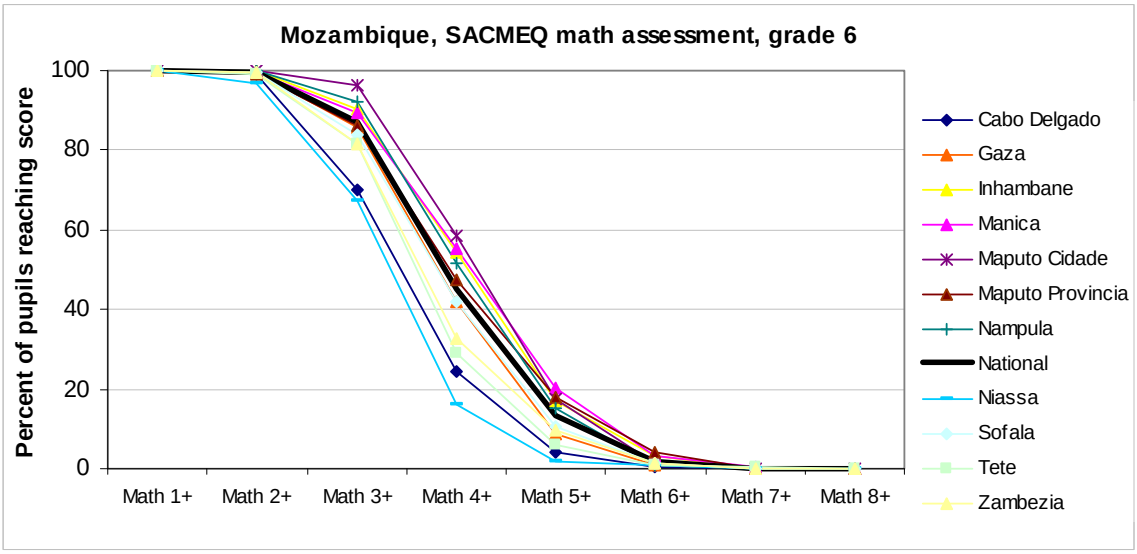

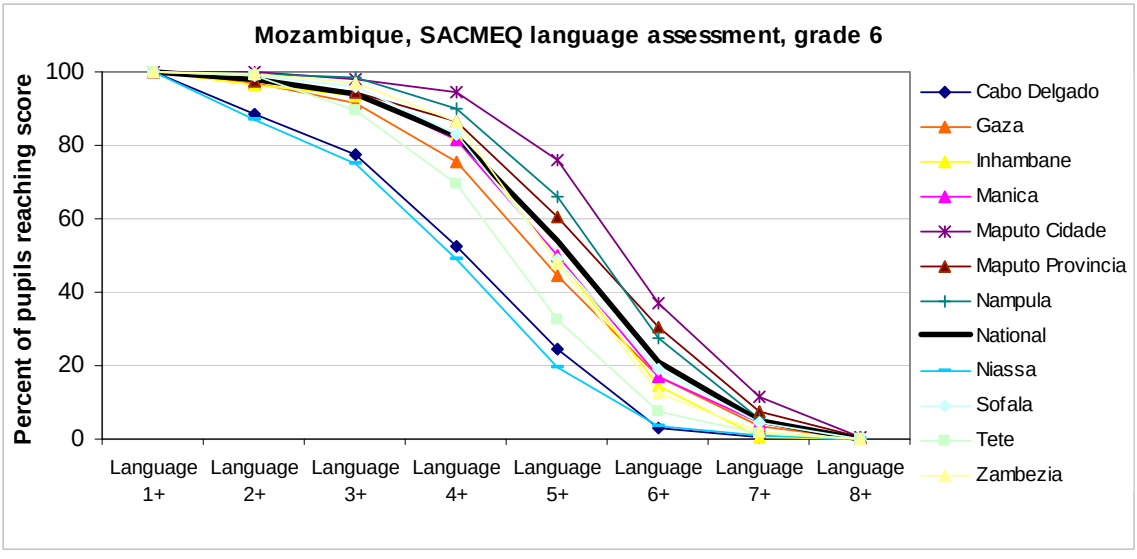

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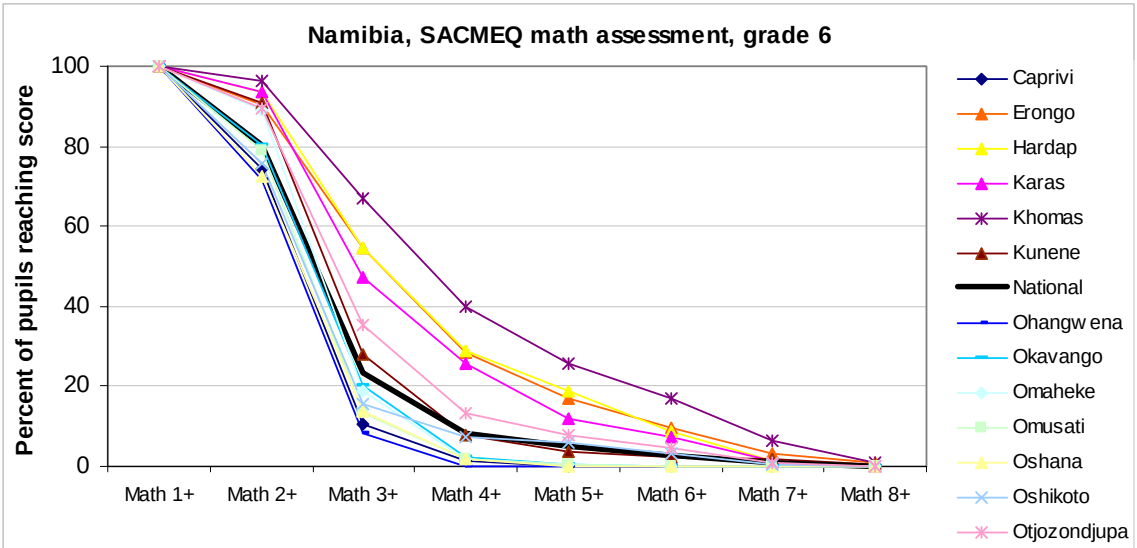

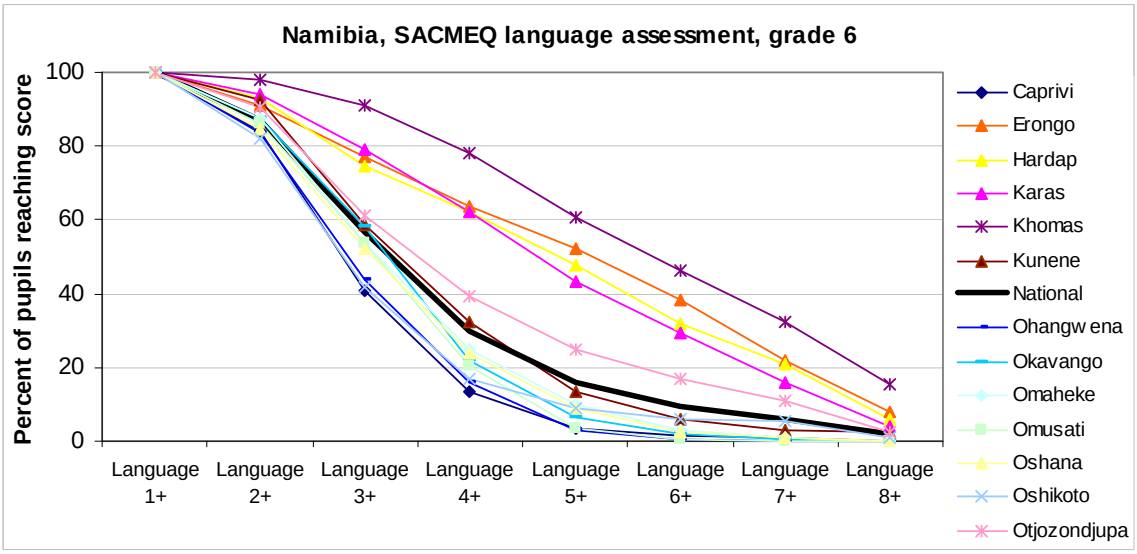

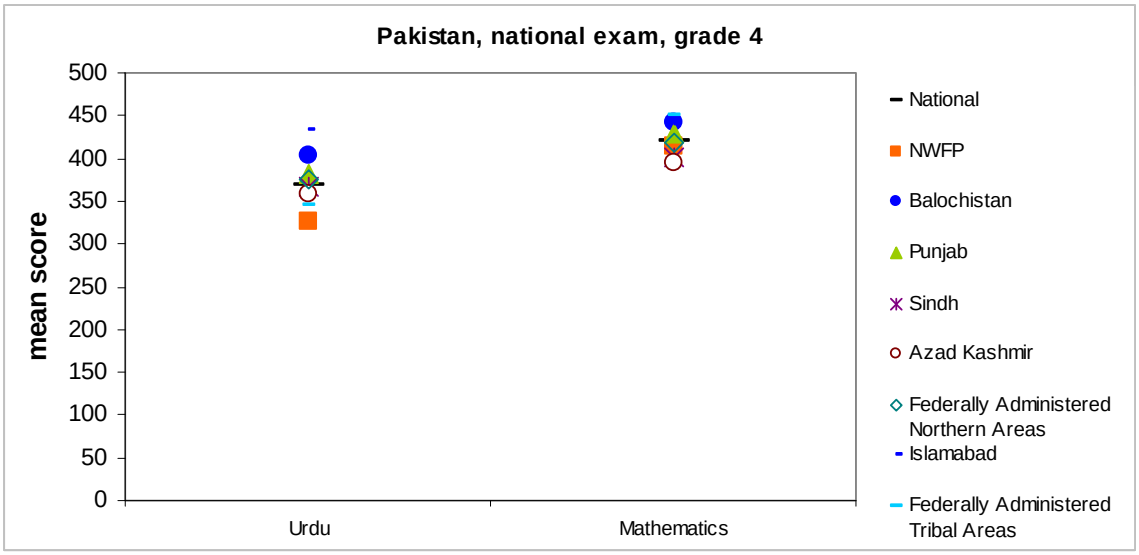

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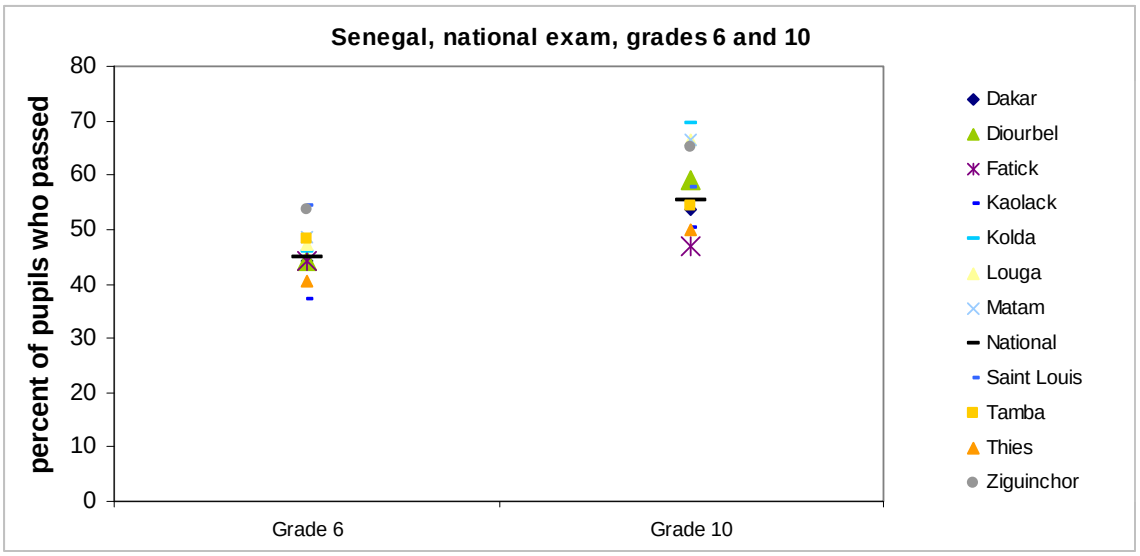

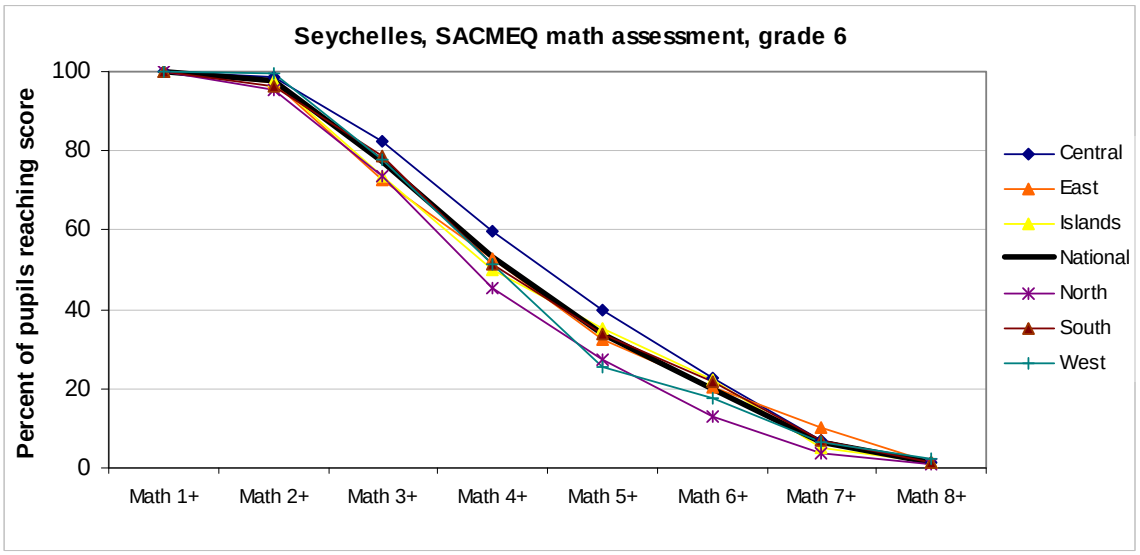

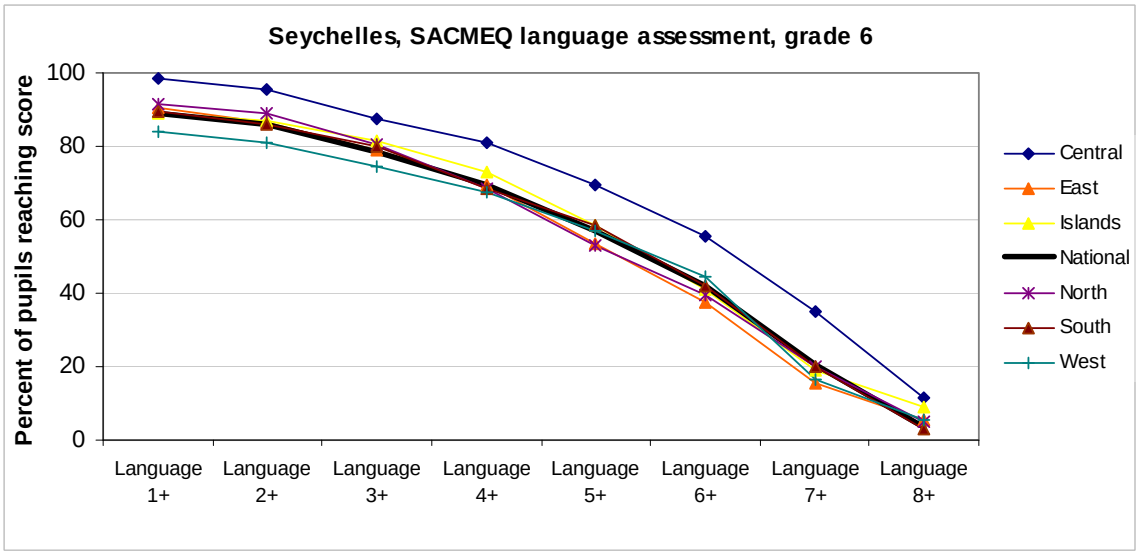

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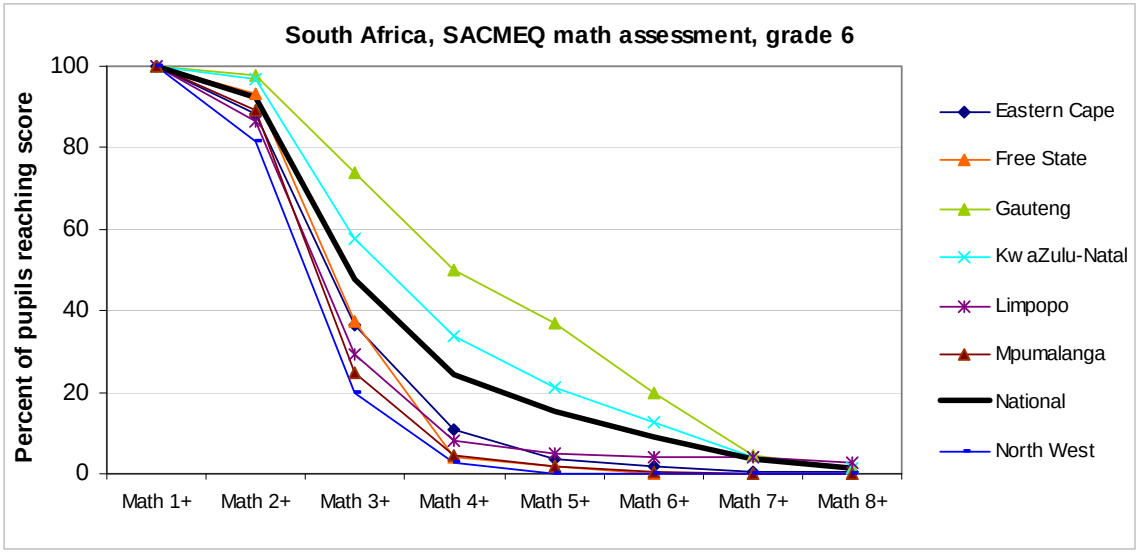

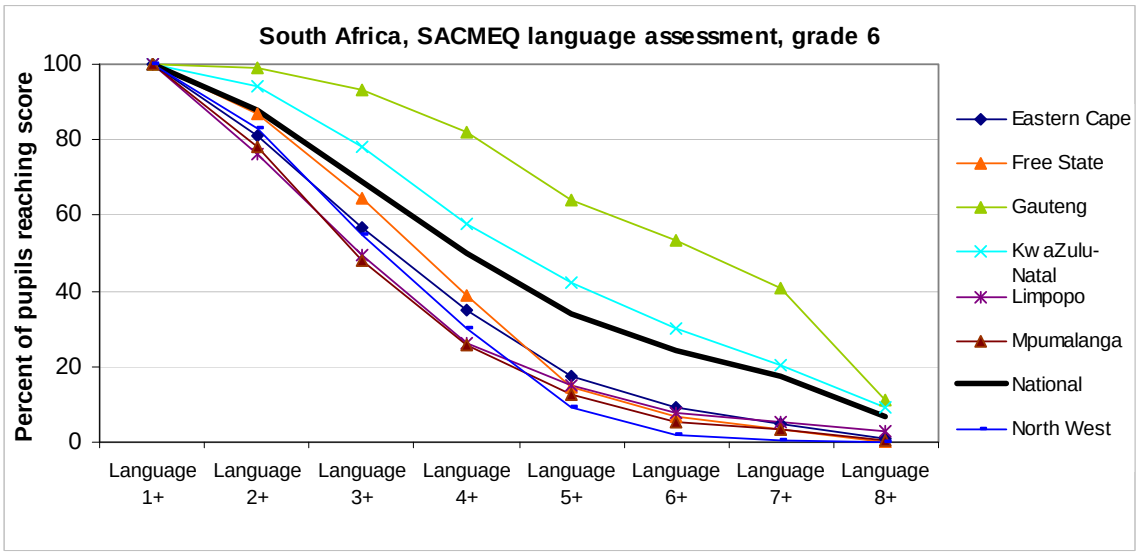

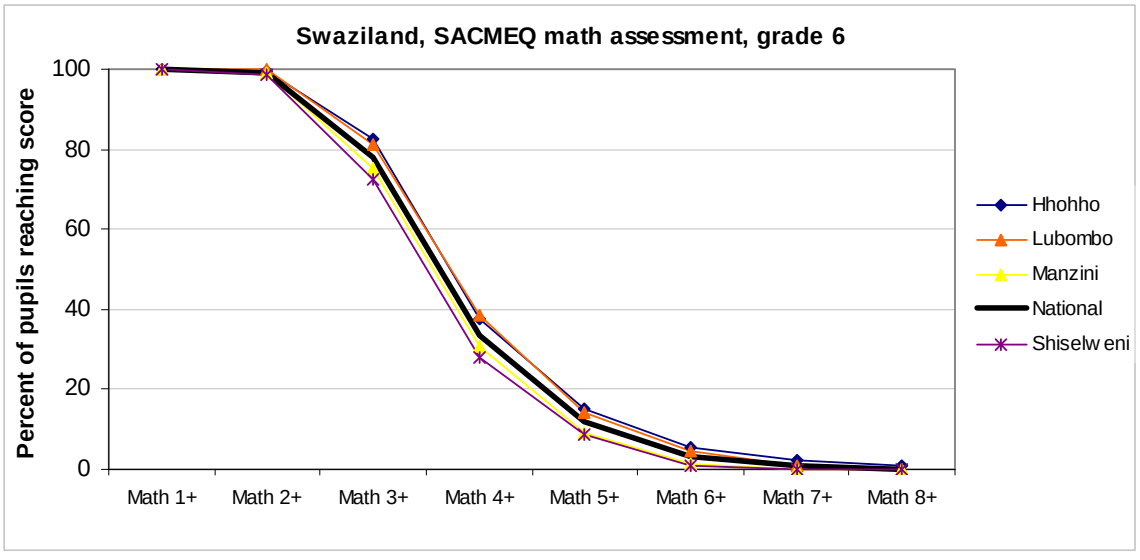

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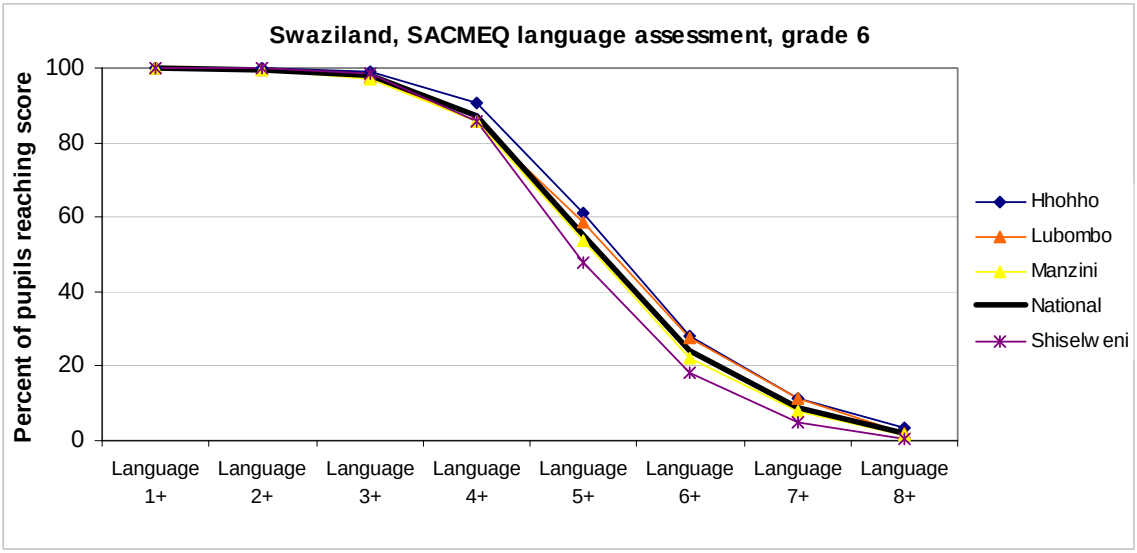

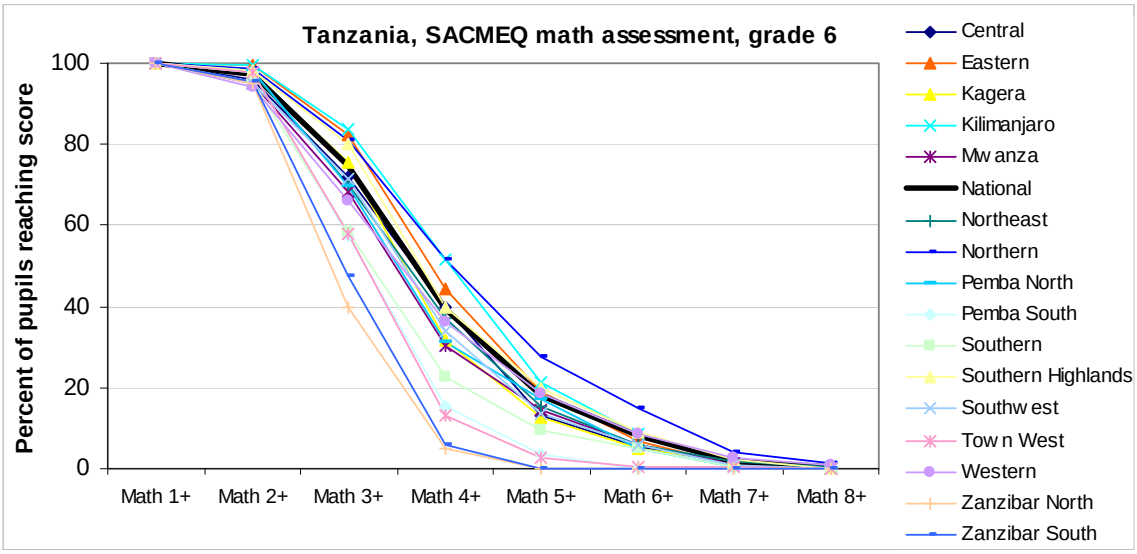

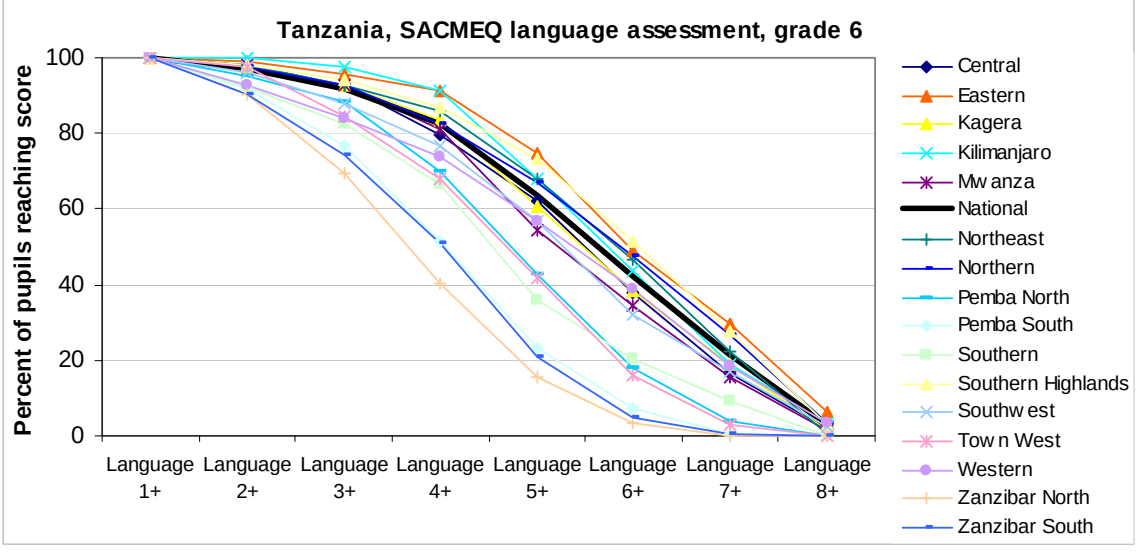

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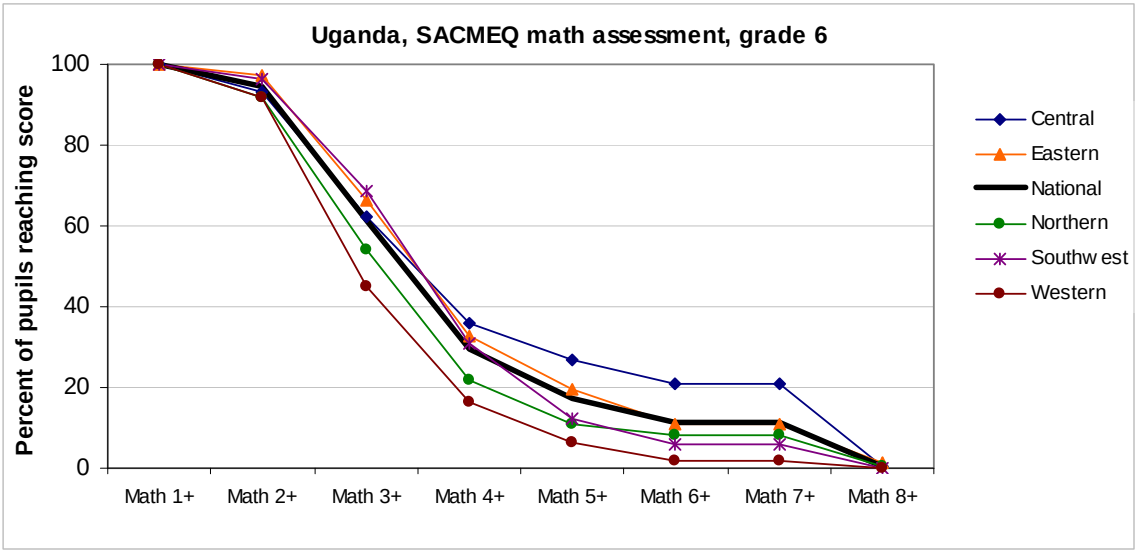
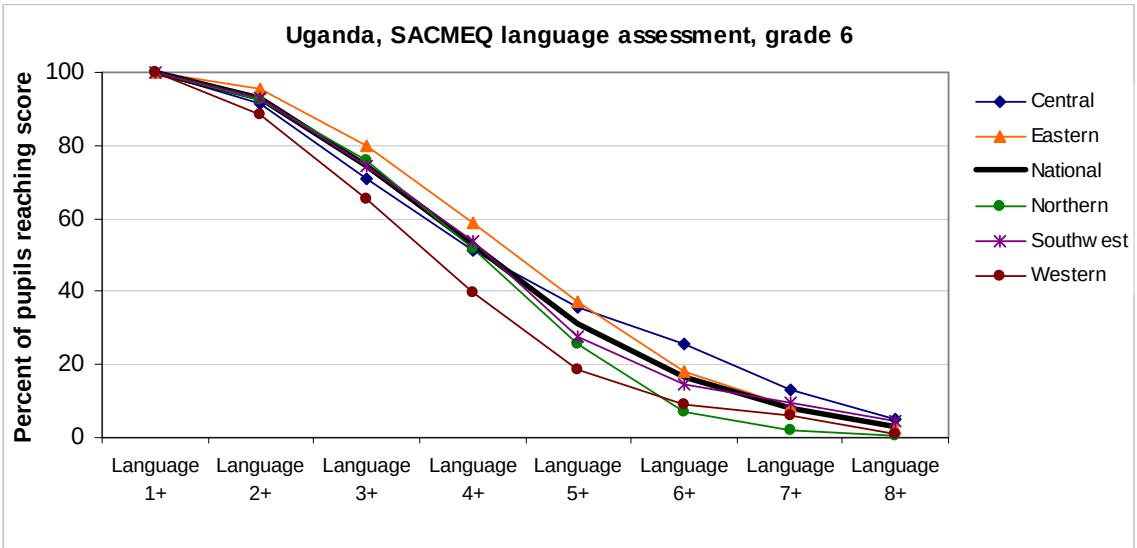




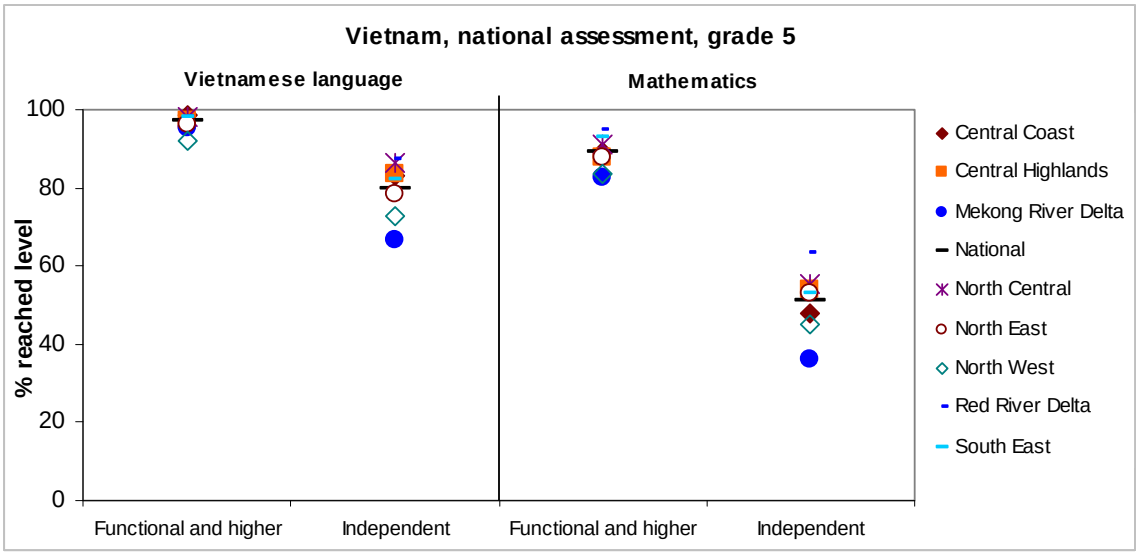
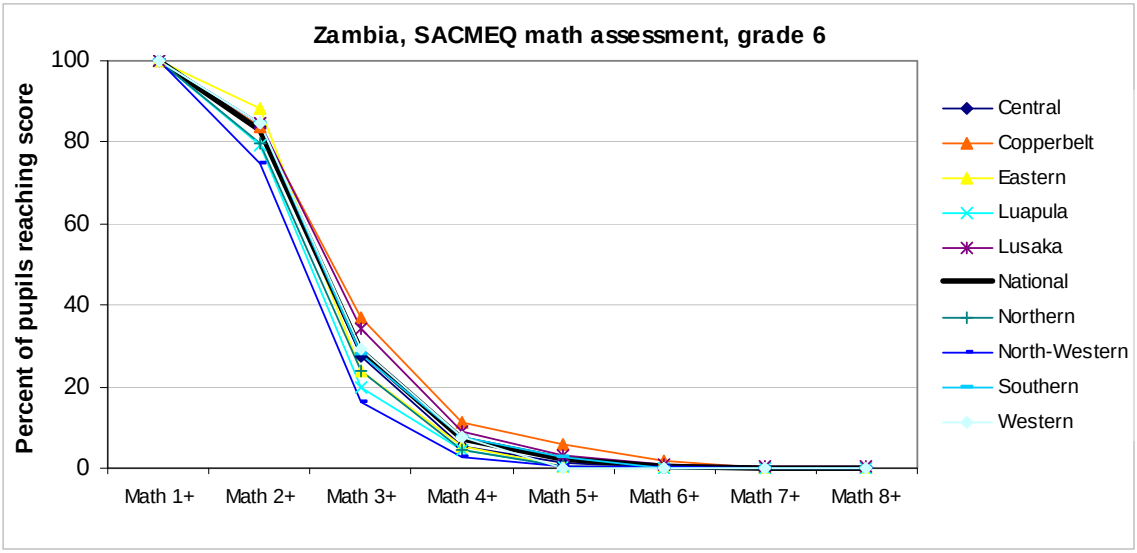
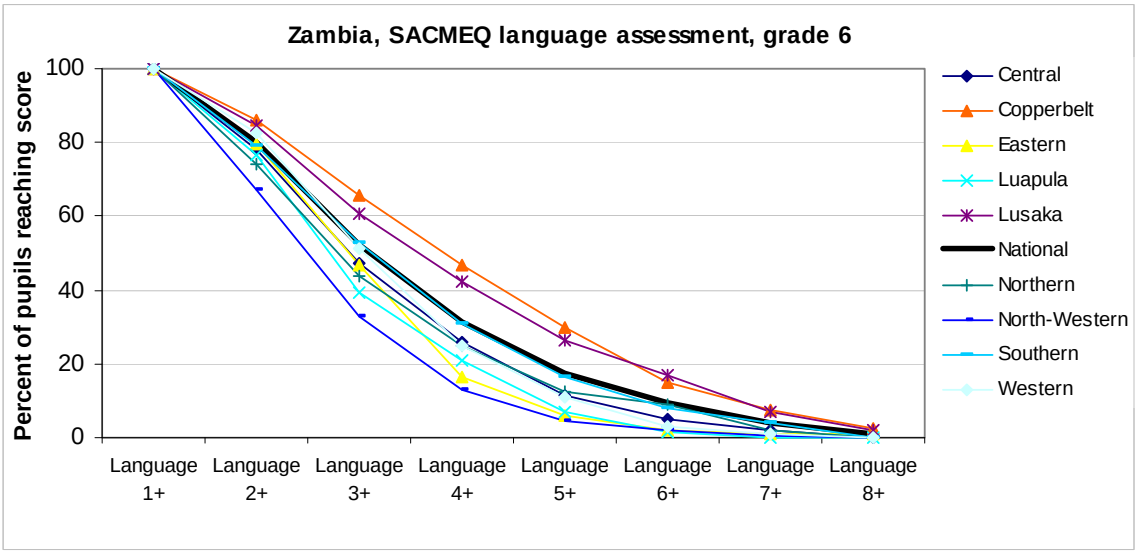


Figure 1 continued.





CROSS-NATIONAL COMPARISON OF SUB-NATIONAL DISPARITIES IN LEARNING SCORES

The variety of scores implies that there is also a range of sub-national disparity for different scores within countries. This complicates the analysis of learning disparity: which score "best" represents learning disparities within a country? The analysis is further complicated by the fact that the sub-national regions are not consistently ranked across learning measures. The next pages are devoted to sorting out this issue and end with two simple criteria for selecting the learning measures that "best" represent learning disparity.

There are two basic approaches to measuring disparity: as a ratio or as an absolute differential. Both approaches are discussed below in turn.

A ratio measure proposed by Sherman and Poirier (2007) in a discussion of sub-national differences of the pupil-teacher ratio, is the *range ratio*. It is calculated as: *highest sub-national score divided by the lowest*.

An absolute differential along the same lines is an indicator one could call the *percent point disparity*, calculated as *highest sub-national score minus the lowest.*

It turns out that both measures of learning disparity are related to the national average score, which is an indicator of the difficulty of achieving the learning measure relative to average national student ability. This fact helps in the selection of the "best" learning measure for disparity.

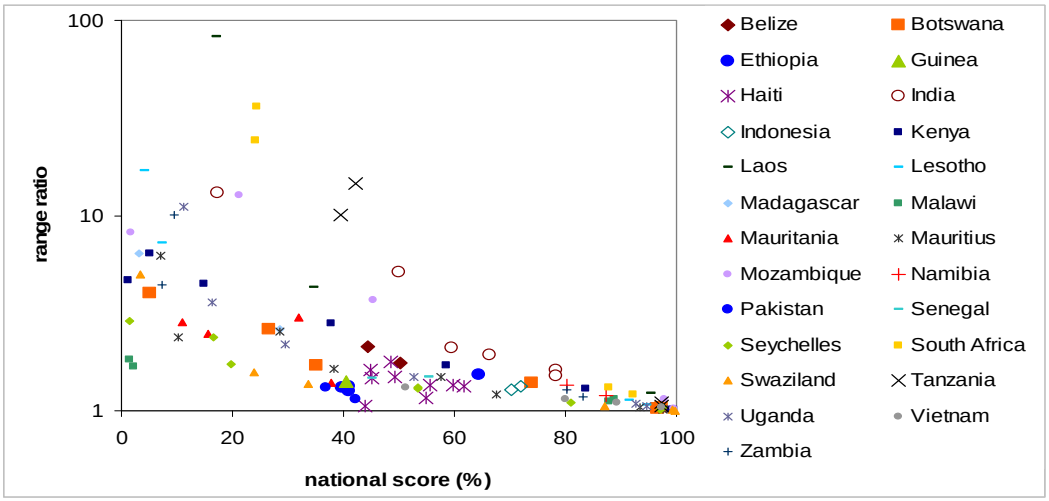
Range ratio

Figure 2 shows the *range ratio* for the learning measures in the 25 countries cross-tabulated with the national average scores. The figure shows that there is a general relationship:

- *The lower the national score, the higher the range ratio.*

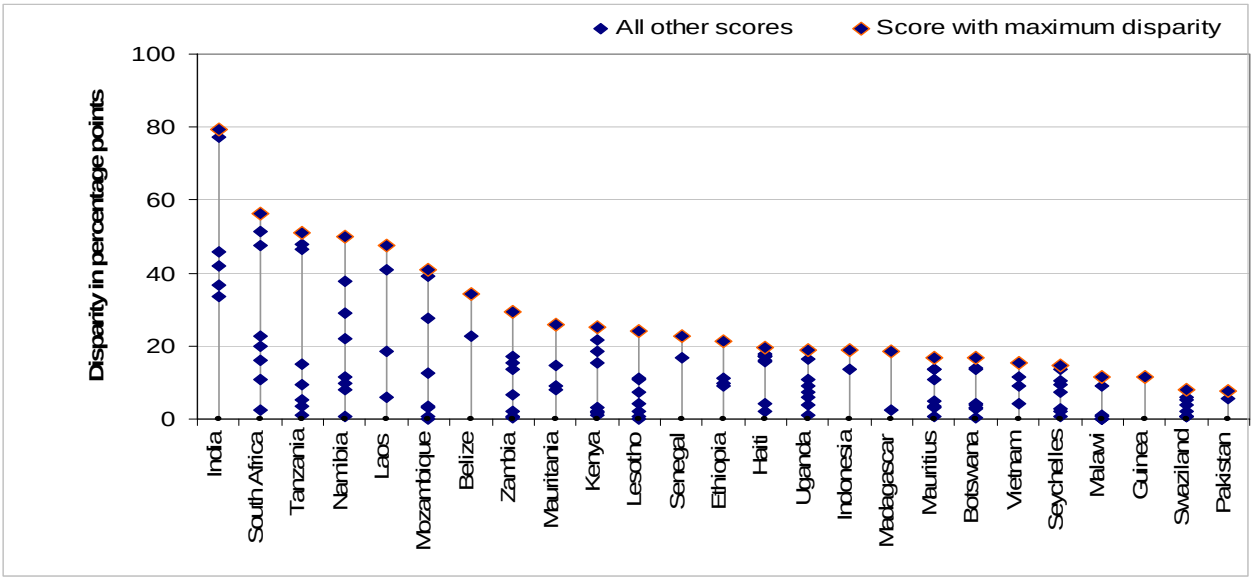
High range ratios for the low national scores can be very sensitive to *low* scores in the denominator (the poorest performing region). For example, in Botswana, in the lowest performing region less than 1% of the students reach level 8 in language and the range ratio is about 10. If the lowest score were just half a percentage point lower (a very small difference), the range ratio would double, to 20.

Figure 2. Range ratio (ratio of highest sub-national score to lowest) for different measures of learning in 25 countries, cross-tabulated with the national scores (scores scaled to 0-100). Y-axis shown with logarithmic scale.



Aside from the sensitivity, the range ratios don't provide enough guidance for the selection of the "best" measure to represent learning disparity. Should the lowest score be selected? But then a country's disparity is biased by how difficult the lowest score was to achieve – in countries that report more difficult scores, disparity measured by the range ratio will tend to be considerably higher – hardly an internationally comparable determinant. The same issue applies to the highest score. Possibly, one could select a mid-range national score, but the range of national scores that one could compare would have to be relatively small, to avoid bias again, and for any given narrow range of national scores, only a few countries would have information.

Figure 3. Disparity as percentage point difference between the maximum and minimum scores for different measures of learning, by country, for 25 countries.



Percent point disparity

Figure 3 shows percent point disparity - the percentage point difference between the maximum and the minimum score for each of the different scores for each country - arranged in order of the highest percent point disparity. The graph again shows that there is a range of values for percent point disparity within and across countries.

The country with the highest percent point disparities is India, where the two scores of English language reading at grades 1-2 and 3-5 vary enormously from one state to another - close to 80 percent point differences, with the highest states scoring almost 100%. But even for other learning measures - reading in own language and mathematics – the differentials in India are large compared to most of the other countries.

Other countries with relatively high percent point disparities for at least some of the learning measures are (in the order shown in the figure): South Africa, Tanzania, Namibia, Laos, Mozambique, and Belize. Countries with relatively low differentials are: Indonesia, Madagascar, Mauritius, Botswana, Vietnam, Seychelles, Malawi, Guinea, Swaziland and Pakistan (the maximum differentials are all <20 percentage points).
The question remains whether selection criteria could be developed for the selecting a measure that best represents learning disparity.

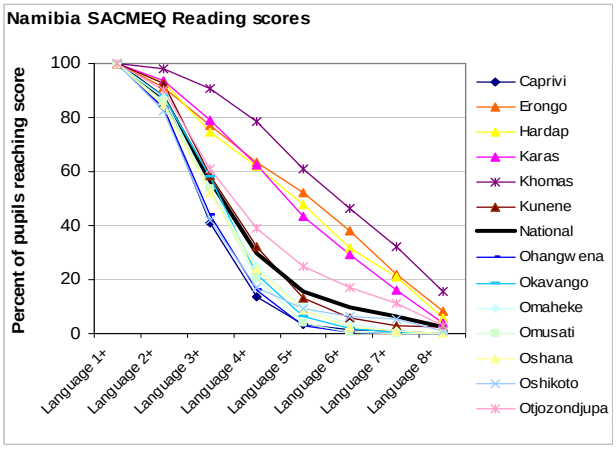
Again, there is a correlation between the percent point disparity and the average national performance of students. This correlation is illustrated in the SACMEQ assessments. Test scores are reported for achievements from level 1 to level 8 and these provide more insight into the relationship between the difficulty of the learning measure and the extent of sub-national disparity observed Figure 4 shows two of the country graphs from Figure 3 above, namely the SACMEQ results from Namibia, with the highest disparity, and from Uganda, with relatively low disparity. In addition, the figure includes a graph showing the percentage point differences between the maximum and minimum score for each learning level. In both countries (in fact, in all the 13 countries with SACMEQ assessments) almost 100% of pupils in all

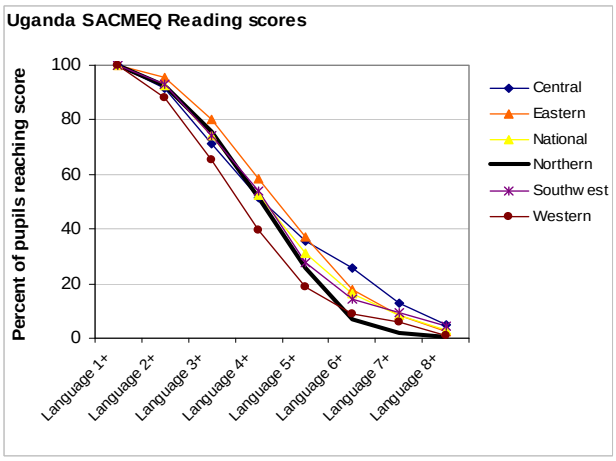
regions reach level 1 and, at the other extreme, almost no pupils reach level 8. The figures show:

- At the upper and lower extremes of student capability there is very little sub-national disparity measured by the percent point disparity in scores.
- The greatest levels of difference are found in the middle ranges of this test.

The reader can confirm that the same pattern holds for all of the countries with SACMEQ results.

Figure 4. SACMEQ reading scores for eight levels of achievement in Namibia and Uganda.





Percentage point differences maximum-minimum score by level

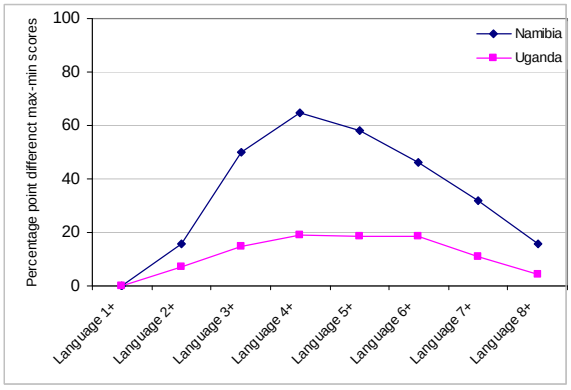


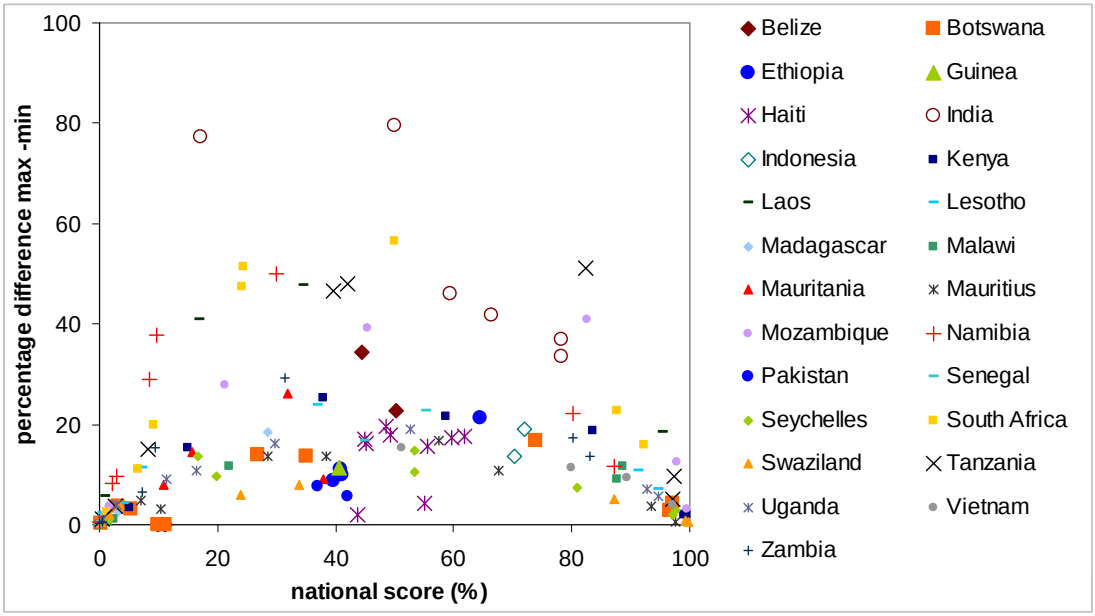
Figure 5 shows the percentage point disparity cross tabulated with the national scores for all the learning measures in the 25 countries. It is a bit more difficult to see these relationships when all the scores in the study are collected but a general picture remains. The two general observations from the SACMEQ studies remain:

- *At very low and very high national scores, the percentage point difference converges towards zero.*
- *The largest percentage point differences are found in the mid range national score (15-85).*

In addition:

- *Even for scores between 15-85 percent point disparity can vary, but there does not appear to be a bias one way or another – the scores look randomly distributed.*

Figure 5. Percentage point differences between the highest and the lowest sub-national learning score in 25 countries, cross-tabulated with the national learning score.



SELECTION OF A "BEST" MEASURE OF LEARNING DISPARITY

These two relationships provide very simple guidance for the selection of a "best" measure of learning disparity from a collection of multiple measures:

1) Learning measures with an extremely low (<15) or high (>85) national average score will underestimate (probably: strongly underestimate) the extent of learning disparity in the country. These scores should not be used to measure disparity. If a country has only scores with this range of national averages, it should be excluded from the comparative study.
2) From learning measures with a national score between 15 and 85, select the one with the highest percent point disparity.

Figure 6 shows the percent point disparity measure selected based on the above criteria in the 25 countries and Table 3 lists the learning measures in the figure. The figure also shows the national average scores for the measures with the highest sub-national disparity.

There are six *high-disparity countries*, where the maximum percent point disparity exceeds 40 percentage points: India, South Africa, Tanzania, Namibia, Laos, and Mozambique. There are 10 *low-disparity countries*, where the selected percent point disparity is below 20 percentage points: Haiti, Uganda, Indonesia, Madagascar, Mauritius, Botswana, Seychelles, Guinea, Swaziland, and Pakistan. In the middle are 9 *mid-disparity countries*: Belize, Zambia, Vietnam, Mauritania, Kenya, Lesotho, Malawi, Senegal, and Ethiopia.

Figure 6. Comparison of the highest measured sub-national disparity in learning scores in 25 countries, shown with the national average score of the measure with the highest sub-national disparity.

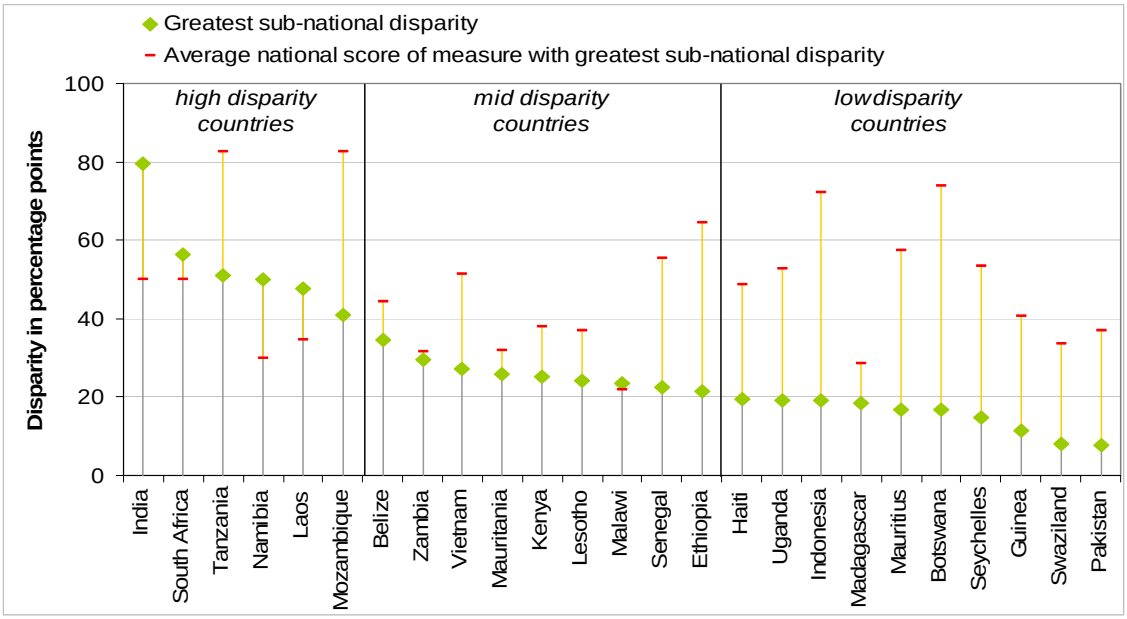


Table 3. List of learning measures shown in Figure 6.

Country	Learning measure with highest disparity	Country	Learning measure with highest disparity
Belize	% reached satisfactory level - English	Mauritania	% of program curriculum acquired by an average student - Arabic
Botswana	% reached level 4+ - language	Mauritius	% reached level 4+ - mathematics
South Africa	% reached level 4+ - language	Mozambique	% reached level 4+ - language
Ethiopia	% of correct answers - reading in English	Namibia	% reached level 4+ - language
Guinea	% of correct answers - reading in French	Pakistan	mean score - Urdu
Haiti	% of correct answers - French	Senegal	% of pupils who passed exam
India	% can read letters or more in English	Seychelles	% reached level 4+ - mathematics
Indonesia	Mean score - language	Swaziland	% reached level 4+ - mathematics
Kenya	% reached level 6 or higher - reading in the language of learning	Tanzania	% reached level 4+ - language
Laos	% reached functional level or higher - mathematics	Uganda	% reached level 4+ - mathematics
Lesotho	% reached level 4+ - language	Vietnam	% reached independent level - reading in Vietnamese
Madagascar	% answered more than 50% correctly	Zambia	% reached level 4+ - language
Malawi	% reached level 4+ - language		

The error hypothesis – likelihood disparity is under-reported

It is possible that the learning disparities shown in Figure 6 are still not representative of learning disparities in the country. Assessments and exams measure only a portion of learning, and beyond that, only a small selection of the results is reported. It is possible that there is unreported disparity. For example, in Madagascar, there is low learning disparity in mathematics, but there may be a high disparity in language not covered in the assessment. It is also likely that a higher level of disaggregation – more regions – would lead to higher disparity. How likely is it that there is such higher, unrecorded disparity in any of the 25 countries?

One way to guesstimate the likelihood of such higher, unreported disparity is to compare the learning disparities for all the learning measures with national scores between 15 and 85. Table 4 shows the highest and lowest percent point disparity in the 15 high- and mid-disparity countries. The countries are arranged in the same order as Figure 6.

Table 4. Range of different percent point disparity measures in high- and mid-disparity countries. Only percent point disparity for learning measures with a national average between 15 and 85 is shown.

High disparity countries (highest measured disparity >40 points)		Mid-disparity countries (highest measured disparity 20-40 points)	
Country	**Percent point disparity range**	**Country**	**Percent point disparity range**
India	34 - 80	Belize	23 - 34
South Africa	48 - 56	Zambia	14 - 29
Tanzania	47 - 51	Vietnam	20 - 27
Namibia	22 - 50	Mauritania	9 - 26
Laos	41 - 48	Kenya	19 - 25
Mozambique	28 - 41	Lesotho	24 - 24
		Malawi	23 - 23
		Senegal	17 - 23
		Ethiopia	9 - 21

The table shows that none of the countries with the highest disparities have *any* disparity measure below 20 percentage points. This suggests that:

- It is highly unlikely that the low-disparity countries have any unrecorded, high disparity that is as high as in the high-disparity countries.

Three of the six countries with the highest disparity have at least one disparity measure in the mid-range (20-40 percentage points), but in 2 of these 3, the highest recorded percent point disparity is 50 or below. This suggests that:

- There is a good chance that a mid-disparity country has higher unrecorded disparity, but it is unlikely that the unrecorded disparity exceeds 50 percent points.

Of the 9 mid-disparity countries, there are five which also have some percent point disparity below 20 percentage points but the highest recorded percent point disparities in these five are all below 30. This suggests that:

- There is a good chance that one of the 10 low-disparity countries actually has some disparity up to 30 percentage points.

In summary, based on the limited number of observations in this study, there is a roughly 50% chance that countries recorded as having low learning disparity (< 20 points across the country) actually have some unrecorded disparity up to 30 percentage points; and a roughly similar chance that a country recorded as having mid-level learning disparity actually

has unrecorded disparity up to 50 percentage points (and a fairly small likelihood to have an even higher disparity).

Patterns of sub-national learning disparity within countries

Thus far, the disparities have been discussed with summary measures – as the percentage point difference between the maximum and the minimum score, and the range ratio. However, it is also of some interest to investigate the pattern of sub-national disparity within countries: are learning differentials evenly spaced out, or are there one or two outliers with exceptionally high or low scores? The spacing patterns can give an indication of whether there are a few worst performing areas that require focused attention, or a few best-practice areas to be emulated.

Figure 7 shows all of the sub-national scores for each country, for the "best" learning measure disparity arranged in order of the highest sub-national score.

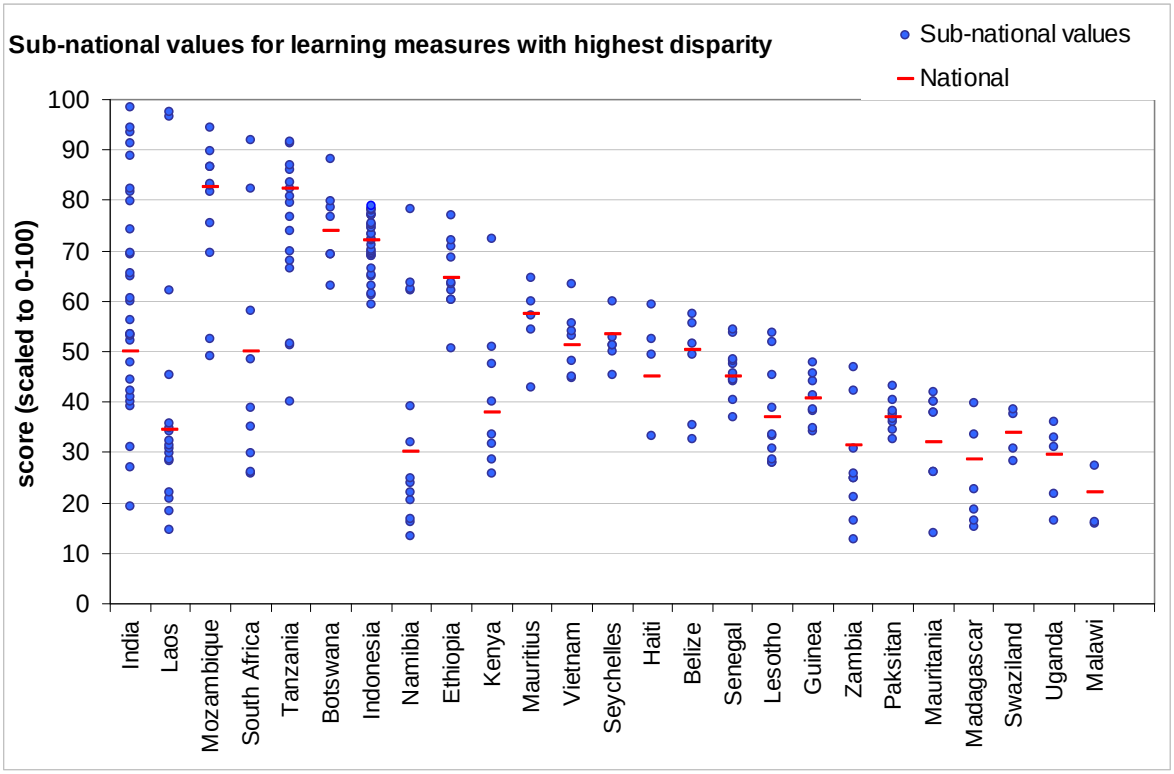
A few observations from the figure:

- In India, the country with the highest disparity, there is a relatively *even spread* of scores throughout the country. Other countries with an even spread of scores include Mozambique, Ethiopia, Vietnam, Haiti, Senegal, Lesotho, Guinea, Pakistan, Madagascar, Swaziland, and Uganda.
- In contrast, in Laos, two regions stand out with particularly high scores, (Borimhanxay and Xekong), while most of the regions are concentrated around a fairly narrow range of low scores. Other countries with a concentration of similar learning levels and *one or two outlying regions with much higher scores* are: South Africa (Western Cape); Namibia (Khomas, and to a lesser extent Erongo and Hardap); Kenya (Nairobi); Zambia (Copperbelt and Lusaka). Countries with a concentration of similar scores and *one or two worse-performing outliers* are: Mozambique (Niassa and Cabo Delgado in the remote north); Tanzania (both Zanzibar regions); Mauritius (Island of Rodrigues); Haiti (Centre); Belize (Stann Creek and Toledo); Mauritania (Guidimaka, and to a lesser extent the capital Nouakchott).
- In many countries the best performing regions are more urban. In Zimbabwe, between 64% and 74% of students in most regions attained level 4 in reading while in the capital of the country, Harare, 88% of students reached level 4 or higher. In Botswana, 88% of students attained level 4 in the capital Gaborone while between 69 and 80% of students in the rest of the regions in the country reached the same level.

SUB-NATIONAL DISPARITY FOR OTHER INDICATORS OF SCHOOL QUALITY AND QUANTITY

Sub-national inequality in learning scores implies that some children are in better learning environments than others – the learning environment taken here to encompass the school, the home, as well as the community. It is known from many other studies that many aspects of the learning environment also vary sub-nationally – household circumstances, the ethnic composition of the community, average wealth, how many children enter school, the survival rates in school, school resources available, and so forth. The relationship between these other aspects and learning is by no means linear, nor is it likely to be the same in all countries. For example, in one country, a highly selective school system – with low entry rates and/or low survival – may result in high learning measures for the lucky few; in another, firm national commitment to school may lead to near 100% enrolment and survival, as well as high learning scores.

Figure 7. Sub-national differences in learning scores for the measure with the highest disparities, in 25 developing countries.



For this study, four other measures of learning quality and quantity have been selected to correlate to learning scores. The four measures are: net attendance, total school entry, survival to grade 5, and the pupil-teacher ratio (PTR)[8]. The PTR is selected as a proxy for school resources. School resources – hours of school, books, teachers, and other factors – have been found to play an important role in learning. Many of these indicators are not available at the sub-national level. Among the resource indicators, PTR is the only one that is available for more than a handful of countries.

Earlier studies have found considerable sub-national differences. Sherman and Poirier (2007) examine sub-national disparity in net enrolment and PTR in an earlier paper; Wils et al. (2005a and 200b) examine sub-national differences in school entry and attendance rates.

[8] The indicators are defined as follows:
- *Primary net attendance rate* - defined as the percentage of children of primary school age who are attending school.
- *School entry rate* - calculated as the percent of 10 year old children who have ever attended more than pre-school education. This school entry rate is an alternative measure to net or gross intake rates (children in grade 1 for the first time/children of school entry age). The school entry rate takes into account the over and underage school entry prevalent in many developing countries. This indicator has been used to assess overall school access by UNICEF and UIS (2005).
- *School survival to grade 5* - calculated using the reconstructed cohort method as provided by UIS. It is based on promotion, repetition, and dropout rates up to grade 5. It is primarily determined by dropout rates; secondarily by repetition. Promotion, repetition, and dropout can be calculated from DHS data on attendance by grade in the present and the previous year. The promotion rate for grade *n* is the percent of children in grade *n+1* in the present year who were in school in grade *n* in the previous year. The repetition rate is the percent of children in grade *n* in the present year who were also in grade *n* in the previous year. The dropout rate for grade *n* is children who were in grade *n* in the previous year, but are not attending school in the present year.
- *Pupil teacher ratio* – number of pupils in primary divided by the number of teachers in primary.

Data for attendance, entry, survival and pupil teacher ratios

The sub-national measures for school attendance, school entry, and survival are calculated from Demographic Household Survey (DHS) data. Pupil-teacher ratios are obtained from national administrative websites and from Poirier and Sherman (2007)[9]. Table 5 shows the countries for which the indicators are available.

There are 20 (of the 25) countries for which sub-national net attendance rates are available; 16 with sub-national entry rates; 14 with sub-national survival rates; and 15 with sub-national pupil-teacher ratios.

The values for test scores, attendance, entry, survival, and pupil-teacher ratios come from different sources which sometimes use different sub-national units. In most of the countries, the sub-national regions match, usually along province or state borders. For the data from Malawi, Tanzania, Vietnam, and Uganda, it was necessary to combine some regional data in order to make comparisons possible. Note that the combined regions apply only to this section, not the previous section on learning disparity. Combining the regions removes some of the granularity and therefore some of the disparity.

In the case of *Malawi*, the student assessment data provided by SACMEQ are available for six different sub-national units – North, Central West, Central East, South West, South East, and Shire Highlands. School entry and survival rates are based on DHS data, which provides data for only three main regions in the country: North, Central, and South. The pupil-teacher ratio comes from the Ministry of Education in Malawi at the province level (28 provinces in the country). The regions used by SACMEQ and the MOE have been combined to correspond with the larger sub-national units used in the household survey, and the score for these new, larger regions is the simple average of the smaller sub-regions.

In the case of *Tanzania,* the SACMEQ data are divided into 11 mainland regions, and five from Zanzibar. The DHS survey includes 21 mainland regions and five from Zanzibar; the pupil teacher ratio data has only 21 mainland regions. The 21 regions were combined to correspond with the larger units used by SACMEQ: Central, Eastern, Kagera, Kilimanjaro, Mwanza, Northeast, Northern, Southern, Southern Highlands, Southeast, and Western.

In *Uganda* the SACMEQ data are divided into five regions; the DHS data for entry and survival rate into nine regions. The nine regions can be subsumed into the five SACMEQ regions: Central, Eastern, Northern, South Western, and Western.

For the *Vietnam* data, the learning assessment and the pupil-teacher ratio data are divided into eight regions (including three northern regions); the DHS data for entry and attendance into 7 (including two northern regions). Two of the northern regions for the learning assessment and pupil-teacher ratios are combined.

In several countries, namely India, Indonesia, Pakistan, and Tanzania, indicators were not available for all regions. For example, student assessments might have been conducted only in certain parts of a country while pupil-teacher ratio is available for all regions. In those cases, a comparison between indicators could be made only for those regions where data were available.

[9] The PTR ratios are not available in the report, but were graciously shared by the authors.

Table 5. List of indicators available for 25 countries at the sub-national level.

	Test Scores	NAR	Entry	Survival	PUPIL-TEACHER RATIO
Belize	X	X			
Botswana	X				X
Ethiopia	X	X	X	X	X
Guinea	X	X	X	X	X
Haiti	X	X	X	X	
India	X	X	X	X	X
Indonesia	X	X	X		X
Kenya	X	X	X	X	X
Laos	X				
Lesotho	X	X	X	X	
Madagascar	X	X	X	X	X
Malawi	X	X	X	X	X
Mauritania	X				X
Mauritius	X				
Mozambique	X	X	X	X	X
Namibia	X	X	X	X	
Pakistan	X	X			X
Senegal	X	X	X	X	X
Seychelles	X				
South Africa	X	X			X
Swaziland	X	X			
Tanzania	X	X	X	X	X
Uganda	X	X	X	X	
Vietnam	X	X	X		X
Zambia	X	X	X	X	
Total	**25**	**20**	**16**	**14**	**15**

Sub-national values for attendance, entry, survival, and pupil teacher ratio

Figure 8 shows the sub-national values for attendance, entry, survival, and pupil teacher ratios. The figure confirms earlier findings of large sub-national disparity in these indicators.

Countries with the largest disparity in NAR are: Senegal (mid-disparity in learning scores) and Mozambique (high-disparity in learning scores), followed by India (high-disparity), Kenya (mid-disparity), and Namibia (high-disparity).

Larger regional disparities in primary net attendance rates can be observed in the countries where national attendance rates are lower than 80%, with differences between regions being particularly noticeable in Ethiopia, Senegal, and Mozambique. In Ethiopia, net attendance rates at the primary level range from 76% in the capital Addis Ababa to only 13% in the Somali region. In Senegal and Mozambique, regions with the highest levels of primary net attendance are also capital cities - Dakar and Maputo Cidade, respectively, where primary net attendance rates exceed 90%. The lowest attendance rates are in primarily rural areas – Niassa (42%) in nothern Mozambique; Diourbel (28%) in Senegal.

Primary net attendance rates tend to be highly correlated with entry rates and, as such, the largest regional disparities of entry rates can be observed in the same countries where net attendance rates are also disparate: Ethiopia, Senegal, and Mozambique. In Kenya, in most

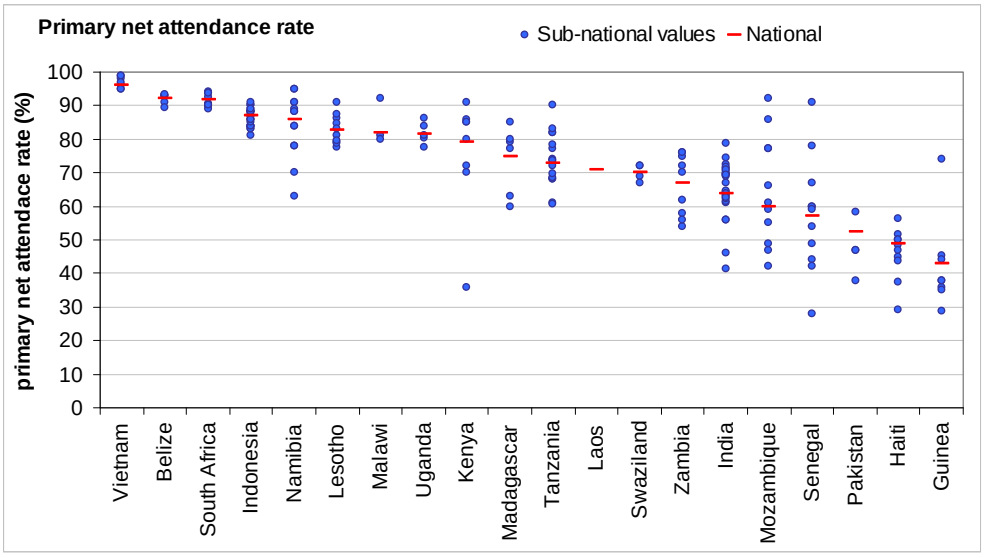
regions the percentage of children entering school reaches between 82-99%, but in one region, North Eastern, it is only 32%. The same region has the lowest primary attendance rate in the country (36%).

The sub-national differentials in survival to grade 5 are smaller than for the other three indicators. The small differentials are somewhat surprising, given the high sub-national differentials of the other indicators. The high survival values are in contrast to lower UIS values for survival for some countries. Sorting this out is beyond the scope of the present study, but the low disparity and the contrast to UIS data is intriguing.

In all of the countries included in the study, the differences between the regions with the highest and the lowest survival rates are less than 25 percentage points even in regions where entry rates are very low. In the North Eastern region of Kenya mentioned above, most children (96%) reach grade 5 and in the Somali region of Ethiopia, mentioned above, the survival rate of the few who do enter school is also high (89%).

Pupil teacher ratio varies among countries and regions quite significantly from 14:1 in Jammu & Kashmir in India to 95:1 in Maputo Cidade in Mozambique. In India and Ethiopia regional differences in pupil teacher ratios are the highest. In India, the pupil teacher ratio ranges from 14:1 in Jammu & Kashmir to 62:1 Bihar, while in Ethiopia it varies between 27:1 in Harari to 70:1 in Amhara. Botswana has the smallest regional disparities in the pupil teacher ratio - in all seven regions, the average number of students per teacher is approximately 25:1. Sub-national disparities in the pupil teacher ratios are highest in Mozambique (high-disparity in learning), Ethiopia (mid-disparity in learning), India (high-disparity in learning), and Pakistan (low-disparity in learning).

Figure 8. Sub-national disparity for net attendance, school entry, survival to grade 5, and the pupil teacher ratio in 25 countries, in order of the average national score.



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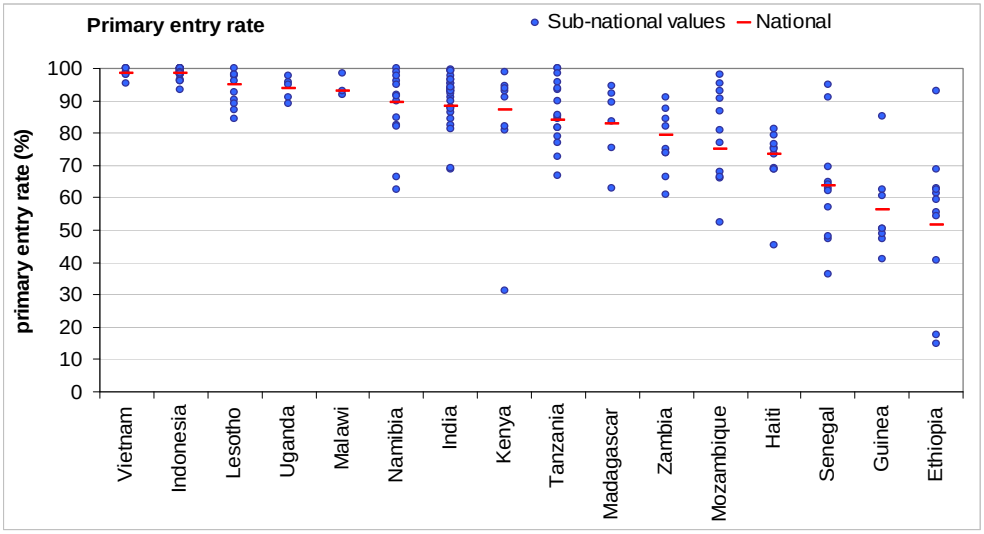
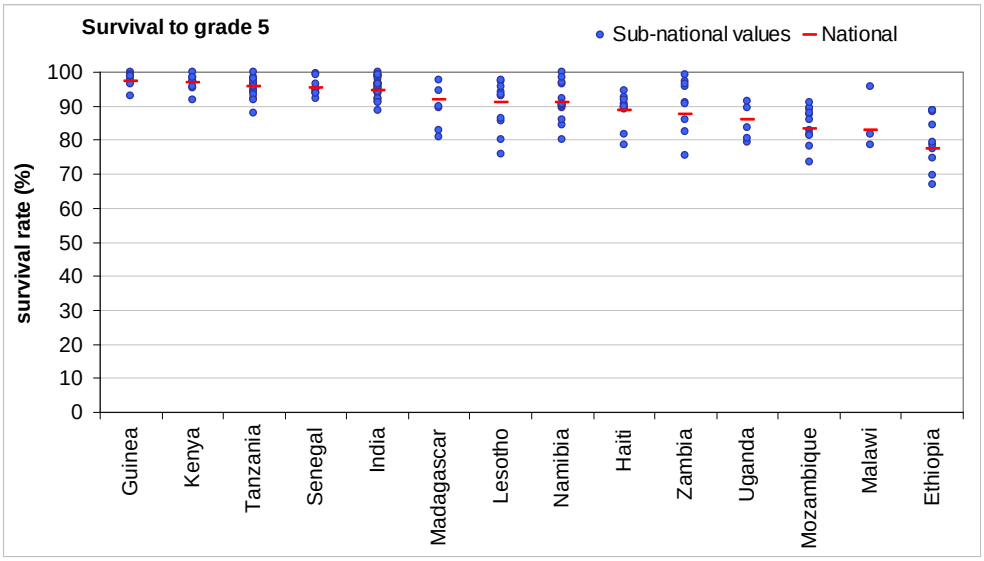
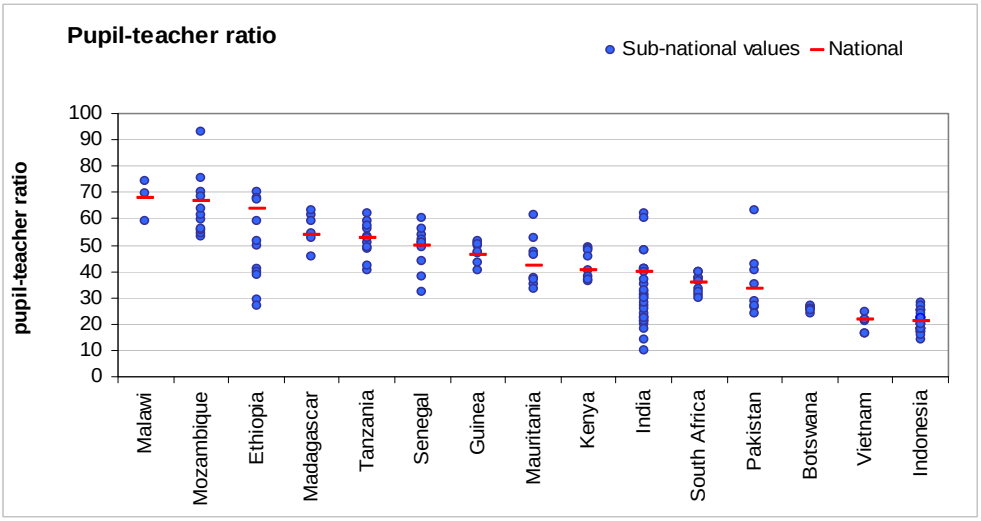






Sub-national correlations of learning and selected indicators of school participation, efficiency, and quality

How much, if at all, are sub-national values for learning scores correlated with these other measures of school quality and quantity? If there are high correlations, then children in some sub-national regions suffer from multiple disadvantages in the school system, whereas in other regions, children have multiple advantages. A high correlation also suggests that one can use these other measures as predictors for learning (in the absence of actual learning measures). If there are no or little correlations, or if the correlations are inconsistent across countries, then one cannot substitute one school quality or learning measure as a proxy for another.

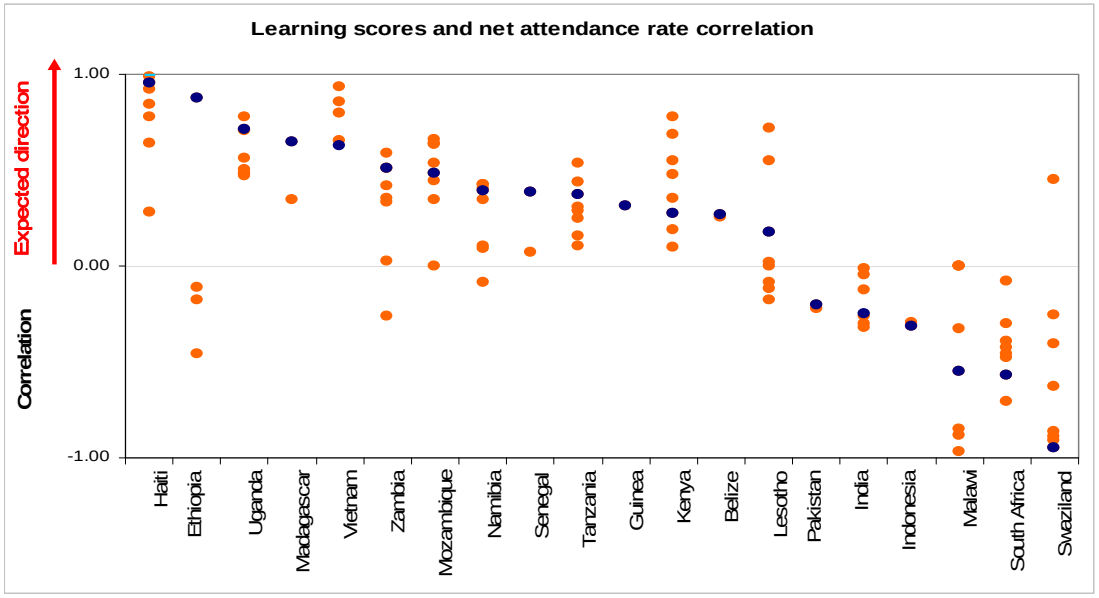
As a first test of possible correlations between learning measures scores and these other indicators, it seems prudent to run the correlations against all of the learning measures, rather than against the "best" measure only.

Figure 9 shows a summary of the results in four panels. The panels show the correlations ratios between learning and attendance (top), entry (second), survival (third) and the pupil-teacher ratios (fourth). A priori, positive correlations are expected between learning scores and the first three indicators; and negative correlations with the fourth.

The graphs show that within countries,

- There is generally a wide range of correlations between different learning measures and each of the four other measures.
- The strongest correlations in the expected direction are between learning scores and net attendance and entry. Correlations are in the expected direction in 14 out of 20 countries for learning and attendance and in 11 out of 16 countries for learning and entry.
- The weakest correlation and most often in the unexpected direction are between learning and survival and the pupil teacher ratio. Correlations are in the expected direction in only 8 out of 14 countries for learning and survival and only 7 of 12 countries for learning and the pupil teacher ratio. These indicators appear to be the *weakest* proxies for learning (and quality), although they are more often used as proxies than attendance and entry.

Figure 9. Correlation coefficients of all learning scores and four measures of school quality and quantity – net attendance (top), entry rate (second), survival to grade 5 (third), and the primary pupil-teacher ratio (bottom). The learning score with the highest percent point disparity shown in blue.



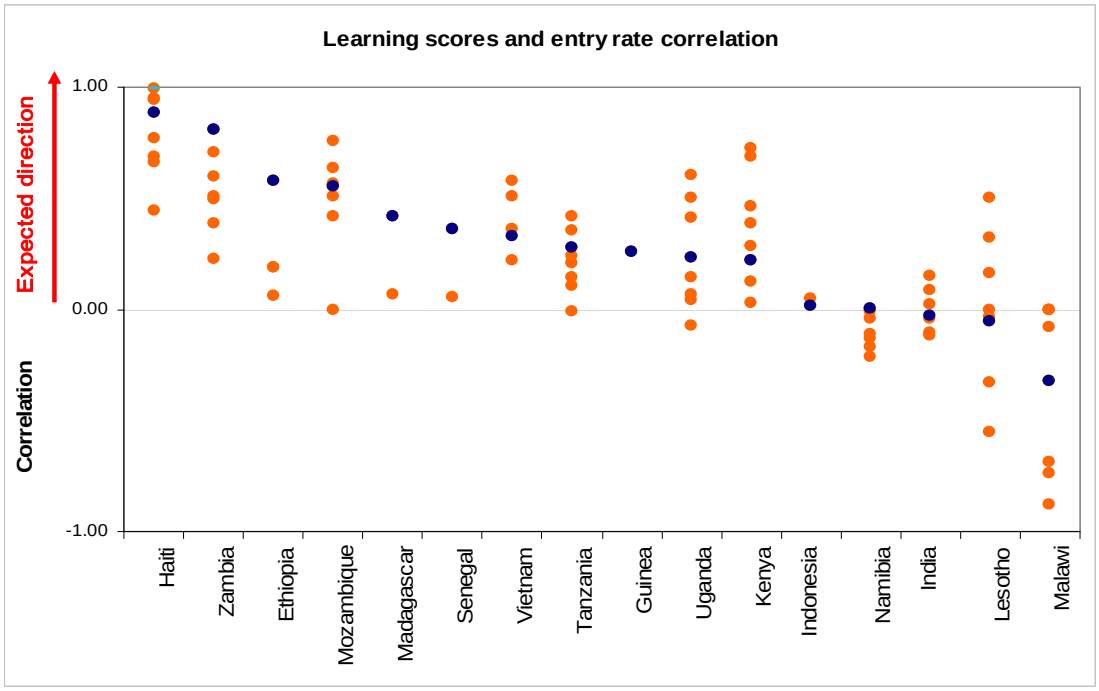
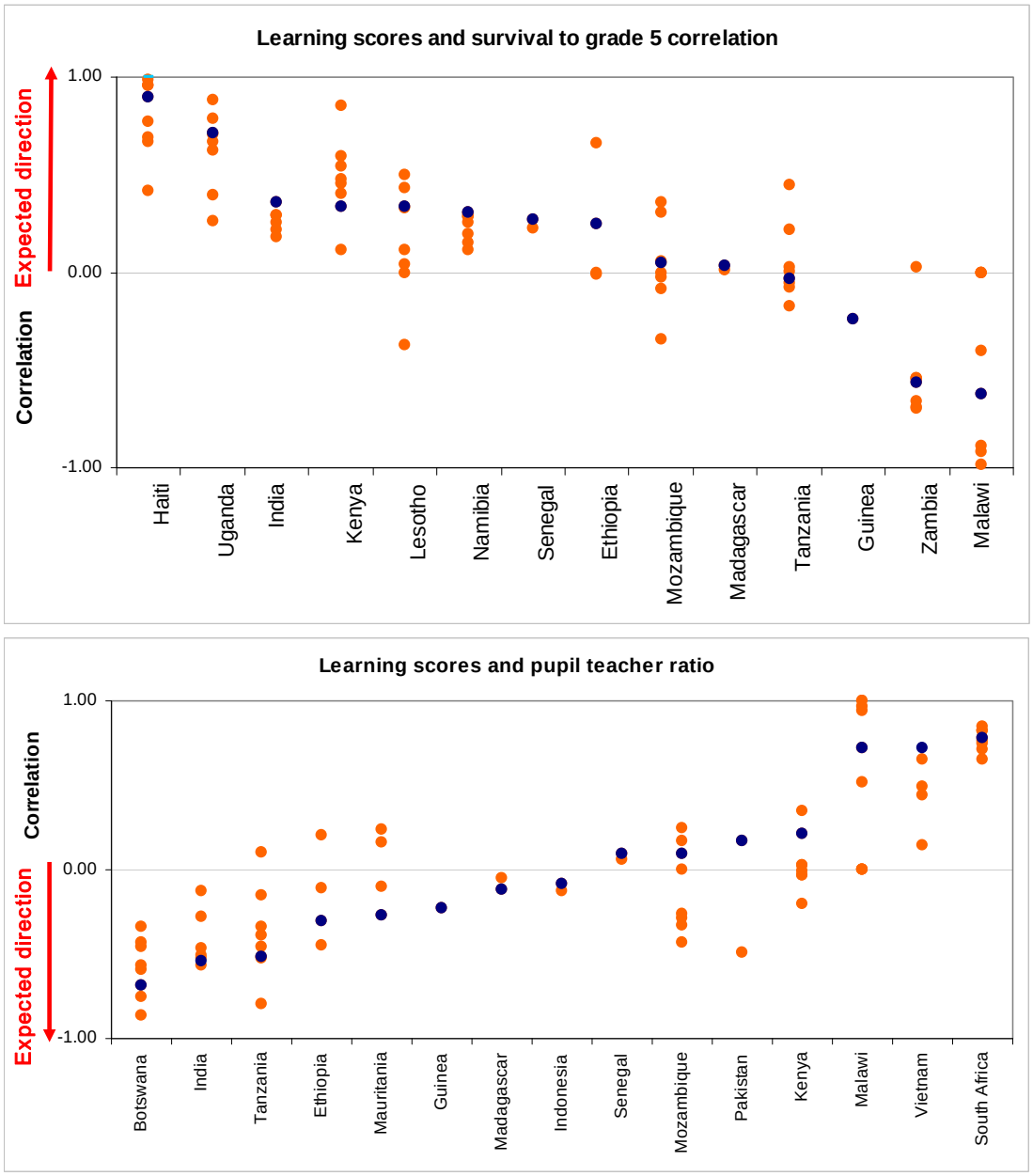


Figure 9 continued



CONCLUSIONS

Assessment tests or exams are important tools for policymakers as they help to assess the quality of education that children receive. At the sub-national level, they provide valuable information on learning disparities across regions, identifying areas where children lag behind the rest of the country and need particular attention in the effort to increase the quality of schooling.

Many countries report multiple learning scores. This study shows that *disparity measures can be affected by the difficulty of the test*, so criteria were developed to select the "best" representative measure of learning disparity. These "best" measures show that in some countries there is a high degree of learning disparity, notably in India, South Africa, Tanzania, Namibia, Laos, and Mozambique. Other countries show much smaller learning disparities, notably, Pakistan, Swaziland, Malawi, Seychelles, Vietnam, and Botswana. There is not an obvious predictor of sub-national disparity. There may be some correspondence to the number of sub-national divisions included in the reports (India has many regions). There may also be some relation to whether the education system is directed centrally or governed by sub-national regions (India).

In 17 of the 25 countries there is a moderate to high correlation between various learning scores, suggesting that in general, certain regions consistently receive low or high scores on all available tests. In many countries included in the studies, capital cities significantly outperform other regions.

In about half of the 25 countries, there are one or two outlying regions with very low or very high scores, while learning scores in the rest of the country are more similar – these regions could be targeted for emulation or for special intervention. In the other half of countries, the spread of different learning scores is relatively even.

The study did not find a strong and consistent relationship between learning scores and other measures of school quantity and quality, namely entry rate, primary net attendance rate, survival rate, and the pupil teacher ratio. The best correlations were found between learning and net attendance and school entry. The weakest correlations were found between sub-national scores of learning with survival rates and the pupil-teacher ratio.

The low correlations between learning scores and other indicators of school quality and quantity imply that none of them is an appropriate proxy for student learning – although simple attendance and entry may be better proxies than survival and pupil-teacher ratios. At the same time, the sub-national disparities observed in many countries highlight the necessity to target the most disadvantaged areas where quality of schooling is particularly poor. As the quality of schooling that children receive remains a central theme of the Education for All discourse, the need to monitor learning, through either assessment tests or exams, increases significantly.

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DEFINITIONS

Assessment. Test measuring students' learning outcomes that can be used for monitoring (in the classroom or on a larger scale), with no direct consequences for students.

Exam. Test measuring students' learning outcomes that can be used as portals to entry or completion of a particular school or

Pupil-teacher ratio. The average number of pupils (students) per teacher at a specific level of education in a given school-year, based on headcounts of both pupils and teachers.

School entry rate. The percent of 10 year old children who have ever attended school beyond pre-primary education. This school

entry rate is an alternative measure to net or gross intake rates (children in grade 1 for the first time/children of school entry age). The school entry rate takes into account the overage and underage school entry prevalent in many developing countries.

School survival to grade 5. Calculated using the reconstructed cohort method based on promotion, repetition, and dropout rates up to grade 5. It is primarily determined by dropout rates; secondarily by repetition. Promotion, repetition and dropout can be calculated from DHS data on attendance by grade in the present and the previous year. The promotion rate for grade n is the percent of children in grade n+1 in the present year, who were in school in grade n in the previous year. The repetition rate is the percent of children in grade n in the present year, which was also in grade n in the previous year. The dropout rate for grade n is children who were in grade n in the previous year, but are not attending school in the present year.

Primary school net attendance rate (NAR). The total number of children who said they were attending primary school in the present year and who are of primary school age, expressed as a percentage of the primary school age population.

Secondary net attendance rate (NAR). The total number of children of the official (ISCED) secondary school age who said they were attending secondary school in the present year, expressed as a percentage of the secondary school age population.

ABBREVIATIONS

DHS	Demographic and Health Surveys
EFA	Education for All
EPDC	Education Policy and Data Center
GMR	Global Monitoring Report
MOE	Ministry of Education
NAR	Net Attendance Rate
PASEC	Programme d'Analyse des Systemes Educatifs dela CONFEMEN
PIRLS	Progress in International Reading and Literacy Study
PISA	Programme for International Student Assessment
PTR	Pupil Teacher Ratio
SACMEQ	South and Eastern Africa Consortium for Monitoring Educational Quality
TIMSS	Trends in International Mathematics and Science Study
UIS	UNESCO Institute of Statistics
UNESCO	United Nations Education, Science, and Culture Organization
USAID	United States Agency for International Development

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ANNEX 1. CORRELATIONS BETWEEN LEARNING MEASURES WITHIN COUNTRIES.

The correlation between the different measures of learning across the sub-national regions varies from country to country. One might expect that sub-national regions perform either well, average, or poorly in all learning measures, but this is not always the case. Table 6 shows which learning measures are highly correlated across sub-national regions within countries, and which ones are not.

There are high levels of correlation for all of the different learning measures in 17 of the 25 countries with multiple scores:

- Mid-range learning measures for the SACMEQ tests – levels 4 and higher, and 6 and higher – for both mathematics and language are best correlated in 13 of the 14 countries. Learning levels at the extremes of pupil capability, with either almost all pupils scoring very well (>90) or very low (<10), are not well correlated with the other learning measures.
- Indonesia's grade 9 examination – scores of language and "all subjects" correlate well.
- Laos's grade 5 assessment – moderate to high correlations (c=.67-.88) for two levels of language and mathematics scores.
- Madagascar's grade 8 assessment – high correlations for scores of two levels of mathematics scores.
- Mauritania's grade 5 assessment – high correlations of scores of Arabic, French and mathematics scores.
- Vietnam's grade 5 assessment – moderate to high correlations for both language and mathematics scores.

There are moderate or low levels of correlation for at least some of the learning measures in 7 of the 25 countries with multiple scores:

- SACMEQ scores in Seychelles – low to moderate correlations between all scores.
- Belize's exam at the end of lower secondary – almost no correlation between the two language and mathematic scores.
- Ethiopia's grade 4 and grade 8 assessments – low correlations for all scores (c =-.07-.57).
- Haiti's national assessments in grades 1, 3, and 5 – Creole language scores in grade 1 correlate highly with all other scores; but there are low correlations between mathematics and French and Creole language scores in grades 3 and 5.
- India's assessments in grade 1-5 – the lowest correlations are for reading scores in English with reading in own language (c=.31-.54), and with mathematics (c=.51=.69); and highest between reading scores in own language and mathematics (c=.78-.96).
- Pakistan's national grade 4 assessment – low correlations between Urdu and mathematics scores (c=.37).
- Senegal's examinations grade 6 and 10 – moderate correlation (c=-.53).

Table 6. Scores available for each country and correlations between scores across sub-national regions.

Country	Scores	Moderate-good correlation	Moderate-poor correlation
Belize	-% satisfactory English; -% satisfactory Math		Language and mathematics (c=.12)
Botswana SACMEQ II Grade 6	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	Language and mathematics, levels 4+, 6+ and 8+	Moderate correlation Level 2+ language and mathematics with higher learning levels.
Ethiopia National assessment	-% correct answers English, grade 4 and 8 -% correct answers Math, grade 4 and 8		Language and mathematics across grades 4 and 8 (c = .07-.57)
Guinea	-% correct answers French, grade 4	Only one score	
Haiti National assessment	-% correct answers Creole, grades 1, 3, and 5 -% correct answers French, grades 1, 3, and 5 % correct answers math, grades 1, 3, and 5	Creole score in grade 1 correlates highly with all other scores in other subjects and later grades.	All other scores low correlations (c = -.34-.79)
India ASER assessment	-% read own language, grades 1-2 and 3-5 - % read English, grades 1-2 and 3-5 - % can do math, grades 1-2 and 3-5	Reading own language and mathematics grades 1-2, Reading English in grades 1-2 and grade 3-5 Mathematics in grades 1-2 and grade 3-5	Lowest correlations can read own language and English, grade 1-2 and 3-5.
Indonesia Grade 12 examination	-mean score language -mean score all subjects	Very high correlation between language score and “all subjects” (c=.97).	
Kenya SACMEQ II Grade 6	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	Moderate to high correlations of levels 4+ and 6+ mathematics and language.	Low correlations language level 2+ and mathematics level 8 (extreme high and low) with other scores.
Laos National assessment	-% reached functional+, independent levels, Lao and mathematics, grade 5	Moderate to high correlations Lao both levels and mathematics functional level (c=.67-.88)	Invalid: numerous zero scores for mathematics independent level
Lesotho SACMEQ II Grade 6	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8		Moderate to high correlations for levels 2+ and 4+; low correlations for higher levels 6+ and 8.
Madagascar National assessment	-% correct answers, math, 50%+ and 75%+	High correlation 50%+ answers correct and 75%+ (c=.92)	
Malawi SACMEQ II Grade 6	-Language level 2+, 4+, 6+ -Mathematics level 2+, 4+		Moderate to high correlations (c=.66-.91) for all measures.
Mauritania National assessment	-% program acquired, Arabic, French, mathematics grade 5 -% program acquired mathematics grade 11	Moderate to high correlations between Arabic, French and mathematics in grade 5 and mathematics grade 11 (c=.67-.88)	

Table 6 continued.

Mauritius SACMEQ II Grade 6	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	Moderate to high correlations (c=.65-.96) for all measures except language level 2+.	
Mozambique SACMEQ II Grade 6	-Language level 2+, 4+, 6+ -Mathematics level 2+, 4+, 6+	Moderate to high correlations (c-.67-,.92) for all measures	Invalid: numerous zero scores for level 8
Namibia SACMEQ II Grade 6	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	Moderate to high correlations (c=.70-.99) for all scores except mathematics level 8.	Invalid: numerous zero scores for mathematics level 8
Pakistan National assessment	-mean score Urdu grade 4 -mean score mathematics grade 4		Moderate correlation mean score Urdu and mathematics (c=.37)
Senegal Final examinations	-% passing grade 6 -% passing grade 10		Moderate correlation % of pupils passing grade 6 and grade 10 (c=.53)
Seychelles SACMEQ II	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8		Low to moderate correlation for all measures (c=-.26-.85).
South Africa SACMEQ II	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	High correlations for all measures except mathematics 8.	Moderate correlations (c=.44-.87) of mathematics with other scores.
Swaziland SACMEQ II	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	Moderate to high correlations (c=.25-.99) for all measures except mathematics 8.	
Tanzania SACMEQ II	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8		Moderate correlations (c=.32-.94) for all levels except very low correlations for all scores with mathematics level 8.
Uganda SACMEQ II	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8	Moderate to high correlations (.42-.89) for all scores except language level 2+ and mathematics level 8.	
Vietnam National assessment	-% reached functional+, independent levels, Vietnamese and mathematics	High correlations language, functional+ and independent levels, and mathematics level independent level	Moderate correlations mathematics functional+ level and mathematics independent and language both levels (c=.060-.080)
Zambia SACMEQ II	-Language level 2+, 4+, 6+, 8 -Mathematics level 2+, 4+, 6+, 8		